

Payments and market infrastructures in the digital era

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Means of payment, together with financial market infrastructures (payment systems, clearing houses, financial instrument settlement systems and trade repositories) play a fundamental role in the economy. They facilitate the circulation of money and securities and enable the financial markets to operate smoothly and securely, thus helping to finance the economy.

These systems remain largely unfamiliar to the general public. Committees of experts regularly release reports on them. Yet books providing an overview of these areas for educational purposes are thin on the ground and rather old.

The payments and market infrastructures landscape has changed significantly over the last ten years. The 2007-2008 financial crisis prompted measures to tighten the regulatory framework and the proliferation of technological innovations is radically transforming the sector.

The regulatory framework for payments and market infrastructures was strengthened considerably, first by the adoption of the Principles for Financial Market Infrastructures (PFMI) and their transposition into the regulations of the main jurisdictions, then by the second Payment Services Directive (PSD2), which came into effect in Europe at the beginning of 2018.

Then came the fintechs, driving major developments in means of payment and payment services, with three key features: immediacy, with increasing demand for payment services to be available “anytime, anywhere”; dematerialisation, with payments being executed without having been explicitly initiated by the payer and the emergence of micro-payments in the Internet of Things; dissemination, through the proliferation of service providers.

These developments create a risk of fragmentation in the retail payment market, which would undermine the progress made in terms of harmonisation and integration, notably in Europe with the SEPA (Single Euro Payments Area) project.

Having been forced to sharpen their focus on strengthening the management of their financial risks, including by establishing recovery and resolution frameworks for central counterparties, financial market infrastructures now face the challenges of digital innovation: for instance, how can payment systems help to meet new demand for instant payment services available 24/7/365? What contribution might be made by “disruptive” technologies such as blockchain in terms of performance and security?

Against this backdrop, the authorities must ensure that innovations are rolled out within a properly secured framework so that their anticipated benefits are enjoyed by the whole economy.

This framework must be secured in a number of fundamental ways:

- *by developing a “neutral” approach to supervising technology and ensuring that regulations are commensurate with the size of the players concerned and the risks that they assume, in order to foster the emergence of new technologies and new players;*

- *by ensuring that the significant progress made in terms of harmonisation is not jeopardised by the development of these new technologies;*
- *through data protection, by adapting regulations to ensure that Big Tech companies – the giant digital services and data platforms based mainly in the United States and China – apply the same rules as banks and insurance companies if they engage in the same regulated activities, in accordance with the “same business, same rules” principle; and by monitoring the effects of Big Tech on market concentration;*
- *by preventing the development of monopolistic market infrastructures that could become “too big to fail”, especially as regards central counterparty activities;*
- *by strengthening the cyber resilience of infrastructures whose systemic nature is increasingly evident, notably due to their interconnectedness.*

The Banque de France intends to play actively its part in promoting innovation while at the same time maintaining security and stability, crucial factors underpinning public confidence in money and the economy. We want the Bank to play an educational role in this area, in which its legitimacy is two-fold. Issues involving payments and market infrastructures are central to its key missions: monetary strategy, financial stability and services to the economy. In addition, it performs the full spectrum of roles a central bank may play in this area, acting simultaneously as supervisor, catalyst and operator.

Hence this book, which begins with a chapter examining the nature of money and its various forms, together with the mechanisms involved in money creation, and ends with a chapter on innovation (new players, new technologies and regulatory issues). The chapters in between can be grouped into three main sections: the first deals with means of payment (chapters 2 to 4); the second addresses financial instruments, payment systems and financial market infrastructures (chapters 5 to 16); the third examines market infrastructure risks and their monitoring by central banks, together with the economics of market infrastructures (chapters 17 to 19).

I thank the authors for sharing their expertise in these clearly written pages and I hope you will enjoy reading this book.

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CHAPTER 1

Money

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Money is traditionally defined on the basis of its functions. Yet money is more than just what it does: it is also an institution, built on confidence. It is therefore important to consider the nature of money (Section 1). Money comes in various forms and, over time, has evolved towards dematerialisation (Section 2). Lastly, money creation, which is endogenous, relies on the sharing of roles and functions between a central bank and commercial banks working through a hierarchical structure (Section 3).

1. The nature of money

1.1. “Money is what money does”: the instrumental approach to money as defined by its functions

Economic approaches to money tend to be largely instrumental: they define money by the services it provides, echoing Francis Walker’s saying, “*Money is what money does*”. In other words, money is often seen as a way to eliminate trade frictions that would arise if it didn’t exist, i.e. in a non-monetary economy. This thinking dates back to ancient times – Aristotle, for one, defined money in terms of its functions – but has always been a subject of debate (by economists, but not only). The issues surrounding the concept of money remain entirely topical today and continue to be addressed in countless research studies.

The first function traditionally assigned to money is that of a unit of account.

Money can be used to measure and compare the value of dissimilar goods, providing a common standard or yardstick against which they can be priced for trading. This function’s usefulness is traditionally captured by comparing it with a non-monetary barter economy, in which each commodity or service has a relative price expressed in terms of the other commodities and services in the economy. The introduction of money can then be seen as a technical simplification to facilitate comparisons between goods and reduce the cost of trading. According to Arrow and Debreu,

this was the approach adopted by Walras in his general equilibrium theory.

Beyond such technical simplification, the introduction of money is also the result of a collective choice. Looking at it from this angle, the unit of account is an institution to which people refer in order to trade. It is not only a calculation aid, but also a social relationship (based on collective acceptance).

Money’s purpose, however, is not limited to measurement: money can also buy any goods or services available in an economy. **It is a medium of exchange. This is the second function traditionally assigned to money.** Here again, the function’s usefulness is often defined (by Adam Smith, for example) in comparison with a barter economy, in which an agent wanting to trade one commodity for another will not necessarily find a counterparty who owns the commodity sought and is willing to accept the commodity offered in exchange. Using a medium of exchange solves this classic problem referred to as a “double coincidence of wants”, which can limit trading opportunities. According to Irving Fisher, “Any property right which is generally acceptable in exchange may be called money”. Classical economists considered this to be the primary function of money. For them, within the hierarchy of money’s functions, the unit of account merely derives from this function. In neo-classical thinking, the emergence of money out of a barter economy is described in the works of Menger, who said that a commodity comes to be used as money following a selection process to find the most convenient instrument for exchange. A commodity could be chosen because, on the one hand, it has the properties of a “good” medium of exchange,¹ and on the other, it benefits from network effects relating to its acceptability.² Therefore, the decision by a community of users to adopt one form of money rather than another is partly the result of self-fulfilling expectations.

The third function traditionally assigned to money is that of a store of value: money makes it possible to hold purchasing power

1 In view, in particular, of criteria of availability, standardisation, ease of transport and divisibility. However, these criteria are associated with material goods and are less relevant in a situation where the money in circulation is largely in dematerialised form.

2 The greater the number of agents using the commodity as a medium of exchange, the more apt the commodity becomes as a medium of exchange for an extensive network of counterparties, and the more likely people are to use it as such.

over time. Historically, this function has been a source of disagreement among economists. For instance, it was omitted from the analysis made by classical economists (for whom using money as a store of value meant holding idle cash, which defied common sense – there was no hoarding). Moreover, as John Hicks pointed out, using money as a store of value is a questionable practice if there are other assets available that generate better returns (such as real estate), since money is not remunerated. For others, however, this function is absolutely crucial, especially for Keynes,³ who held that “The importance of money flows from it being a link between the present and the future.” Keynes bases part of his analysis of a monetary economy on the fact that agents may want to store money as a precaution (to provide a buffer against future risks) or for speculative reasons (in hope that further investment opportunities will arise). When comparing money to other assets that could also be held as a store of value, Keynes stresses on its liquidity, being immediately available for trading without risk.

1.2. Money is more than what it does: money as an institution and the role of confidence

The different approaches that view money in terms of its functions all tend to qualify its properties using contrasts with theoretical non-monetary economies, principally barter economies, in which the economy and its equilibrium are defined assuming that money does not exist. Money, however, is more than the sum of its functions and can be studied more comprehensively using complementary approaches.⁴ These approaches suggest that barter systems existed only in a few specific cases, that “non-monetary” societies had an alternative form of currency whereby trades were arranged using a kind of debt contract, and that money’s use as a measure of value was not a natural consequence of the quest to eliminate trade frictions.

The historical validity of the assumption that barter was used as a trading system before money emerged in “primitive” societies

is thus hotly contested. In fact, a number of works point out that the dominant method of exchange in “primitive” societies cannot be likened to a “non-monetary” trading system⁵ like barter, as presented in instrumental monetary theory.⁶ In these societies, the role of trade was first and foremost to resolve issues of social relations, redistribution and reciprocity. Money can thus be seen primarily as a social convention (not only in the legal sense of the term) or even a social technology.⁷

In this respect, it can be said that money is primarily the result of sovereign acts, including, but not limited to the designation of legal tender (see Box 1). For instance, Georg Friedrich Knapp defines money as anything that the state decides to accept in payment of tax, whether or not it has legal tender status. So money is seen not so much as a means to reduce trade frictions that emerged independently of any political intervention from above, but rather as a unit of account in which debts to the “palace” (tax obligations) are measured. By accepting it in repayment of debt, the state lays down the conditions for demand for what it considers to be money, which can subsequently be used in private transactions between agents. Or as Keynes put it, the state writes the dictionary and enforces it at the same time. **The state’s role in the acceptance of money as a common benchmark in transactions is thus crucial.**

That said, the state does not have absolute control over monetary practices, as shown by the simple fact that monetary crises exist. If the state declares an instrument to be money by decree, there is no guarantee that the instrument will be unanimously accepted. In France, for example, between 1789 and 1796, the over-issuance of several billion assignats secured by property confiscated from the clergy⁸ ended in failure, despite the state declaring the assignats fiat money in 1790 and introducing the death penalty for refusal to accept them in 1793. During the period in question, the assignats’ value depreciated continuously against metallic money.

3 Keynes believed that money was more than a simple instrument and thus did not share this instrumental approach.

4 Namely approaches based on historical and anthropological material. In the economics sphere, the works of Heinsohn and Steiger in the 1980s comes to mind, as well as that of Larry Randall Wray – see, for example, his “Introduction to an Alternative History of Money”, L. R. Wray, *Levy Economics Institute Working Paper*, 2012 – and David Andolfatto.

5 Which served to allocate resources in a mutually beneficial manner to the counterparties to a trade.

6 For example, Marcel Mauss points out in *The Gift* (1923) that the dominant system of exchange in many primitive societies is not barter, but gifting. Bronislaw Malinowski, in *Argonauts of the Western Pacific*, 1922, describes the circulation of items with no practical use in the Trobriand Islands, which he puts down to the sole aim of building relationships.

7 This term is used by Geoffrey Ingham in *The Nature of Money*, 2004, and was recently taken up by Felix Martin in *Money: the unauthorised biography*, 2013.

8 In 1796, the total amount of assignats in circulation was around 45 billion livres, while the estimated worth of the clergy’s property was between 2 and 3 billion.

Demonetised first by general rejection, then by law in 1796, the assignat contributed to discrediting the revolutionary political regime. So although the State can help to secure an instrument's acceptance as currency, doubts as to the quality of the assets used to back the instrument and justify its value (such as a country's economy) can cause it to be shunned in favour of other ways of holding purchasing power that are deemed safer. This shows that confidence is crucial when it comes to money: there must be confidence in the quality of the monetary network⁹ and the guarantees it provides. With a currency like the euro, for example, these guarantees are reflected in its legal tender status (see Box 2) and help to cement its effectiveness as a unit of account.

Ensuring that conditions are in place to preserve public confidence in its currency is the main role of a central bank and all its activities derived from it. This role is reflected in the central bank's aim to provide banknote issuance technology of the utmost security to prevent forgery. In the case of Banque de France (as a member of the Eurosystem), it forms part of the duties assigned to it under the French Monetary and Financial Code¹⁰ ensuring that cashless payment instruments are secure and that all payment systems function safely and efficiently. It also explains the regulatory requirements applicable to the activities of credit institutions, which are responsible for the bulk of money creation (see Section 3 of this chapter). Lastly, it is the reason for the price stability objective set for the Eurosystem's monetary policy, which aims to preserve the euro's purchasing power over time (thus constituting a stable store of value).

2. Forms of money

2.1. From commodity money to metallic money

From ancient times until the 19th century, some regions of the world used commodity

money for trading: the item used as currency (shells, livestock, wheat, tea, beans, etc.) may have been sought in its own right to meet non-trading needs. Over time, these "currencies" gave way to metallic money, which took its value from the metal it contained (gold or silver). The metals used tended to be fungible, divisible and scarce, with a high market value. Metallic money was historically exchanged on the basis of its weight (such as in Egypt, two thousand years before our era), amount (around 800 BC, ingots were divided into coins, which would become widely used in ancient times in Greece then Rome, as well as in China, India and the Islamic world) or stamp (which indicated the coin's weight; the first modern coins date back to the 6th century BC in Lydia¹¹ then Greece). Gradually, the metal's value as a precious material ceased to be linked to the numerical value stamped onto the coin. However, during the 19th century, from the end of the Napoleonic wars to the outbreak of World War I, the world adopted the gold standard system, whereby national currencies were defined by their weight in gold (and/or silver). In France, the last coin based on gold was the "Poincaré" franc in 1926. The over-issue of currency to finance the war effort from 1914 to 1918, together with the 1929 crash and its fallout, forced all countries to abandon the convertibility of their banknotes into gold. That said, under the gold exchange standard brought in by the Bretton Woods agreements in 1944, gold continued to play a role internationally until 1976, the year of its total demonetisation. Now, coins bear only their value in units of account and the stamp of the issuing authority, and are known as coins. This form of money constitutes the first kind of fiduciary money (from the Latin word *fiducia*, meaning confidence or trust), the face value of which is completely unrelated to its intrinsic value (as measured by the weight of the metal). Coins now represents around 1% of the stock of money circulating in the French economy (the M1 aggregate, see 2.4).

2.2. The development of paper money

The emergence of paper money was a major milestone on the path to the dematerialisation of monetary instruments,

⁹ Understood to mean all the stakeholders and institutions involved in issuing and circulating money.

¹⁰ For further information, see <https://www.banque-france.fr/en/page-sommaire/market-infrastructure-and-payment-systems>

¹¹ Lydians were an Indo-European people living in the centre of what is now Turkey.

since, from the outset, a note's face value bore no relation to the intrinsic value of the paper it was printed on. While paper money was initially secured by an underlying asset which had intrinsic value, this practice was gradually phased out. The first banknotes took the form of "certificates of deposit" that could be exchanged for precious metals deposited in banks' vaults, then for coins. They first appeared in the 10th century in China, then in the 16th and 17th centuries in Europe, where they were used by merchants in places like Venice and Amsterdam. The value of these notes was not intrinsic, but laid in the credibility of the issuer's promise to convert them.¹² Gradually, however, the

volume of notes came to be higher than the stock of coins held by banks, which, not expecting all holders of notes to request their conversion simultaneously, issued a portion of their notes "uncovered"; thus exposing themselves to the risk of bankruptcy. In France, in 1848, Banque de France gained a monopoly over note issuance. **Thus, notes, after coins, constitute the second form of fiduciary money** (currently making up around 12% of the stock of money circulating in the French economy): paper money is an acknowledgment of the central bank's debt (and as such is included on the liabilities side of the central bank's balance sheet).

¹² In this context, the bearer's confidence in the quality and quantity of precious metal that the issuer has in its vaults.

Box 1: The concept of legal tender

Fiduciary money is made up of banknotes and coins. Generally, notes are issued by the central bank while coins are issued by the Treasury (before being physically put into circulation by the central bank).

Fiduciary money often also has legal tender status (as is the case in France).

Legally, the term "legal tender" refers to a means of payment which, in the territory concerned, nobody can refuse to accept in payment of a debt denominated in a given currency. It is a way for the governing authority to enforce the obligation to accept such means of payment to discharge a debt.

The concept of legal tender therefore differs from that of fiat money (which was not convertible into the underlying asset when money was defined by its weight in metal). However, it can be considered to follow on from it, since, once an instrument had been declared non-convertible, it was given legal tender status to ensure that holders' payments would not be refused (the basic condition for its acceptability).

The concept of legal tender is not, however, interpreted in the same way across all jurisdictions and situations.¹ In the Eurosystem, the regulatory texts² state that "The Union shall establish an economic and monetary union whose currency is the euro" and that "the banknotes issued by the ECB and the national central banks shall be the only such notes to have the status of legal tender within the Community". To clarify this concept, on 22 March 2010 the European Commission adopted a recommendation on the scope and effects of the legal tender of euro banknotes and coins. However, Member States do not all give the same legal force to the notion of legal tender.

Under French law, new Article 1343-3 of the French Civil Code stipulates that "payment in France of a sum of money due shall be made in euro" and Article R. 642-3 of the French Penal Code makes it a punishable offence to refuse payment in banknotes and coins that are legal tender: legal tender is thus effectively used to support the unit of account. In addition, Article 442-4 of the Penal Code provides for a five-year prison sentence and a fine of EUR 75,000 for "putting into circulation any unauthorised monetary instrument intended to replace coins and banknotes that are legal tender in France". It should also be noted that the legal weight of legal tender status is mitigated by provisions obliging creditors to make payments above and beyond a given amount using cashless means. Moreover, the creditor's obligation to accept payments in currency with legal tender status does not prevent them from requiring debtors to pay the exact amount.

¹ For a more general overview of the differences between the various approaches, the topic is addressed in the appendix of the CPSS report, *The role of central bank money in payment systems*, August 2003: <https://www.bis.org/cpmi/publ/d55.pdf>

² Article 3.4. of the Treaty on the functioning of the European Union, transposed into French law in Article L. 111-1 of the French Monetary and Financial Code.

2.3. The expanding role of scriptural money

Scriptural money, which takes its name from the bank scripts that determine its value (accounting entries on the issuing institution's books), is an acknowledgement of the issuing entity's debt.

Scriptural money emerged before banknotes and coins, first coming into evidence in 1800 BC on tablets found in Mesopotamia. The Greeks and Romans were familiar with transfers between accounts, as were the Arabs, who used them in the 9th century. Such transfers became more widely used from the 12th to the 14th century in Europe's trade fairs, where transactions could be made using bills of exchange (IOUs between merchants, the forerunners of today's bank cheques). As these practices spread, vast multilateral clearing systems developed, with specialised intermediaries — bankers — stepping in to centralise bills of exchange, assess their quality and execute exchange transactions for those denominated in different currencies. This is how the first centralised payment systems developed, the precursors of the modern payment systems in use today.

Only in more recent times, with the emergence in the Middle Ages of discounting (credit transactions whereby a bank makes an advance to its customer, equal to the price of the goods represented by the bills of exchange that the customer endorses to the bank), did scriptural money come to circulate among the public, in the form of transfers from one account to another. Scriptural money includes customers' bank account balances and commercial banks' assets held with the central bank (reserves). Chapter 2 addresses how scriptural money circulates in more detail.

2.4. Accounting currency and statistical currency

Although scriptural money is sometimes referred to as credit money,¹³ from an

accounting viewpoint, credit money is not only scriptural money but includes **all money in any current form that represents a claim on its issuer**, or, from the issuer's point of view, a debt: this can be a claim on the central bank recorded as a liability by the latter, in the case of fiduciary money¹⁴ or banks' reserves, or a claim on commercial banks, in the case of commercial scriptural money. This form of debt differs from other forms in that it circulates in the economy and is accepted as a means of payment.

In statistical terms, the Eurosystem defines money using a set of indicators covering all assets that can be used to buy goods and services or repay debt in a given territory, or are readily convertible into means of payment with a low risk of loss of capital.

The Eurosystem has defined three broad, intertwined statistical aggregates, ranging from the most liquid to the least liquid, linking the "money-issuing sector", the monetary financial institutions sector¹⁵ and the other sectors of the economy:

(1) **M1**, the most liquid aggregate, includes notes and coins in circulation and overnight deposits: it is the narrow definition of money supply, representing the intuitive view of money and the most liquid and readily mobilised assets.

Sometimes the M0 aggregate is used, also known as the "monetary base", comprising notes and coins in circulation and scriptural money held with the central bank. The M0 aggregate sheds light on the central bank's role in the money creation process, but is not considered to be an integral part of the money supply (as defined for statistical purposes) because some of its components (banks' reserves) do not circulate among all economic agents, but only among banks;

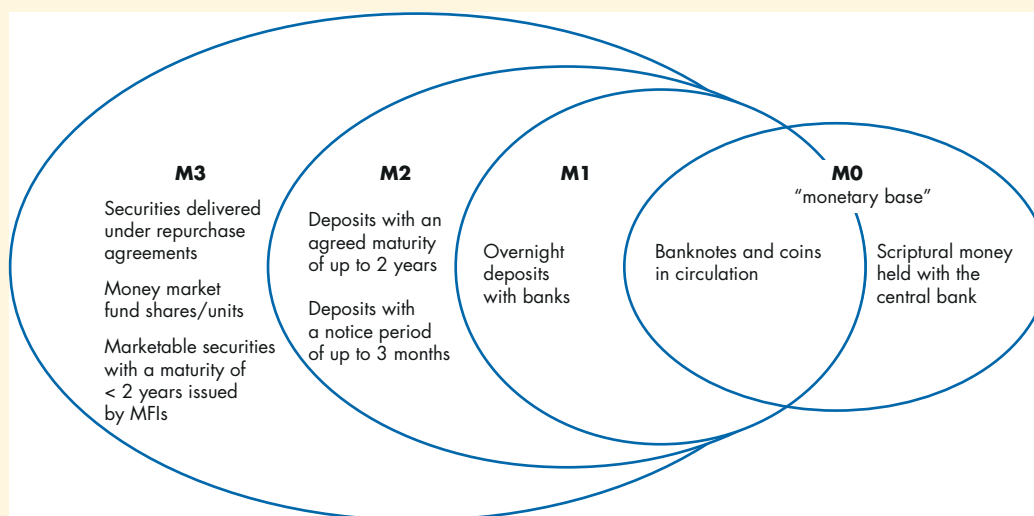
(1) **M2** includes the M1 aggregate, together with deposits redeemable at notice of up to three months and fixed-term deposits with maturities of up to two years;

¹³ Because it is largely created by credit transactions by commercial banks. More details are provided on this topic in 3.1.

¹⁴ As a rule, only **banknotes** are recorded as liabilities by the central bank, not coins (which are issued by the Treasury, even though the central bank physically puts them into circulation). One exception worth noting is the CFP Franc ("Pacific Franc"): both coins and banknotes in CFP are issued by the *Institut d'émission d'outre-mer* (IEOM – the French overseas departments currency-issuing bank) and are recorded as liabilities on the issuer's balance sheet (under "Currency in CFP francs in circulation").

¹⁵ Including resident credit institutions as defined by European legislation and all resident financial institutions whose business is to take deposits and/or close substitutes for deposits from entities other than MFIs and, for their own account, to grant credit and/or invest in securities.

The monetary base and the instruments constituting the monetary aggregates



(1) **M3** includes M2, together with transferable money market instruments issued by monetary financial institutions, representing assets with a high level of liquidity and a low risk of loss of capital in the event of liquidation (e.g. money market UCIs,¹⁶ certificates of deposit). M3 is the broadest monetary aggregate.

Long-term investments (homebuyer savings plans, investments in bonds) and higher-risk investments are excluded from the money supply definition.

2.5. Electronic money: a specific form of money used for transactions

Under Article L. 315-1 of the French Monetary and Financial Code,¹⁷ electronic money is defined as “a monetary amount which is specific in that it is stored in electronic form, and which represents a claim on its issuer”. It must also fulfil a number of conditions, such as being issued against receipt of funds,¹⁸ and being accepted for a payment transaction by a legal entity or individual other than the issuer. A holder of electronic money must therefore previously have put money into an electronic money account held with either an electronic money institution or a credit institution.

Originally designed to define the monetary units stored on physical media, such as prepaid cards, the concept of electronic money was then extended to online accounts also operating on a prepaid basis. In both cases, electronic money services are primarily intended for transactional purposes:

- prepaid cards can be used as an alternative to conventional payment cards, cheques and cash in point-of-sale payment transactions. In some cases, they serve a specific purpose, such as with e-gift vouchers;
- in the form of an online account, electronic money allows payments to be made directly between clients of a given issuer, without the need for the usual interbank payment methods (cards, transfers, direct debits, cheques). This generally means that payments are credited almost immediately to the beneficiary’s account and are billed only once by the issuer. In addition, prepaid accounts effectively prevent fraud, since electronic money accounts cannot be overdrawn should the payer fall victim to identity theft. Thanks to these factors and the rise in online transactions between individuals, electronic money

¹⁶ Undertakings that use clients’ funds to make short-term investments. French SICAVs (investment companies with variable capital) and FCPs (investment funds) are undertakings for collective instruments (UCIs). Shares or units in money market UCIs can be redeemed on demand without incurring a material risk of loss of capital, which makes them similar to liquid investments such as “*livrets*” (passbook saving accounts).

¹⁷ Transposition into French law of the 2nd European Directive on Electronic Money (EMD2).

¹⁸ Because of this, a monetary sphere of electronic money cannot be created autonomously and spontaneously, since the issue is systematically secured by a deposit of funds in official currency. This is a fundamental difference between electronic money and crypto-assets (see 2.7 and Chapter 20).

in this form has been quite a success, as highlighted by the major role played by PayPal in this type of exchange. So electronic money is considered more as a vehicle for making transactions than as a form of money.

2.6. Complementary local currencies

Complementary local currencies were introduced in the French Monetary and Financial Code by Law 2014-856 of 31 July 2014. They can be defined as unofficial currencies that can only be used within a limited geographical region and that were created to provide a medium of exchange to complement the currency designated as legal tender. These currencies are often issued as part of a political or charitable initiative to promote social inclusion and local development. As such, in accordance with Article L. 311-5 of the French Monetary and Financial Code, these currencies can only be issued by companies that comply with the principles of the social and solidarity economy.

The status of these local currencies is, however, complex and varies depending on which of the three possible formats of issue is used: paper securities, scriptural money or electronic money. The format directly affects the local currency's legal status, as well as the manner in which its issuing company is authorised by the *Autorité de contrôle prudentiel et de résolution* (ACPR, French Prudential Supervision and Resolution Authority) and monitored by Banque de France (see Chapter 3). Since they are not denominated in euro, these local currencies do not have legal tender status and can thus be rejected as a means of payment, including in the region of issue. However, as they are recognised by the Monetary and Financial Code and are issued – strictly pegged to the euro – by specific, supervised companies, they can be considered a means of payment in the legal sense, provided that they meet specific conditions attached to their format.¹⁹ If the complementary currencies do not comply with these conditions, they

are not considered a means of payment and fall outside the regulatory scope.

In France, sixty or more complementary local currency schemes are in place or have been launched. They are based on longstanding systems in other countries, such as Canada's "Local Exchange Trading Systems" (LETS) – which were launched in the early 1980s and promote regional business and commerce using complementary local currencies – or Switzerland's *Wir*, a complementary currency managed by the WIR bank since 1934 as a facility to promote mutual assistance and, potentially, credit between cooperative companies in the network (of which there are currently almost 60,000).

2.7. Crypto-assets: the pseudo currency that is not money at all

Crypto-assets like bitcoin and ether emerged at the start of the 2010s, following the global rise of "virtual" communities, where internet users interact through digital media, such as chat rooms, forums, etc. Often mistakenly termed "virtual currencies" or "cryptocurrencies", these assets are legally defined in France as "any instrument containing non-monetary units of value in digital form that can be held or transferred for the purpose of acquiring an item or service, but do not represent a claim on the issuer"²⁰

Crypto-assets do not meet, or only partially satisfy, the three functions of money:

- firstly, their value fluctuates very significantly and is uncertain, so it cannot be used as a unit of account. Consequently, very few prices are expressed in these crypto-assets;
- secondly, as a means of exchange, crypto-assets are far less effective than currencies with legal tender status in that (i) their increasing price volatility makes it increasingly difficult to use them as a means of payment; and (ii) they generate transaction costs that are disproportionately high for simple retail payments;

¹⁹ See "Les monnaies locales"; La revue de l'Autorité de contrôle prudentiel et de résolution, no.14, September-October 2013, p.14-15.

²⁰ Article L. 561-2, 7° bis of the French Monetary and Financial Code.

Box 2: From the inefficiency of metallic monetary systems to the inefficiency of bitcoin as a monetary system

Some proponents of currencies backed by precious metals such as gold say that the key advantage is that, in such systems, monetary policy depends entirely on the metal stock held by the central bank, so money available in the economy is limited by its “natural” supply and the public authorities are unlikely to create inflation on a significant scale in order, for example, to devalue public debt. The link between the quantity of metal held and the currency issued, it is argued, protects the currency from arbitrary measures by the authority in charge of it. In practice, however, in systems like the gold standard, an automatic link does not necessarily exist between the quantity of precious metal held and the currency issued, since the stability of such systems hinges on the credibility of the issuer’s promise to convert the currency (although coverage by stocks of gold does support this credibility). Moreover, history has shown that the state can sever the link between metal quantity and currency value, as seen in France with the devaluation of the Poincaré franc.¹

Some of the rhetoric used to promote crypto-assets² like bitcoin draws parallels with metallic money systems: references to precious metals and gold permeate the arguments put forward, emphasising the scarcity programmed into the rules on the number of units in circulation (capped at 21 million in the case of bitcoin). For some of its proponents, bitcoin is “digital gold”, there to be “mined” until reserves run dry.

Arguments such as these disregard the cost of such mechanisms in terms of economic stability.³ In practice, the functioning of metallic monetary systems suffered from the fact that gold stocks, and hence money supply, were dictated by disruptions in the discovery of new ore deposits (random, exogenous shocks affecting money supply) rather than by economic activity and trading volumes. In general, this system has a deflationary bias, which is problematic in debt-based economies, such as most modern economies.⁴ It works in the opposite way to the monetary policies adopted in major developed economies today, which allow the money supply to fluctuate so as to maintain price stability. Moreover, the gold-standard period saw sharp fluctuations in production: within the restrictive framework laid down by this type of system, with money supply determined solely⁵ by the balance of payments, macroeconomic adjustments had to rely partly on changes in prices and wages, generally for long periods (due to the system’s inflexibility). During this period, an adverse shock tended to send the economy into recession.

To an even greater extent than metallic monetary systems, bitcoin lacks “shock absorption” properties and offers no guarantee that its pace of issue can be adjusted in line with economic activity, from which it is totally decorrelated as it is not backed by a tangible underlying economic asset. If we consider that a monetary system’s efficiency depends on its ability to ensure economic stability, the system proposed by bitcoin’s promoters is not efficient.

Moreover, arguments in favour of metallic monetary systems or bitcoin-type systems overlook money’s function as a means to measure and circulate claims and debt, the value of which is wholly unrelated to that of its medium (whether material or immaterial, such as bitcoin).

¹ Paradoxically made possible by the considerable increase in precious metal stocks in the 19th century.

² See Chapter 20.

³ For further details, see the Banque de France Focus “What is the Gold Standard?” published in 2010.

⁴ This difficulty linked to deflation was less of an issue in the debt-free economies that existed during the times of metallic money systems. At that time, if a price decrease took hold, it was a decrease in all prices, proportionally. Deflation did not cause a relative price distortion, as in the case of debt-based economies.

⁵ With an equal quantity of gold in the system.

- lastly, their lack of a tangible underlying asset,²¹ coupled with their volatility, means that they cannot be used as a credible store of value. Crypto-assets are generally produced by computer processing power, with no consideration for economic and trading needs.

Legally, crypto-assets are not recognised as legal tender or a means of payment:

- according to Article L. 111-1 of the French Monetary and Financial Code, “The currency of France is the euro”. This is therefore the only currency with legal tender status in France. Thus, crypto-assets can be refused as payment without violating the provisions of Article R. 642-3 of the French Penal Code, under which it is an offence to refuse payment in banknotes and coins denominated in euro with legal tender status;
- crypto-assets also fail to meet the French Monetary and Financial Code’s definition of a means of payment, and more specifically its definition of electronic money, in that they are not issued against receipt of funds. Therefore, and contrary to electronic money, crypto-assets do not benefit from a legal guarantee in the European Union to be reimbursed at face value at any time in the event of an unauthorised payment.

Consequently, crypto-assets do not provide their holders with any guarantee in terms of security, convertibility or value, and carry a multitude of risks (see Chapter 20).

3. The hierarchical structure of money creation

3.1. The role of commercial banks in the money creation process

The act of money creation entails converting claims on the issuer into means of payment. For a currency like the euro, the authority to do this lies exclusively with monetary institutions, i.e. commercial banks and the central bank.

Firstly, money is created every time a monetary financial institution²² grants credit to the economy (to a non-bank agent). This type of money creation is driven by the financing needs of economic agents: money creation is therefore endogenous. In fact, it was long said that “deposits create loans”, i.e. commercial banks are mere intermediaries, lending out money deposited with them by savers. Although it may have held true in the past, this saying no longer (except in marginal cases) reflects the situation in modern economies, in which the relationship between deposits and loans is actually the opposite: loans, via a simple book entry, are the source of deposits (in other words, “loans create deposits” and, hence, money). The money thus created is credited to the borrower’s account and recorded on the liabilities side of the bank’s balance sheet, while the corresponding claim is recognised on the assets side.

Conversely, when a non-bank agent pays back part of all of a loan it has taken out, it helps to “destroy” money. The amount of money available in the economy depends on the net result of these processes of creation and destruction.

In theory, central banks can also create money by financing the public deficit directly, crediting the government’s account held on their books with the amount of the deficit.²³ A transaction such as this increases the amount of money in the economy and thus carries a very high risk of inflation. To prevent this risk, within the framework of the Eurosystem, direct advances to the Treasury are prohibited.

Contrary to popular belief, the central bank does not create money when it puts banknotes and coins into circulation. Fiduciary money is only put into circulation in the economy in exchange for scriptural money (in an ATM for example), so the money supply does not increase.

Secondly, money is also created or destroyed each time a monetary financial institution buys or sells currencies or other assets from/to individuals, companies or the Treasury. The sale or purchase of

21 Fiduciary and scriptural currencies represent claims on an issuer, which has assets on its balance sheet that help to guarantee the currency’s value. There is no such guarantee with crypto-assets, whose value is not backed by assets.

22 See footnote 22. MFIs create money each time they acquire securities issued by non-MFIs.

23 A belief popularised by the use of the expression “printing money” to describe situations in which a central bank financed the public deficit directly.

such assets by commercial banks in the private non-bank sector involves creating or destroying private scriptural money and thus increasing or decreasing the amount of money circulating in the economy (see 2.4).

However, when a central bank lends to banks, the scriptural money created does not increase the money supply (M1 definition), because these assets are not made available to non-banks, in the same way that interbank transactions do not affect money supply, because dealings between monetary financial institutions are consolidated when calculating monetary aggregates. Central bank purchases or sales of currencies in the banking system also affect the liquidity available to banks, without directly affecting the amount of money in circulation.

In recent times, only central bank purchases of public debt securities in the primary markets (during quantitative easing by the Fed and the Bank of England) or secondary markets (the case of the ECB) increase the money supply in statistical terms. When the ECB purchases securities in the secondary market, the statistical increase in the money supply depends on the commercial banks themselves acquiring the securities from non-banks. The money this provides to non-banks sustains their demand for goods and services, contributing to the monetary policy transmission mechanism.

3.2. Limitations on commercial banks' power to create money

Although commercial banks have the ability to create money through a simple book entry, their power to do so is not unlimited.

The first limitation on commercial banks' ability to create money is that it is conditional upon demand (considered to be solvent demand) for credit by non-financial agents, due to the endogenous nature of this form of money. Moreover, the prudential requirements applicable to credit institutions, requiring them to have own funds in proportion to the credit they extend, also limit their ability to create money.

The second limitation on the ability of commercial banks as a group to create money lies in their needs for scriptural assets from the central bank.

Individual banks can lend money to each other: that is what the interbank market is for. Even so, as a group, they generally need central bank refinancing. This is firstly because commercial banks use this liquidity to acquire banknotes from the central bank to meet demand from non-financial agents. Hence, the more banknotes or currency non-financial agents request, the greater the commercial banks' need for central bank refinancing. Another source of "leakage" for banks relates to the fact that the Treasury holds an account at the central bank: when the Treasury collects tax, banks' balances at the central bank decrease and the Treasury's balance increases. Payments to the Treasury, together with demand for banknotes, constitute the "autonomous factors" in bank liquidity.

Lastly, banks' refinancing needs are increased because of a monetary policy instrument, the reserve requirement, whereby credit institutions must hold reserves on the central bank's books.²⁴

Banks can meet this liquidity need by selling assets pledged as collateral or by obtaining funds, subject to interest payments, either directly from the central bank or in the interbank market, by borrowing from institutions with a surplus. The central bank does not, therefore, control money creation by fixing the amount of available reserves,²⁵ but steers it indirectly by accommodating all the refinancing requests it receives, for a set price (the key rate). So the central bank does not directly control the creation of money (and hence the amount of money circulating in the economy): money creation is endogenous, resulting from commercial banking activity. The central bank steers money creation indirectly by influencing interest rates (when it increases them, banks lend less and create less money; when it reduces them, the opposite occurs).

24 Under Article 19.1 of the Statute of the ESCB, credit institutions established in the euro area must hold minimum reserves (funds) in accounts held with the Eurosystem's national central banks, for a duration of around one month. This requirement has two key purposes: to help to stabilise interest rates in the money market, because the reserve requirement can be fulfilled on average, and to broaden demand for central bank money by creating or accentuating a structural liquidity shortage in the market.

25 Contrary to the argument sometimes put forward that the central bank determines the amount of loans and deposits in the economy by controlling the amount of central bank money available (the "money multiplier" theory, based on the assumption that there is a constant ratio between money supply and the monetary base), and thus implements monetary policy by setting a reserve amount.

CHAPTER 2

Means of payment and payment instruments

Updated on 17 December 2018

Let us begin this chapter by clarifying how the terms “means of payment”, “payment instrument” and “money” are used. The distinction between money itself and the payment instruments used to transfer it is often blurred in practice. This confusion stems from our day-to-day use of fiduciary money, i.e. banknotes and coins, which constitute money (a store of value, unit of account and medium of exchange for commercial transactions) as well as payment instruments (used to transfer value). This is not the case for any other payment instrument (card, cheque, credit transfer, direct debit, etc.). We should not allow this characteristic specific to fiduciary money to blur the lines between the two concepts. As regards “means of payment” and “payment instrument”, the difference here relates to the use of terminology: “means of payment” is commonly used as a broad term covering both payment instruments (banknotes and coins, cards, cheques, credit transfers, direct debits and so on) and money (fiduciary money or scriptural money, i.e. bank account balances), without distinguishing between the two. In this chapter, “means of payment” will be used in preference to “payment instrument”, while banknotes and coins will generally be referred to as “fiduciary money”, given their specific nature.

The payment methods in use today are evolving fairly quickly. We are seeing a shift away from physical formats, such as cheques, towards electronic formats like cards and credit transfers, along with the emergence of new payment solutions afforded by the rise of the digital economy. This chapter purports to shed light on these development trends.

1. Types of payment method

In France, means of payment are defined in Article L. 311-3 of the Monetary and Financial Code, under which, “any instrument which enables any person to transfer funds shall be deemed to be a means of payment, regardless of the

medium or technical process used”. This definition actually covers two types of instrument, which can be distinguished from each other based on their nature and their role in transfers between parties: fiduciary money and cashless means of payment.

1.1. Fiduciary money

The term fiduciary money refers to banknotes and coins that are issued by government authorities (central banks or national Treasuries) and have legal tender status. They can be given to a creditor or vendor in order to immediately discharge a debt or pay for goods or services (see Chapter 1).

The conditions for the issuance and circulation of euro banknotes and coins are established by Article 128 of the Treaty on the Functioning of the European Union and by Regulation (EC) 974/98 of 3 May 1998, which provides, in Articles 10 and 11, that banknotes and coins denominated in euro shall be the only currency that has legal tender status in euro area Member States.

1.2. Cashless means of payment

“Scriptural” means of payment enable monetary units to be transferred from a payer’s account held with a payment service provider¹ to that of a beneficiary. If the two accounts are held by two different institutions, the payment method gives rise to an interbank settlement (see Chapter 11).

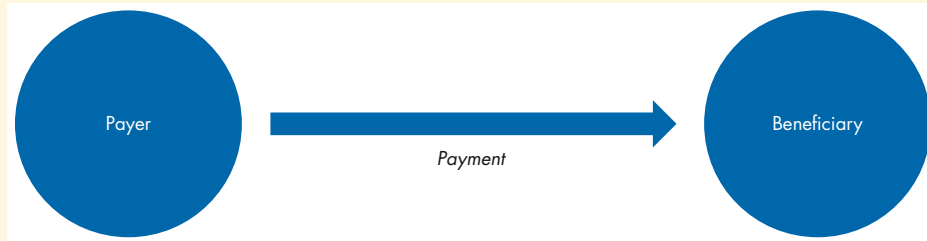
The main categories of cashless means of payment are as follows:

- **payment cards:** these are used to make payments via electronic payment terminals, which read a physical device (chip, magnetic strip) in conjunction with a personal identifier (signature or personal identification number – PIN). With contactless payments, only the chip is needed. Payments can also be made remotely (e.g. on e-commerce websites) by entering the card’s number together with security information. Payment cards

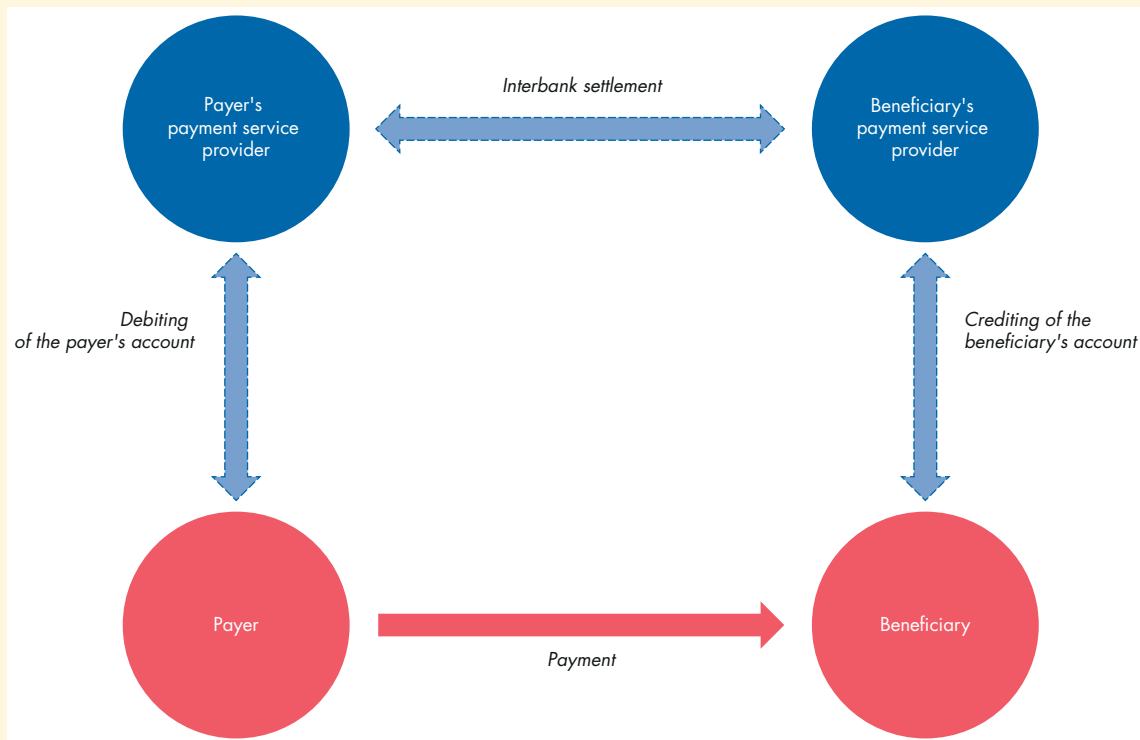
¹ The concept of “payment service provider” (PSP) was introduced into European legislation following the adoption of Directive 2007/64/EC on payment services in the internal market (PSD1), which opened up the provision of payment services to entities other than traditional credit institutions (banks).

Payment service providers (PSPs) are therefore institutions authorised to open and maintain payment accounts for their clients and to issue means of payment. Within the meaning of French and European regulations, they include entities with the following statuses:

- credit institutions and their equivalents (as referred to in Article L. 518-1 of the French Monetary and Financial Code), electronic money institutions, payment institutions and account information service providers **subject to French law;**
- credit institutions, electronic money institutions, payment institutions and account information service providers **subject to foreign law and authorised to practice on French territory.**

Box 1: Fiduciary money and cashless means of payment**Payments in fiduciary money**

When a payment is made in cash, monetary units are transferred directly from the payer to the beneficiary without the need for intermediation by a third party. Cash transfers provide immediate finality, so the beneficiary can immediately use the money received to make another payment.

Cashless means of payment

Cashless payments require the involvement of the payment service providers that hold the accounts of the two parties to a transaction. It is the two service providers that effectively make the payment – a transfer of monetary units – by entering the corresponding amounts in their accounts (for example, by debiting the payer's account and crediting that of the beneficiary). Cashless means of payment thus initiate transactions between the service providers that hold the parties' accounts. The transactions are subsequently settled by means of an interbank payment between the providers.

can also be used to withdraw money from ATMs. Payment cards are attached to card schemes,² i.e. networks that generally manage authorisations (by querying card issuers' authorisation servers to ensure that transactions are valid) and clear transactions to facilitate payment. In most cases, payment service providers ("issuers") that provide cards to their clients ("holders") manage payment flows between the cards and the accounts they are attached to. With card payments, holders' payment service providers guarantee that merchants ("acquirers") will receive amounts due, provided that they comply with the scheme's rules of operation.

- **credit transfers:** based on an instruction from the payer to their payment service provider, the payer's account is debited and that of the beneficiary credited with a specified amount. Payment instructions

are usually transmitted electronically (via online banking orders, file transfers, etc.). In Europe, on 1 August 2014, SEPA transfers permanently replaced the various "national" credit transfer instruments previously used.

- **direct debits:** based on an instruction from the beneficiary to their payment service provider, a payer's account is debited. In Europe, on 1 August 2014, SEPA direct debits permanently replaced the various "national" direct debit instruments previously used. With SEPA direct debits, the payer authorises the beneficiary – under a direct debit mandate – to begin debiting their account. Setting up a SEPA direct debit does not guarantee that the beneficiary will be paid: the payer's payment service provider may be forced to reject a direct debit if, say, there are insufficient funds in the payer's account.

² "Card payment scheme" refers to the rules, procedures and technical systems that together ensure the proper functioning of the processes used to issue cards and manage associated transactions. In France, for example, the bank card economic interest group *GIE Cartes Bancaires (CB)* is the scheme with the largest number of cards in circulation, i.e. almost 60 million CB cards in 2017.

Box 2: the SEPA project

SEPA (Single Euro Payments Area) was launched in 2002, with the creation of the European Payments Council (EPC) by forty or so major European banks. Following the changeover to the euro for the financial markets in 1999 and the switch to euro notes and coins in 2002, the introduction of SEPA was a key stage in European integration in the area of payments in euro.

The objective of SEPA was to create an area in which cashless means of payment used to carry out euro transactions would have the same format (based on the ISO 20022 XML standard) and operating rules. To this end, the EPC developed "Rulebooks" for SEPA transfers and direct debits, which were published in 2008 and 2009, respectively. At that time, however, there was no obligation to follow the rules and their adoption by entities involved in the payment chain was hugely inadequate.

To remedy the situation, in 2012 the European Commission adopted Regulation (EU) 260/2012, which set a number of deadlines for the adoption of SEPA transfers and direct debits by payment service providers and companies. Migration to the SEPA Credit Transfer (SCT) and SEPA Direct Debit (SDD) was completed on 1 August 2014 in euro area Member States.

SEPA is expected to bring a wealth of benefits for entities involved in the payment chain. First and foremost, the establishment of standard processes paves the way to fully automated processing of SEPA payment orders ("straight-through processing" or STP), enabling companies that issue orders, as well as payment service providers, to achieve significant economies of scale. Consumers also stand to benefit, since orders should be processed with greater speed and fluidity.

.../...

Another major advantage for companies and consumers is that the adoption of SEPA breaks down barriers in the SEPA area.¹ For instance, cross-border payments are now subject to the same pricing conditions as domestic payments. This allows companies operating in several countries to set up central payment platforms for Europe-wide payments. Moreover, the fact that companies can set up their main account in any State in the SEPA area heightens competition between payment service providers and should, over time, cause banking fees to converge across Europe.

The SEPA project also promotes longer-term development, in that the existing SEPA payment instruments prepare the ground for the emergence of new European means of payment, such as instant payments (see below) or cross-border electronic invoicing systems.² Moreover, SEPA's success has generated new impetus for Europe-wide harmonisation of other payment instruments, particularly payment cards and new payment services: aggregation of account information, payment initiation, mobile payments between individuals (see Chapter 3). All these initiatives constitute what has come to be referred to as "SEPA 2.0"

1 The SEPA area comprises the European Union's 28 Member States, plus Iceland, Norway, Switzerland, Liechtenstein, Monaco and San Marino (34 countries in all).

2 As defined in Directive 2014/55/EU, an electronic invoice is "an invoice that is issued, sent and received in a structured electronic format which enables it to be processed automatically and electronically". With SEPA instruments already in place, it is much easier to set up this kind of system for cross-border payments.

- **cheques:** written payment orders whereby the holder of a payment account (the "drawer") instructs the payment service provider ("drawee") to pay a specified amount to the beneficiary. Although the specified amount in the drawer's account is legally signed over to the beneficiary as soon as the cheque is signed, there remains a risk that the beneficiary may not be paid if there are insufficient funds in the drawer's account. For this reason, mechanisms were put in place to prevent cheques without sufficient funds from being issued, and France's lawmakers appointed the Banque de France to maintain the Central Cheques Register, in which reports filed by banks on payment incidents involving bad cheques issued by their customers are recorded, among other items.
- **payment in electronic money,** which is also considered to be a cashless payment method. In Article L. 315-1 of the French Monetary and Financial Code, electronic money is defined as "a monetary amount that is stored in electronic form and represents a claim

on its issuer". It must also meet a number of conditions, including being issued against receipt of funds and being accepted as payment by a natural or legal person other than the issuer. Holders of electronic money must credit their account with their electronic money institution before they can use it. They can then draw on the account by paying for purchases by card or online, in the knowledge that the total sum of all payments made using the account can never exceed the amount deposited in it. One of the key advantages of the electronic money system is that it is an easy way to make payments up to a given ceiling, making it particularly suitable for e-commerce.

- **commercial paper:** marketable securities representing a commitment to pay an amount of money to the bearer and used for payment thereof. In France, this type of instrument includes two main categories: promissory notes³ and bills of exchange.⁴

Lastly, under Law 2013-100 of 28 January 2013, the Banque de France was appointed

3 A promissory note is a written order whereby a client agrees to pay a specified sum of money on a given date to their supplier, the beneficiary.

4 A bill of exchange is a written order whereby a creditor instructs a debtor to pay a specified sum of money on a given date to the creditor himself or to a third party (the beneficiary).

to ensure that **specific electronic payment vouchers**⁵ are secure and subject to appropriate standards. The status of these vouchers is, however, ambiguous: although they are similar to cashless means of payment, for tax reasons⁶ they are not legally considered as electronic money or cashless means of payment. As a result, specific electronic payment vouchers constitute a category in their own right. What they all have in common is that their use is restricted to purchases of a limited number of goods or services, or to a limited network of parties that accept them. The list of recognised specific electronic payment vouchers was established by the Decree of 17 June 2013 and comprises nine categories, including restaurant vouchers, holiday vouchers and pre-paid CESUs.

1.3. Alternative means of payment

Alongside the proliferation of payment channels supported by new technologies, recent years have also seen the emergence of “alternative” means of payment, whereby transactions can be made in units other than currency with legal tender status. This category includes a variety of instruments that differ in terms of status.

- The first group of alternative means of payment includes crypto-assets (see Chapter 1, Section 2.7, and Chapter 20), which are not means of payment in the legal sense. However, in France, the intermediation business, whereby funds are received from a buyer in order to transfer them to a seller, of bitcoin for example, is qualified as the provision of payment services and, as such, is subject to authorisation by the ACPR.⁷
- The second group includes “complementary local currencies” (see Chapter 1, Section 2.6), which were introduced in the French Monetary and Financial Code by Law 2014-856 of 31 July 2014. They can be defined as unofficial currencies that can only be used within a specific geographical region and are created as a medium of exchange to

complement the currency designated as legal tender. They come in various possible formats (paper securities, scriptural money or electronic money) and are issued – strictly pegged to the euro – by specific, supervised companies. As such, they can be considered to be a means of payment in the legal sense, provided that they meet specific conditions governing their format.⁸

Taking all these alternative methods together, the total volume and value of transactions they are used to conduct is low. For instance, the total valuation of crypto-assets worldwide was around EUR 600 billion as of end-December 2017, which amounts to around 8% of the M1 aggregate for the euro area alone (EUR 7,500 billion). Moreover, at the end of 2017, the average daily number of trades in bitcoin – the most widely used virtual currency, representing 45% of the total – was just 300,000, compared to the 330 million cashless transactions executed daily across the 28 countries of the European Union. The volumes for complementary local currencies are even lower. Taking, for example, the *eusko* – one of France’s principal, longest standing complementary local currencies – in 2017, the total in circulation was equivalent to less than EUR 750,000.

2. Change in the use of means of payment

2.1. General use of means of payment

Breaking down payment transactions into cash (fiduciary) and cashless methods is a complicated task, mainly because it is difficult to ascertain the exact number of transactions conducted using fiduciary money.

Based on the Eurosystem’s estimates of point-of-sale transactions,⁹ in the euro area, payments in fiduciary money are more popular than cashless payments. On average, payments in fiduciary money represent nearly 79% of total payments in terms of volume (number of transactions)

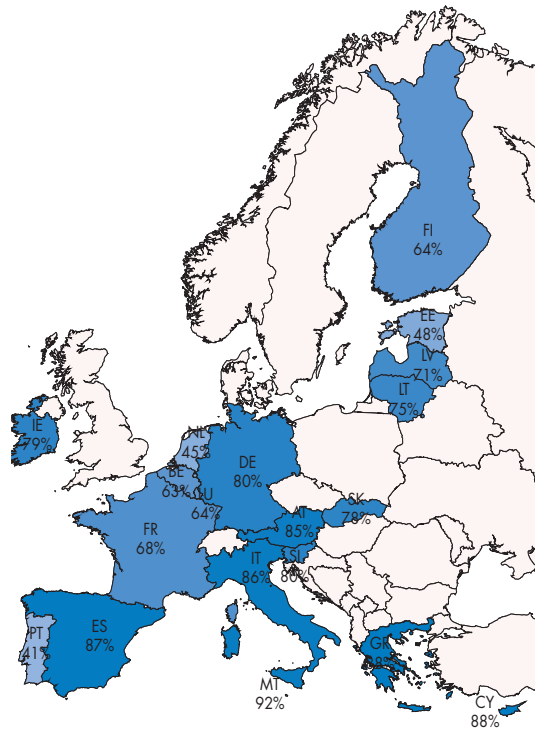
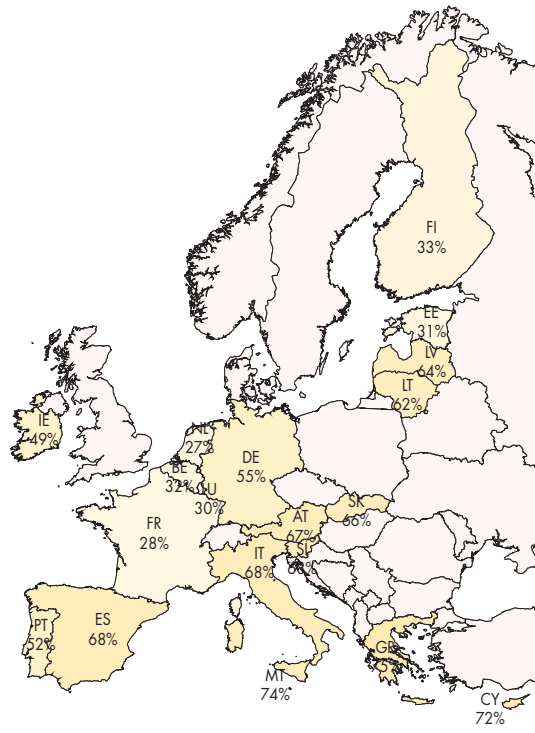
5 Article L. 141-4 of the French Monetary and Financial Code, which governs the key roles assumed by the Banque de France, stipulates that it “[...] ensures that the means of payment as defined in Article L. 311-3, other than fiduciary money, are secure and that the regulations applicable thereto are pertinent”.

6 Specific electronic payment vouchers are subject to specific tax and social security regimes. If, having been made paperless and stored on an electronic device, they had to be considered as electronic money, the issuer would be obliged to reimburse the holder, which could interfere with these regimes. For this reason, France’s lawmakers explicitly differentiate them from electronic money.

7 See “Position de l’ACPR relative aux opérations sur Bitcoins en France” (Position 2014-P-01), 29 January 2014: https://acpr.banque-france.fr/sites/default/files/20140101_acpr_position_bitcoin.pdf

8 See “Les monnaies locales”, La revue de l’Autorité de contrôle prudentiel et de résolution, no. 14, September-October 2013, p.14-15: <https://acpr.banque-france.fr/sites/default/files/media/2018/06/07/201309-revue-autorite-contrrole-prudentiel-resolution.pdf>

9 “The use of cash by households”, Occasional paper series no. 201, November 2017: <https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op201.en.pdf>

Box 3: Cash payments as a percentage of point-of-sale transactions**Based on volume****Based on value**

Source: European Central Bank

and 54% in terms of value (amounts paid). As shown in the map below, these averages take in a wide range of situations in the various countries covered. In France, for example, the same study found that fiduciary payments represent only 68% of point-of-sale payments and just 28% of total amounts paid.

Since euro notes and coins were introduced in 2002, the amount in circulation has risen steadily at a rate of around 8.5% a year (see Chart 1). This reflects strong demand for euro notes and coins and likely includes demand from outside the euro area, where euro could be sought as a store of value or for hoarding, for example.

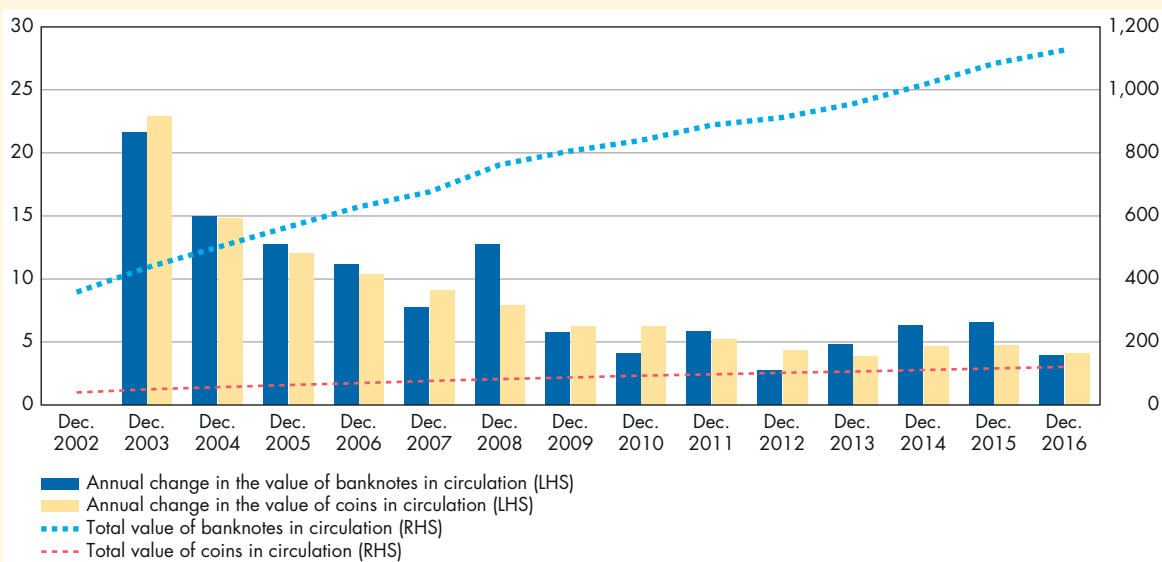
That said, in some countries outside the European Union, particularly countries in Asia and Africa, together with Sweden,

demand for fiduciary money has stabilised or fallen so much, usually following government decisions, that the prospect of a cashless society seems to be drawing closer (see Box 4).

Cashless transactions are easier to monitor, since all transactions can be tracked by the payment service providers in charge of the associated accounts. In 2016, more than 122 billion cashless transactions were carried out in the European Union, including almost 21 billion in France, which ranks third after the UK and Germany in terms of the number of cashless transactions executed annually in the European Union. The use of cashless means of payment has been increasing steadily for several years in the European Union, as in France, at average annual rates of 8.5% and 3.5%, respectively. However, the pace of growth

C1: Fiduciary money in circulation in the euro area

(Annual change as a percentage; amounts in circulation € billions)



Source: European Central Bank

Box 4: The cashless society

The notion of a cashless society is based on the observation that, despite all their benefits, banknotes and coins may have a number of disadvantages relative to cashless means of payment.

First, there are the general costs involved, for society as a whole, in using cash. Based on an ECB study published in September 2012, “The social and private costs of retail payment instruments: a European perspective”¹ the costs incurred by using cash means of payment, which are primarily borne by banks and merchants, on average represent 0.5% of GDP, versus 0.21% for payment cards. However, given the different payment volumes involved and the other ways in which cash is used (notably for hoarding), this data must be treated with caution.

In addition, the reduced traceability of cash transactions, coupled with their higher risk of theft and misappropriation, is likely to slow down the transition of many activities to the legal economy, for tax or other reasons, especially in economies that have a strong informal sector.

A challenge for developing countries...

Some central banks have taken measures to reduce the use of cash payments and promote cashless methods. For instance, in January 2012, the Central Bank of Nigeria implemented a “Cashless Policy” aiming to curb the use of fiduciary money, without eliminating it altogether. The policy is based on three key measures: (a) the introduction of fees (3-5% of the amount concerned) payable on cash withdrawals exceeding a certain daily amount; (b) a ban on banks offering cash transport services to professional customers wanting to deposit notes and coins; (c) restrictions on cash withdrawals by cheque.

¹ <https://www.ecb.europa.eu/pub/pdf/scpops/ecbocp137.pdf>

.../...

India's authorities adopted a similar strategy, based on one-off measures such as the introduction in summer 2014 of restrictions on the number of free cash withdrawals permitted at ATMs in the country's six main cities, and the end of 2016 demonetisation of two major currency denominations, the 500 and 1,000 rupee notes.

The effects of these measures on the use of cash remain difficult to assess. In Nigeria, the central bank's decisions do not seem to have had a significant impact on the quantity of cash in circulation, which remains very volatile.

... and a trend driven by innovation and the development of new uses in other countries

The fact remains that cash payments have also dropped sharply in countries such as those of Scandinavia. For instance, the percentage of transactions made in cash in Sweden and Denmark, as estimated by the ECB in a study published in 2012² (around 40%), is much smaller than that for card payments and well below the European average (60%). Moreover, a more recent report by the Central Bank of Sweden (the *Riksbank*)³ demonstrates the continuous drop in the overall value of Swedish krona coins and notes in circulation as a percentage of GDP (from 10% of GDP in 1950 to 2.6% in 2011, versus 11% for the euro area today). This situation, however, has more to do with long-term changes in user behaviour than with deliberate government policies. In Sweden's case, although the *Riksbank* expects the value of currency in circulation to continue falling, it does not anticipate the complete disappearance of its fiduciary money, which is still useful for some purposes (such as payments between individuals). The Riksbank's end-2017 launch of a project involving digital central bank currency (see Chapter 20), could, however, be a further step in the (long) path towards a cashless society.⁴

2 "The social and private costs of retail payment Instruments", Occasional paper series n°137, September 2012: <https://www.ecb.europa.eu/pub/pdf/scops/ecbocp137.pdf>

3 "The Swedish retail-payment market", Riksbank Studies, Sveriges Riksbank, June 2013: http://www.riksbank.se/Documents/Rapporter/Riksbanksstudie/2013/rap_riksbanksstudie_The_Swedish_retailpayment_market_130605_eng.pdf

4 See the speech given by Riksbank Governor Stefan Ingves on 4 June 2018 at the Stockholm School of Economics: https://www.riksbank.se/globalassets/media/tal/engelska/ingves/2018/tal_ingves_180604_eng.pdf

varies between the various Member States and different means of payment.

transactions has also risen sharply in both the European Union and France. In 2016, the total value of cashless payments made in the European Union neared EUR 267,800 billion. In France, over the

Alongside this growth in transaction numbers, the annual value of cashless

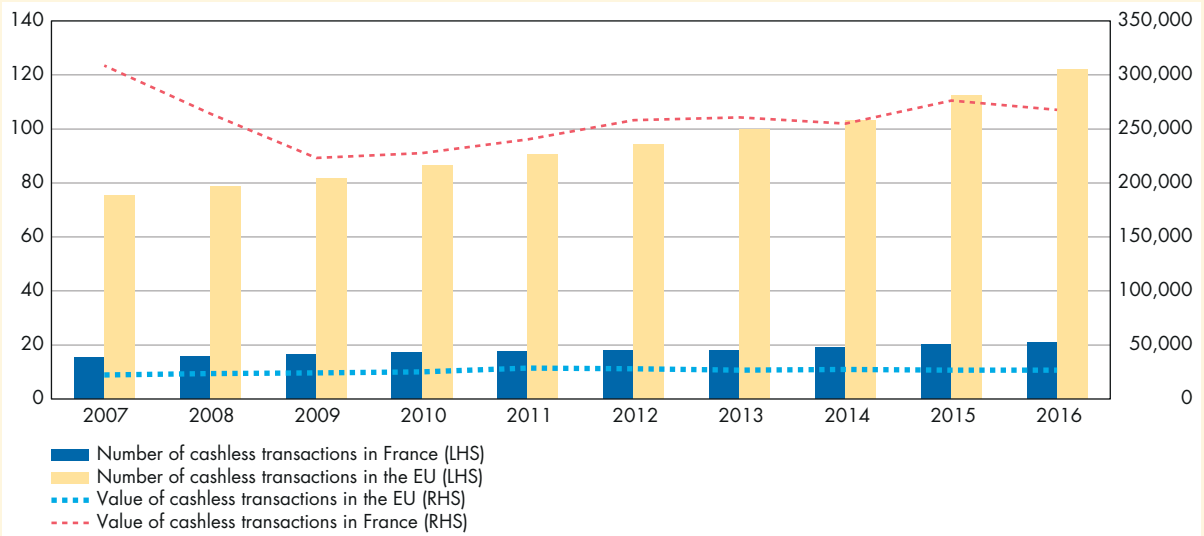
T1: Change in the annual number and total value of cashless transactions since 2006

(European Union and France)

		2009	2010	2011	2012	2013	2014	2015	2016
Annual number of cashless transactions (billions)	European Union	81.7	86.7	90.6	94.4	100	103.3	112.5	122
	O.w. France	16.4	17.1	17.5	18	18.1	19	20.2	20.9
Annual value of cashless transactions (€ billion)	European Union	220,260	226,950	242,650	258,200	260,700	255,000	276,300	267,800
	O.w. France	24,150	25,100	28,420	27,830	26,690	27,220	26,823	26,760

C2: Change in the volume and value of cashless transactions

(Number of transactions in billions, value of transactions in € billion)



Source: Banque de France

same period, the total annual value of cashless transactions rose, in a less linear fashion, to EUR 26,760 billion in 2016, representing 10% of the European total.

2.2. Breakdown of cashless means of payment used based on volume (number of transactions)

The breakdown of cashless means of payment used in the European Union, as in France, has reflected stable trends since the early 2000s.

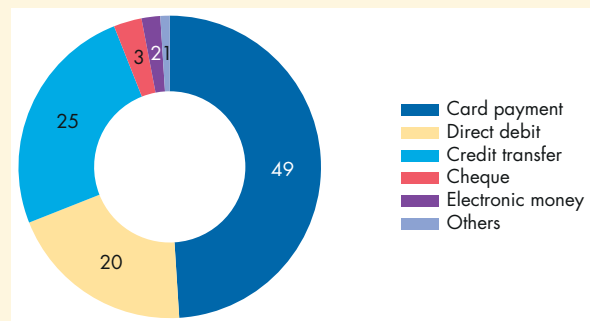
In the European Union, cards remain the most frequently used payment method (49% of total transactions, with almost 60 billion transactions in 2016) and their share of the total number of transactions conducted is rising steadily. Transfers are the second most popular payment method (25%), followed by direct debits (20%). However, the percentage of total transactions represented by these two means of payment has been stable for several years, despite continuous growth in the number of transactions made (31 billion and 25 billion, respectively, in 2016). Lastly, cheques rank fourth in terms of frequency of use, but now represent only a small fraction of transactions conducted (3%). This percentage has been falling for several

years, as has the number of payments made by cheque, which has halved since 2004, reaching 3 billion in 2016 (see Charts 3 and 4).

The breakdown for France differs slightly from that for the European Union. Payment cards remain the most frequently used cashless payment method, as in the rest of the European Union, representing over half of all payments made in 2016 (53%, or nearly 11 billion transactions). This means that the average French person used their card 165 times in 2016. The use of payment cards has been rising continuously since the beginning of the 2000s and cards became

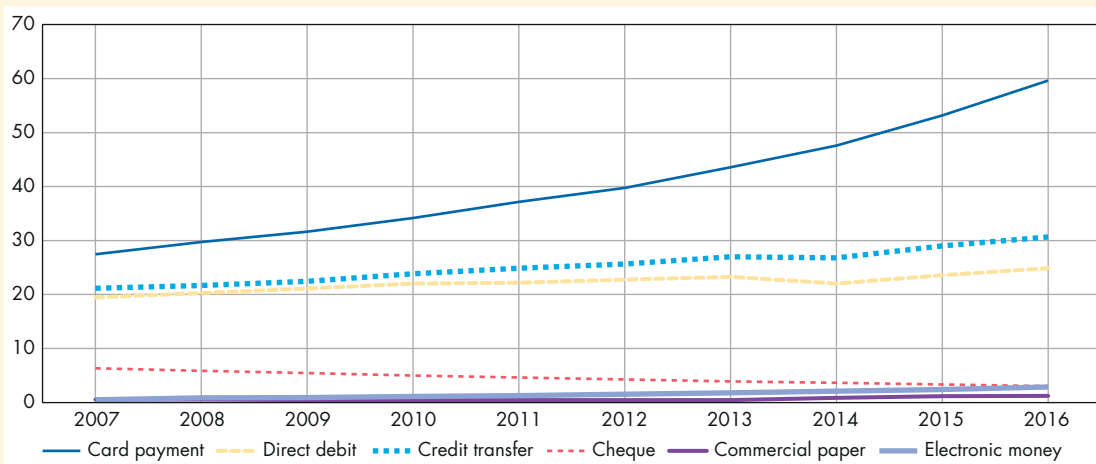
C3: Breakdown of cashless means of payment used in the European Union

(as a % of the total)



C4: Change in payment methods used in the EU in volume terms

(millions of transactions)



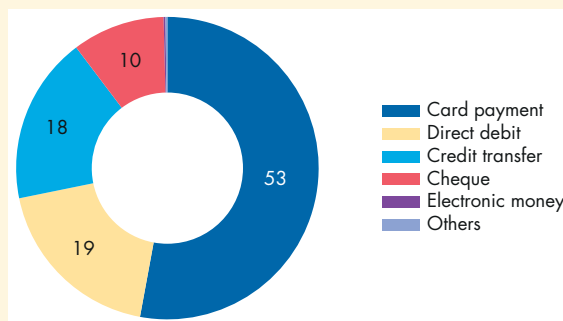
the leading cashless payment method in volume terms in 2003 (see Charts 5 and 6). A key factor driving this growth is the boom in e-commerce over the past decade, which has increased the use of cards for remote payments, together with the more recent development of contactless payment.

“Retail” direct debits and transfers¹⁰ are the second and third most popular cashless means

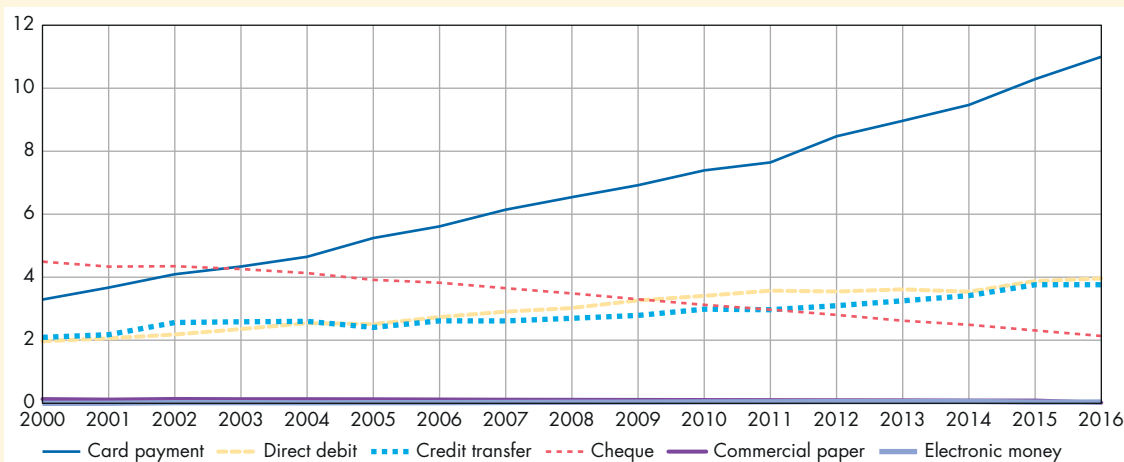
¹⁰ “Retail” transfers (or direct debits) are transactions executed via retail payment systems such as France’s CORE system (see Chapter 12).

C5: Breakdown of cashless means of payment used in France

(as a % of the total)



C6: Payment methods – relative growth trends



Source: Banque de France

of payment used in France, representing respectively 19% (3.9 billion transactions) and 18% (3.8 billion transactions) of the total number of cashless transactions recorded in 2016. This reflects French consumers' preference for direct debits, which, unlike in the European Union, remain more frequently used than transfers. The use of these two means of payment has been rising continuously in France since the early 2000s, albeit at a slower pace than payment by card. Growth has been driven by a number of factors, particularly legislative changes that make the use of these two methods compulsory for a larger number of purposes (e.g. the phasing in of the obligation for companies to pay tax and other similar charges electronically over the last few years and the requirement as of 1 April 2013 for notaries to use bank transfers for all incoming or outgoing payments above EUR 10,000) and the new channels for initiating these transactions that have emerged with the development of internet access.

Cheques are the fourth most frequently used cashless payment method in France, representing almost 10% of the total number of cashless transactions, i.e. 2.1 billion transactions in 2016. This ongoing use of cheques, on a much larger scale than in the European Union as a whole (where cheques make up only 3% of total transactions), is specific to France. In fact, cheque payments in France represent more than 70% of the overall number of payments by cheque recorded for the European Union. That said, even in France the use of cheques has been falling consistently since the beginning of the 2000s, when cheques were the most popular payment method. Cheques were hit by their incompatibility with e-commerce and other new uses linked to the extensive take-up of mobile internet, as well as by recent legislative developments (see above), which contributed to their gradual replacement by cards, direct debits and, to a lesser extent, transfers. As regards electronic money¹¹ and commercial paper, each of these methods represents a tiny fraction (less than 1%) of the total number of cashless transactions.

2.3. Breakdown of cashless means of payment based on value (transaction amount)

The breakdown of cashless means of payment based on value shows a very different picture than that based on volumes, both at the European level and in France.

In the European Union, transfers – particularly large value transfers (LVTs) conducted via dedicated payment infrastructures¹² – represent the bulk (93%) of cashless transactions in value terms, their share of value having grown in recent years. These are followed by direct debits, whose share of the total value of cashless transactions has been stable at 3% in recent years. Next come cards and cheques, each representing 1%, but with contrasting trends: cheques have declined continuously as a percentage of total transactions and in terms of amount since the start of the 2000's, while the opposite is true for card payments. Lastly, transaction amounts in electronic money continue to represent less than 1% of the total.

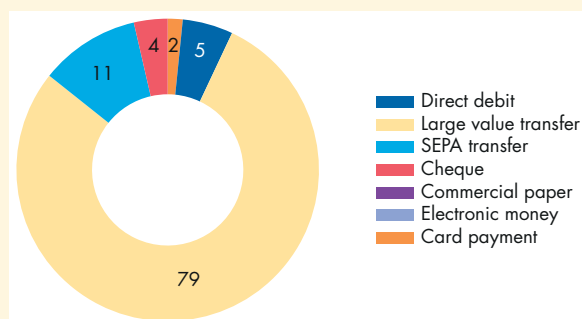
The breakdown for France reflects the broad trends seen at the European level (see Charts 7 and 8). Apart from LVTs, which logically represent the bulk of cashless transactions in terms of value (around 79%, for a total value of EUR 23,697 billion), SEPA transfers represent 11% of the total volume of cashless transactions. The average amount of an individual retail transfer

11 As electronic payment flows operate in a closed system, they are reported by the electronic money issuer and recorded in the accounts of the country of origin, regardless of whether they are used by nationals of other EU countries. This is notably the case of PayPal, Europe's leading electronic money issuer, which is based in Luxembourg and recognises all its payment flows in its Luxembourg accounts, regardless of the country in which PayPal users make their payments. These data collection rules explain why Luxembourg's payment flows represent 75% of the total value of electronic money payment flows across the European Union, while French flows appear to be very limited.

12 Link to Chapters 8 and 9.

C7: Breakdown of cashless means of payment in France based on value

(as a % of the total)



C8: Transaction amounts excluding transfers

(€ billion)



Source: Banque de France

(excluding LVTs), at EUR 1,485, shows that this payment method continues to be used primarily for transactions involving large amounts.

While direct debits and cheques differ in terms of their share of overall transaction volumes (19% and 10%, respectively), in value terms they carry similar weight (respectively 5% and 4% of the total value of cashless transactions, representing around EUR 2,590 billion overall, with similar average transaction amounts of EUR 377 per direct debit and EUR 504 per cheque). These two instruments have followed diverging trends, with cheque payment amounts falling and direct debit amounts rising sharply. The fact that these two instruments have similar profiles lends weight to the idea that, to date, direct debits have often been used instead of cheques in similar payment situations.

Lastly, while payments by card account for more than half of all cashless payments in volume terms, when it comes to value they represent less than 2%. This is because cards tend to be used by consumers for small purchases (averaging EUR 45 in 2016). As such, payment cards are increasingly seen as the most popular cashless payment method for everyday retail purchases in France.

3. Prospective developments in means of payment in Europe

There are two salient trends in the cashless payment sector in Europe today. Firstly, following on from the SEPA project, there is a strong trend towards integration and harmonisation in the European payment landscape, which is set to continue. At the same time, a wealth of innovative products are being developed, generally to enable users to benefit from payment solutions that are both faster and better suited to new technologies. However, the advent of these new payment solutions creates new risks which need to be fully understood.

3.1. Changes in the use of means of payment

Europe's means of payment sector has seen an unprecedented range of new uses arise alongside rapid advances in information technology over the last ten years. Expanding internet take-up and the development of increasingly powerful mobile devices have created a wealth of new channels for making and accepting payments.

As regards payment initiation (the consumer's side), one of the key developments of the last decade is the rise of contactless or "proximity" payment systems

(used at the point of sale), particularly via payment cards. In 2016, almost 60% of French cards were enabled for contactless payments¹³ and the number of annual contactless payments passed the one billion mark in 2017. The main new trend, however, is the growing use of mobile devices to make contactless payments either by card using the same technology as contactless payment cards (near field communication or NFC) or via transfers or direct debits using checkout terminals to communicate with a customer's smartphone and initiate payment orders. The major mobile manufacturers systematically equip their new generation devices with this technology (NFC, Bluetooth and Wi-Fi modules, barcode scanners using the built-in camera, etc.).

Another key trend in payment initiation is the growing tendency for consumers to use cards, transfers or direct debits for remote payments, usually online. Thanks to the spread of mobile internet and the proliferation of devices used to access the web (computers, tablets, smartphones, etc.), remote payments are one of the fastest-growing payment initiation channels today. For example, the volumes and amounts of remote payments by card rose nine-fold between 2006 and 2016. That said, remote payments by card remain much lower, both in volume and value terms, than proximity payments and ATM transactions, representing around 12% of payments. The rise in online payments also calls into question the distinction usually made between proximity and remote payments, since payments can now be made online using a mobile device at the same point of sale, for example.

Technological advances have also affected the ways in which payments are accepted (the merchant's side). For instance, devices such as smartphones can now be used by merchants as electronic payment terminals (EPTs) to accept payments by card. Technically, this can be done in two main ways: by using a simple application that displays a payment terminal interface on the smartphone screen and requires consumers to enter their data

in specified fields, or by attaching a card reader (traditional or contactless) to the smartphone, coupled with an application to process the customer's signature or PIN. These solutions, however, are not yet mainstream and are poised to take off among merchants and mobile service providers (tradespeople, etc.), for use as the main payment channel, as well as among large retailers, for use as a back-up if checkout queues get too long.

3.2. New payment technologies

The new means of payment in use largely rely on recent technologies geared specifically towards promoting their adoption by consumers.

In the case of contactless payments, card payments and most payments by smartphone use a secure physical component (the "secure element," usually an electronic chip) on which contactless payment software is installed. This component can either be "integrated" in the mobile's SIM¹⁴ managed by the operator, or, with some mobiles, it can be separate from the SIM, in which case services independent from the SIM and the mobile operator can be developed and integrated in the secure component. To make payments, the application uses a smartphone feature that enables messages to be sent wirelessly using near field communication so the application can communicate with the merchant's payment terminal.

An alternative technology, "host card emulation" (HCE), in use since 2012, enables mobiles to be used for contactless payments without the need for a secure element. It relies on integrating a software application in the device's operating system to enable payments to be made using wireless communication without routing data to a secure physical component. The main advantage of this technology is that it opens the gates to new players creating innovative mobile payment applications, which can now be developed without the need for expertise in electronic chip-related processes.

¹³ Data taken from the 2016 Annual Report by the Observatory for the Security of Payment Means.

¹⁴ The SIM (Subscriber Identity Module) card is the component that enables a phone to access a mobile network.

In the field of remote payments, the arrival of digital wallet applications means that payment card or bank account details can be transmitted to a trusted third party, so that consumers no longer need to enter them every time they make a payment. These solutions can be provided by a specialised company (such as PayPal or Paylib) or by a merchant on their website. They allow payments to be made not only between consumers and suppliers, but also between private individuals. Digital wallets can also be used to store other types of data such as loyalty card details. Some digital wallet applications can also be linked to contactless payment systems or used to make payments via social networks (such as hashtags used on Twitter, Facebook or LinkedIn).

Alongside these digital wallet services, new players are offering remote payment solutions via a different channel using their customers' online banking facilities. With these solutions, customers are redirected to their online bank when they pay. They must then enter their login details to connect to their account and approve the transaction, for which the details are automatically filled in. The advantage of this type of solution is that consumers do not have to disclose their bank details to a third party. The downside, however, is having to use online banking identifiers, which are considered to be sensitive data. The second European payment services directive (PSD 2), which came into force at the beginning of 2018, clarifies the management and security rules applicable to this new type of payment service (see Chapter 3).

While these new technologies meet the growing need to speed up payment transactions, they also increase the need for funds transferred by consumers to be made available to vendors as quickly as possible. This need can now be met by instant payment solutions, defined as electronic retail payment solutions available 24/7/365 and resulting in the immediate or close-to-immediate interbank clearing of the transaction and crediting of

the beneficiary's account (within seconds of payment initiation). These solutions rely on a reorganisation of interbank clearing and settlement channels to enable transactions to be settled more quickly (see Chapter 20). In Europe, work overseen by the Euro Retail Payment Board led to the EPC developing a new SEPA instant payment scheme (called SCT^{inst}), which is a variation of the traditional SEPA transfer (SCT) subject to execution deadlines (under 10 seconds) and the immediate crediting of the beneficiary's account. This new scheme, open to banks on an optional basis, has been operational since November 2017.¹⁵

The current situations in various countries show that the emergence of instant payment solutions is often closely linked to the development of new payment technologies, especially for initiating payments. For instance, India's instant payment system (Immediate Payment Service or IMPS), operated by the National Payments Corporation of India (NPCI) was launched in 2010, initially for mobile phone payments only, before being extended to online payments and transfers via ATMs. Moreover, several instant payment systems are explicitly geared towards new payment channels, namely the internet and mobiles. The system established in the UK (UK Fast) and that being developed in Australia (New Payments Platform or NPP) are good examples: the platforms set up to provide the service enable payers to give counterparties their phone numbers (or email addresses in the case of Australia) instead of their bank details,¹⁶ provided that this is allowed by their banks.

The development of these new payment technologies creates new challenges in terms of security, as shown in France by the high level of fraud connected with online card payments, which, in 2016, was almost 20 times higher than that connected with proximity payments.¹⁷ These factors are taken into consideration by the authorities in charge of supervising means of payment and the measures taken to address the associated risks are set out in Chapter 3.

15 Upon its launch, 585 payment service providers in 8 countries (Austria, Estonia, Germany, Italy, Latvia, Lithuania, the Netherlands and Spain), had joined the scheme and could make and accept instant payments. By mid-2018, the percentage of PSPs that have joined the scheme still varies widely from country to country: e.g. 4% in Italy, 18% in France, 26% in Germany and 71% in Spain.

16 See S. Bolt, D. Emery and P. Harrigan, "Fast Retail Payment Systems", Bulletin of the Reserve Bank of Australia, December Quarter, 2014 for further information on the various instant payment systems in use worldwide.

17 Data taken from the 2016 report by the Observatory for the Security of Payment Means.

Box 5: The role of public authorities in stimulating the development of means of payment, taking France's National Cashless Payments Committee (CNPS) as an example

The establishment of a French governance framework for cashless means of payment followed on from the process launched by the authorities at the end of 2014 to define development strategies for the payment market in France. This process was based on two pillars:

- the National Conference on Payments, arranged on 2 June 2015 by Michel Sapin, Minister for the Economy and Finance, supported by the Financial Sector Advisory Committee (CCSF), including the presentation of the results of a consultation process carried out throughout the first half of 2015 across the French means of payment sector;
- the Minister's October 2015 presentation of a National Strategy for Means of Payment, setting out the priorities assigned to the French community in the field of payments, in terms of action to be taken and institutional developments.

The objectives of the National Strategy for Means of Payment are three-fold:

- to better meet the expectations of users (consumers, companies, associations, merchants) in terms of speed and simplicity of payment transactions. This entails promoting the use of electronic means of payment, including standard transfers and instant transfers, as well as facilitating point-of-sale card payments and the most innovative new means of payment (contactless, mobile);
- reinforce the security of means of payment in an environment in which the proliferation of participants and payment solutions is creating new risks for users, financial institutions and payment systems. In this respect, the strategy provides for a broadening of the powers of the *Observatoire de la sécurité des cartes de paiement* (OSCP - Observatory for Payment Card Security) to cover all means of payment, thus creating the *Observatoire de la sécurité des moyens de paiement* (OSMP - Observatory for the Security of Payment Means);
- spur the development of innovative payment solutions and increase the competitiveness of the French payment industry, notably by creating incubators to support the sector.

The National Committee for Cashless Payments was set up in April 2016 to provide a forum for all French payment industry participants. It helps to ensure the proper implementation of the national strategy for cashless payments, launched by the Ministry for the Economy in October 2015, and to promote the French community's influence on developments in European payment systems. Thanks to the keen involvement of its members, from its first year in operation the Committee was able to fulfil its role by facilitating the first steps on the path to wider use of innovative electronic means of payment that are safe and effective, in order to better meet users' needs.

To that end, the Committee organised its work around three priorities:

- diversifying the payment channels offered by the public sector. The Committee opened a consultation on initiatives by players in the public and social spheres with the aim of providing contributors, taxpayers and users of public services with means of payment that better meet the needs of users (e.g. enabling them to pay for services by card or transfer) and those in the public sphere;

.../...

- promoting corporate use of new instruments in the SEPA range, particularly instant transfers, which are covered by a pan-European project overseen by the Euro Retail Payments Board. The Committee initiated operational and technical work to ensure the proper implementation of instant transfers in France. It also endeavoured to assess the accounting-related features of electronic payment orders such as SEPA transfers, which many companies cited as a crucial precondition for using these means of payment. The take-up of these means of payment must increase to provide an alternative to cheques as their usage declines, especially for payments between companies;
- the use of rapid, safe and accessible electronic payment instruments by the general public, including for small amounts. To this end, with the aim of enabling the public to benefit from innovations in payment channels, the Committee set up a system to monitor work being done in connection with commitments to break down the barriers to card payments being made from the first euro, in particular fees (by reducing the fixed component of commissions charged to merchants) and technical hurdles (conditions for the provision of devices to merchants). It also put monitoring in place for the use of contactless payments and undertook to actively monitor innovations in the payment industry.

CHAPTER 3

The security of means of payment

Updated on 17 December 2018

This chapter addresses the security challenges posed by means of payment and the mechanisms put in place to defeat fraud in all its increasingly sophisticated forms. The development of electronic means of payment is closely linked to advances in IT and communication technology. Since technological innovations also enable fraudsters to use more sophisticated techniques, the systems security mechanisms associated with means of payment must be upgraded regularly.

Security: a strategic challenge for the payment sector

Fraud hampers the general development of commercial ventures by damaging a company's image and trustworthiness in the eyes of users, and through entities' fear of their business being undermined by an organised attack and large-scale breach of payment data. In view of this, security is an absolute precondition for users' confidence in means of payment.

From the user's point of view, the added value of a means of payment boils down to three factors: ease of use, low or no cost, and security. When it comes to security, users tend to identify two key risks: the misappropriation of funds during the payment process, likely to result in immediate fraud, and theft of their bank details, which could lead to subsequent fraud.

This being the case, there can be disparities between the actual security of a means of payment and a user's perception of it. In practice, a user is more likely to consider a means of payment secure if they haven't lost money through it than because it is fraud-proof.

So, in order for consumers to adopt a means of payment, a delicate balance must be struck between, on the one hand, its cost and user friendliness, and on the other, the investments that payment service providers¹ must make to ensure that it is secure. Users will shun a means

of payment deemed to have too many security holes, but will also steer clear if its security mechanisms make it too complex or costly to use. This leaves limited room for manoeuvre in the development of advanced security technologies.

A payment service provider seeking to market a new means of payment must therefore find the middle ground to accommodate these two requirements. The resulting business model must also factor in the cost of fraud, since, in the event of an attack, the payment service provider is likely to sustain a direct financial loss. In some cases, it can turn out to be more profitable for a payment service provider, and more acceptable to users, to assume a certain risk of fraud and provide for its management than to go to extreme lengths to virtually eradicate the risk, if this complicates the "customer journey" so much that the payment is likely to fail.

This chapter begins by clarifying the concept of payment fraud and presenting the types of fraud identified and the associated techniques used by fraudsters. It goes on to set out the measures put in place across the European Union to enforce the rights of those who use means of payment and ensure the security of payment transactions. Lastly, it concludes with a description of the French framework for the prevention of payment fraud.

1. Payment fraud

1.1. Definition of payment fraud

In France, many criminal offences (scams, misuse of company assets, money laundering, concealment, etc.) can be linked to the use of a means of payment, without the security mechanisms put in place by the payment service providers necessarily being at fault. These types of fraud are not qualified as "payment fraud" in this chapter. Here, we have adopted a narrower definition of payment fraud, restricted to the unlawful use of a means of payment or

¹ Payment service providers (PSPs) are institutions authorised to open and maintain payment accounts for their clients and to issue means of payment. Within the meaning of French and European regulations, they include entities with the following statuses:

- credit institutions and their equivalents (as referred to in Article L. 518-1 of the French Monetary and Financial Code), electronic money institutions, payment institutions and account information service providers subject to French law;
- credit institutions, electronic money institutions, payment institutions and account information service providers subject to foreign law and authorised to practice on French soil.

related data, and any act that contributes to the preparation or performance of such unlawful use:

- **resulting in a financial loss:** for the account-holding institution and/or issuer of the means of payment, the holder of the means of payment, the legitimate beneficiary of the funds (the acceptor and/or creditor), an insurer, a trusted third party or any party involved in the design, production, transport or distribution chain of physical or logical data that could incur civil, commercial or criminal liability;
- **by whatever means, i.e. regardless of:**
 - the means used to obtain, without reasonable cause, the data or physical means of payment (theft, taking possession of the means of payment or data, hacking of acceptance devices, etc.);
 - how the means of payment or associated data was used (for remote or proximity payments or withdrawals, physical use of the payment instrument or related data, etc.);
 - the geographical region of issuance or use of the means of payment or related data.
- **and irrespective of the fraudster's identity:** third party, the account-holding institution and/or issuer of the means of payment, the lawful holder of the means of payment, the legitimate beneficiary of the funds, a trusted third party, etc.

1.2. Types of fraud

Identifying fraud techniques is by nature an ongoing quest: as security systems develop, fraudsters are constantly on the lookout for new flaws to exploit. And when anti-fraud measures are ramped up in one sector of the payment market, fraudsters can simply turn their attention to other less

secure sectors or regions. For example, the introduction of EMV² specifications for chip cards in Europe significantly improved the security of proximity payments, but also led fraudsters to target regions that had not adopted the EMV standard and focus their attacks in the euro area on card payments made remotely.

There are four broad types of fraud involving the various payment instruments:

- **counterfeiting:** fraud by issuing a false payment order using a lost, stolen or counterfeit payment instrument or misappropriated bank data or identifiers;
- **forgery:** fraud by using a forged payment instrument (an authentic payment instrument whose physical properties or associated data have been altered by the fraudster) or making changes to a regular payment order by modifying one or more details (amount, currency, beneficiary name, beneficiary account details, etc.);
- **misappropriation:** fraud in which the intention is to use the payment instrument or payment order as it stands, without changing any details (for example, cashing a non-forged cheque on an account that is not held in the name of the cheque's lawful beneficiary);
- **wrongful use/dispute:** fraud in which the legitimate holder of a means of payment disputes a payment order that he or she has regularly issued, acting in bad faith.

This typology, used together with nationwide statistics collected by the Banque de France, provides a common basis for fraud analysis by payment service providers. Depending on the purpose of the analysis, the typology can be used in conjunction with an analysis of:

- the **means of payment** targeted: payment card, transfer, direct debit, cheque or other instrument;

² EMV (for Europay, Mastercard, VISA) is an international security standard for chip cards, for which the specifications were developed by the EMVCo consortium, comprising American Express, JCB Cards, Mastercard and Visa. The EMV standard for proximity payments and withdrawals provides for the use of a chip attached to the card, coupled with the entering of a confidential code, a system commonly known as "chip & PIN".

- the **payment channel** used: proximity payment at the point of sale using a payment terminal or ATM, remote payment by Internet, mail, telephone or other means;
- the **loss sustained and its distribution** between the beneficiary's bank, payer's bank, merchant, holder of the means of payment, insurers where appropriate, and any other party involved;

Box 1: Types of fraud affecting common payment instruments

The four types of fraud take different forms depending on the payment instrument affected. The table below presents the most commonly observed fraud techniques.

T1: The main four types of fraud affecting common payment instruments

Type of fraud	Payment card	Cheque	Credit transfer	Direct debit
Counterfeiting	<ul style="list-style-type: none"> • The fraudster uses a lost or stolen card or an illegally obtained card number (for remote purchases) • A counterfeit card is created by the fraudster using data they have appropriated 	<ul style="list-style-type: none"> • The fraudster uses a lost or stolen cheque • The fraudster creates from scratch a counterfeit cheque, "issued" by an actual or fake bank 	<ul style="list-style-type: none"> • The fraudster places a fake transfer order • The fraudster takes possession of a person's online bank login details to initiate fraudulent transfers 	<ul style="list-style-type: none"> • The fraudster issues a direct debit order without a mandate or using a false mandate
Forgery	<ul style="list-style-type: none"> • The fraudster alters the magnetic strip data, embossed data^{a)} or programming of a genuine card 	<ul style="list-style-type: none"> • The fraudster intercepts a legitimate cheque and alters it by scratching, rubbing out or erasing the data 	<ul style="list-style-type: none"> • A legitimate transfer is intercepted and altered by fraudster 	<ul style="list-style-type: none"> • The fraudster replaces a legitimate creditor's account details with their own in a direct debit order or file
Misappropriation	<ul style="list-style-type: none"> • Payment or withdrawal under duress 	<ul style="list-style-type: none"> • The lawful holder of a legitimate cheque signs it under duress or manipulation 	<ul style="list-style-type: none"> • A legitimate account holder is forced or tricked into initiating a transfer to an account not held in the name of the legitimate beneficiary or lacking any underlying economic reality 	<ul style="list-style-type: none"> • The fraudster steals a third party's identity and IBAN number to sign a direct debit mandate on an account that does not belong to him/her
Wrongful use/ dispute	<ul style="list-style-type: none"> • The fraudster, acting in bad faith, disputes a valid card payment they have made 	<ul style="list-style-type: none"> • The legitimate holder of a chequebook deliberately writes a cheque that he or she previously reported lost or stolen 	<ul style="list-style-type: none"> • An account holder, acting in bad faith, wrongfully disputes a valid transfer that he or she initiated 	<ul style="list-style-type: none"> • A debtor, acting in bad faith, wrongfully disputes a valid direct debit order issued by the creditor (commercial dispute)

a) Modification of the raised card numbers embossed on the card.

- the **business sector** of the merchant that fell victim to fraud affecting remote payments: food & drink, online gaming, personal services, technical & cultural products, telephony & communications, etc.;
- the **geographical areas** of issuance or use of the means of payment or related data, depending on whether the banks of the payer and beneficiary are located in the same country or currency area.

Box 2: Payment fraud in France

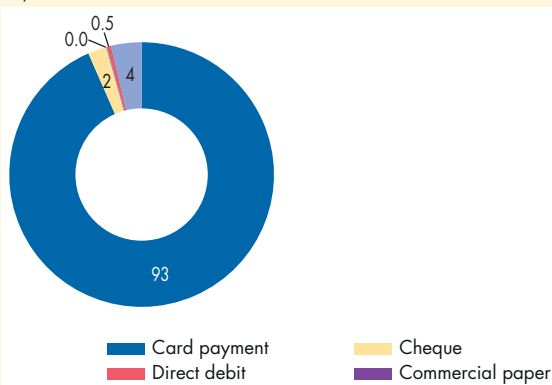
The data compiled by the OSMP *Observatoire de la sécurité des moyens de paiement* – Observatory for the Security of Payment Means) for 2016 shows the overall amount of fraud affecting cashless means of payment issued in France to be roughly EUR 800 million, for slightly over EUR 27,000 billion in total payments processed. The breakdown by means of payment shows the following profile:

- Card payments, given their prevalence (used in almost half of all cashless transactions), account for roughly 50% of fraud involving cashless means of payment (around EUR 360 million in 2017), with a fraud rate of 0.054%, i.e. one euro of fraud for every EUR 1,850 in transactions. This type of fraud has two main characteristics: firstly, it targets primarily remote payments, especially online payments, which account for two thirds of fraud in terms of amount but only 12% based on the number of transactions, and secondly, it affects cross-border transactions more than domestic transactions, with the former making up more than 60% of the fraud amount even though they account for just 13% of transactions conducted.
- Cheques are the second means of payment most affected by fraud, accounting for one third of the overall fraud amount (i.e. a fraud rate of 0.029%, representing one euro of fraud for every EUR 3,500 in payments made).
- Credit transfers show a lower fraud amount of around EUR 78 million and, proportionally speaking, are far less affected than cards and cheques, with a fraud rate that is more than sixty times lower.
- Lastly, direct debit and commercial paper fraud show the lowest fraud amounts, at around EUR 9 million and EUR 0.15 million respectively in 2017.

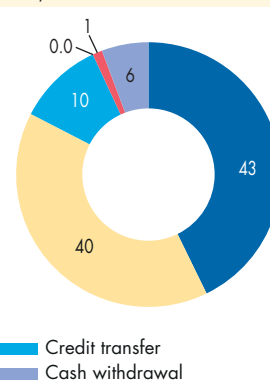
C1: Breakdown of fraud by cashless means of payment in 2017

(%)

a) Based on volume



b) Based on amount

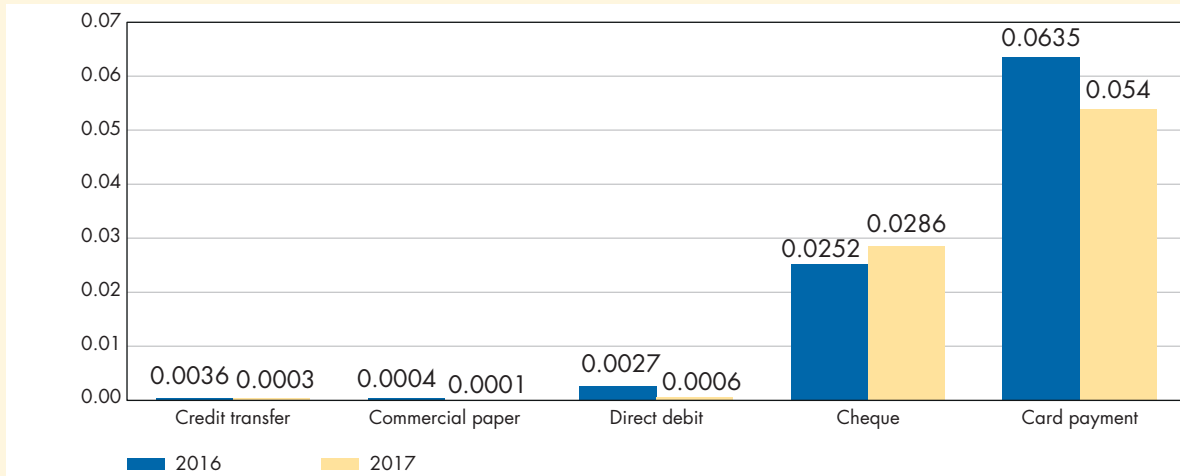


Source: *Observatoire de la sécurité des moyens de paiement*.

.../...

C2: Fraud rate broken down by cashless means of payment, 2016–2017

(%)

Source: *Observatoire de la sécurité des moyens de paiement.***1.3. Fraud techniques**

When analysing fraud, it is crucial to identify the technique used by the fraudsters. Alongside the development of electronic means of payment, fraudsters have increasingly targeted the data related to a means of payment or specific payment service. One difficulty this presents is that the data is transmitted along the entire length of the payment chain, so effective protection mechanisms must be provided throughout the chain, particularly at any sensitive points identified.

IT systems: the IT equipment (computers, smartphones, etc.) of consumers or merchants, and the databases of payment service providers and payment integrators for card-related payments, can be subject to attacks aiming to capture insufficiently secure data. The databases compiled at various stages in the payment process, containing data relating to a large number of transactions, have become magnets for fraudsters due to the sheer volume of data they contain that could be put to fraudulent use.

In order for fraudsters to launch this type of attack, they must first install malware

without the user's knowledge, typically through seemingly trusted sources. This fraud technique targets the servers of large companies, as well as individual users' PCs and, increasingly, mobile phones, which are becoming more widely used in payment transactions. One of the most popular types of malware, "keylogger", records the victim's keystrokes.

Internet: a fraudster can incite users to disclose personal data such as payment card details (card number, expiry date, security code on the back of the card) or authentication data (e.g. the mobile number to which codes are sent to confirm payment transactions). This technique, known as "phishing," is typically implemented by sending the victims emails bearing usurped logos and visual branding that is familiar to them (e.g. a credit institution's logo) asking them to log onto a (fraudulent) website, with the aim of obtaining sensitive data. Another variant of this technique, "vishing," targets mobiles, with fraudsters sending messages – SMS, MMS, notifications from the mobile network – with fraudulent intent.

Another technique known as "pharming" entails tampering with servers so that users of a website are unknowingly redirected to a fake website resembling the legitimate

site, which is then used to embezzle funds or obtain sensitive data.

Email, fax and telephone conversations: targeting transactions initiated by mail, fax or phone involving an element of manual processing, fraudsters record bank details during the payment or booking process in order to reuse them at a later date.

Acceptance systems and networks: with card payments, the acceptance devices (ATMs and payment terminals) and the networks that channel data between them and their acquisition servers can be targeted by attacks to misappropriate data.

The most frequently used technique, “skimming”, involves obtaining the data encoded on a card’s magnetic strip without the holder’s knowledge.³ An ATM’s entire front panel or card insertion slot can be faked to disguise an unlawful device. The device can also be linked to a video camera or fake keypad to obtain the user’s PIN and can contain systems to store or send compromised data.

Another technique involves retaining payment cards in an ATM for their subsequent use. Fraudsters insert a device in the ATM, observe the PIN being entered on the keypad, then take possession of the card once the user has departed. This technique is similar to the physical theft of payment cards.

Fraudsters can also exploit security holes in ATM or payment terminal software. They attempt to introduce malicious code in the systems so as to modify their behaviour or even take control of their components (keypad, screen and printer).

Lastly, attacks can target the networks themselves, when data is transferred between acceptance devices, payment integrators, when used, and acquisition servers.

Physical payment instruments: The physical theft of a means of payment, when the fraudster intends to use it in place of its legitimate holder, is the predominant kind

of attack. With payment cards, fraudsters try to obtain the PIN so that they can maximise their fraudulent use of the card in ATMs, payment terminals, online and through all other payment channels.

2. Combating payment fraud

2.1. Performance of oversight missions by the Banque de France

Given the wealth of payment services – and fraud techniques – in use, coordination is required between institutions and private sector players to ensure that payment services function properly.

In France, the oversight of cashless means of payment was entrusted to the Banque de France by the French law of 2001 on everyday security. It is codified in Article L. 141-4 et seq. of the French Monetary and Financial Code. The Banque de France is responsible for overseeing all cashless means of payment, together with specific electronic payment vouchers. The scope of its oversight mission is therefore extensive, given that Article L. 311-3 of the Monetary and Financial Code stipulates “any instrument which enables any person to transfer funds shall be deemed to be a means of payment, regardless of the medium or the technical process used”.

To exercise its oversight, the Banque de France relies in particular on the Observatory for the Security of Payment Means (OSMP), whose mandate is threefold:

- it monitors the implementation of measures adopted by issuers, merchants and companies to reinforce the security of means of payment;
- it compiles statistics on fraud;
- it maintains a technology watch, with the aim of proposing ways to prevent security breaches involving cashless means of payment.

³ For further details on this topic, see the OSCP’s 2010 report, <https://www.banque-france.fr/sites/default/files/medias/documents/oscp-rapport-annuel-2010.pdf>

Box 3: Observatory for the Security of Payment Means, a body specific to France

The Observatory for the Security of Payment Means (OSMP) is a national body whose purpose is to promote dialogue and consultation between all parties (consumers, merchants and companies, public authorities and administrations, banks and managers of payment means) involved in the smooth functioning of cashless means of payment and the fight against fraud.

Created by the French Law 2016-1691 of 9 December 2016, known as “Loi Sapin 2”, the OSMP succeeded the Observatory for Payment Card Security (OSCP) and took over all its missions within a wider scope covering all cashless means of payment (credit transfers, direct debits, payment cards, electronic money, cheques and commercial paper). The pivotal role in reinforcing card payment security that had been assumed by the OSCP since its establishment in 2002, coupled with the fact that innovative payment-related developments had reached a variety and breadth extending well beyond cards, prompted the French authorities to extend the Observatory’s remit to all cashless means of payment.

Chaired by the Governor of the Banque de France, the Observatory brings together representatives from a number of spheres: the State and Parliament, the banking oversight and supervisory bodies, the *Commission nationale de l’informatique et des libertés* (CNIL – the French data protection authority), issuers of means of payment, operators of payment systems, consumer associations, business associations and merchant associations.

The Observatory, whose secretariat is provided by the Banque de France, monitors security measures implemented by issuers, merchants and companies, compiles fraud statistics and maintains a technology watch in the payment sector with the aim of proposing ways to combat technological security breaches affecting means of payment. It produces an annual activity report that is sent to the Minister for the Economy, Finance and Industry and submitted to Parliament.

¹ These reports are published on the Observatory’s website: www.observatoire-paiements.fr

The Banque de France’s main objective in implementing its oversight mission is to ensure that the public remains confident when using means of payment. It does this by helping to spread good security practices among all parties concerned in a consistent manner throughout France. To this end, it performs risk analyses for each means of payment and establishes an oversight framework. By conducting document-based or on-site controls, it ensures that all the parties concerned, together with their technical service providers, comply with these standards. If the Banque de France finds that a means of payment lacks sufficient security guarantees, it can recommend that its issuer take all due measures to rectify the situation. Should the issuer fail to effectively implement these recommendations, after assembling the

issuer’s observations, the Banque de France may decide to draft a negative opinion for publication in the Official Journal.

As part of its supervisory role, the Banque de France can monitor all payment service providers (issuers, acquirers and managers of cashless means of payment) operating on French soil: banks, payment institutions and electronic money institutions. These institutions are authorised and supervised by the Autorité de contrôle prudentiel et de résolution (ACPR, French Prudential Supervision and Resolution Authority). Banque de France oversight can also extend to institutions that are exempt from ACPR authorisation but manage cashless means of payment that are accepted within a limited network or are used to pay for a restricted range of goods or services.

Box 4: Examples of security requirements included in the oversight framework

IT systems security

Measures to combat fraud must include, as a priority, the protection of personal data. IT systems must therefore meet security standards so as to limit the risks identified in the capture of data relating to means of payment. As a general rule, IT systems must be protected against internal and external threats. To that end, they must be subject to security reviews with a view to implementing protection mechanisms appropriate for the environment in which they operate. Systems managers must therefore develop a security policy and regularly assess the risks to which their systems are exposed. A number of methods are provided for this purpose, including Ebios (developed and maintained in France by *Agence Nationale de la Sécurité des Systèmes d'Information*, the national IT systems security agency) and the suite of ISO 27000 standards.

To ward off attacks on databases, the European directive on network and information security in the EU,¹ adopted on 6 July 2016, makes it a requirement for banks and online retailers to put in place data protection systems tailored to the risks identified and to report to the authorities any breaches of databases containing customer information, particularly if it is payment-related.

These security policies must also cover the security of data upon its input into a system. They must ensure the traceability of all access to the system for the purpose of entering or modifying data needed to conduct a transaction, so as to constitute a reliable audit trail. Data tends to be compromised at this point through misconduct by dishonest employees. Acceptance devices that limit interaction between merchants and means of payment must therefore be given preference. It is also important to restrict data access to individuals who are properly authorised and to ensure that sensitive data is not retained after it has served its purpose.

User awareness

Making users aware of security-related issues helps to combat social engineering attacks. Effective communication using all available channels (regular mail, email, websites, etc.) is therefore recommended for all parties involved in the payment chain, to ensure that users know the risk factors to look out for and the best practices to implement. Users must also be urged to use only trusted websites that meet the security standards set out in these documents.

Identification of risky transactions

The implementation of systems to analyse and exploit payers' personal data is a key area of development in terms of detecting fraudulent transactions. In recent years, this type of system has tended to collect an increasing amount and variety of data during online transactions in order to check the information for consistency and authenticate a payer's identity with more certainty. For instance, alongside the data usually gathered on a person's identity and contact details (surname, first name, postal address, delivery address, email address, phone number, etc.), fraud prevention tools have gradually added:

- the payer's consumption patterns (number and breakdown of orders, frequency and amount of purchases, age of the business relationship);
- the payer's location (e.g. the IP address of the computer used);

¹ Network and Information Security (NIS) Directive.

- the devices used to access the internet;
- behaviour-related data (time taken to fill in forms, input interface such as keyboard, etc.).

While using more criteria in transaction scoring has made these assessments more reliable, it also runs the risk of invading users' privacy. Players in the payment chain have taken data collection to a new level, shifting from a "declarative" approach, whereby users provide their own details, to the automatic gathering of data without users being systematically informed. This is why, in France, prior authorisation must be obtained for this type of processing from the data protection authority (CNIL), pursuant to the European Union's General Data Protection Regulation (GDPR).

In recent years, the Banque de France has conducted a number of on-site inspections covering, in turn, (i) the main French banking groups' preparedness for migration to SEPA payment methods, (ii) the security and proper management of cheque-related operations and (iii) the compliance of online payment administrative and management processes with European Banking Authority (EBA) guidelines. Following each of these inspections, the Banque de France issued a set of recommendations to the institution concerned. Its key recommendations were to reinforce mechanisms for monitoring clients' migration to SEPA, improve the quality of statistics on fraud reported to the Banque de France and enhance the quality of internal control frameworks.

In connection with its supervision of cashless means of payment, the Banque de France also issues advisory opinions for the ACPR on the technical, IT and organisational mechanisms put in place by companies seeking authorisation to operate as payment or electronic money institutions, in order to ensure that their means of payment are secure. These opinions are included in the file submitted to the ACPR banking sub-college responsible for granting the authorisation concerned.

The Banque de France reports on its supervisory activities relating to cashless means of payment in oversight reports published every three to four years.⁴

2.2. Parties involved in the fight against fraud

Alongside the work done by central banks in relation to their oversight of means of payment, law enforcement agencies play a crucial role in dismantling payment fraud networks. In France, law enforcement agencies operate within a tiered structure, whereby the national police force and gendarmerie have set up a number of specialised units:

- at the judiciary police headquarters, the department responsible for combating organised crime and financial crime (SDLCODF) is tasked with compiling information, conducting strategic analyses and maintaining relations with the authorities for issues involving specialised crime, among other areas. For this purpose, it has a number of central offices, some of which are actively involved in combating payment fraud, such as the serious financial crime office (ORCGDF) and the ICT crime office (OCLCTIC), which oversees the central unit for the prevention of payment card counterfeiting (BCRCCP);
- within the national gendarmerie, the technical department for legal research and documentation has a financial division and a division for the prevention of cyber-crime, in charge of coordinating and making use of legal information on criminal and other offences.

⁴ <https://www.banque-france.fr/liste-chronologique/rapports-sur-la-surveillance-des-moyens-de-paiement-et-des-infrastructures-des-marches-financiers>

These two divisions are deeply involved in combating payment card fraud;

- in addition to these specialist departments, technical departments carry out high-level technical investigations, namely the police force's department for IT and computer forensics and the digital and forensic engineering division of the national gendarmerie's institute for crime investigation.

At the level of both the police and the gendarmerie, this structure is backed up on the ground by investigators specialising in digital technology and cyber crime.

In addition, banks and, more generally, payment service providers, law enforcement agencies, accreditation bodies, specialised technical laboratories and the banking authorities have all deemed it necessary to put in place permanent cooperation

Box 5: GIE Cartes Bancaires and the fight against payment card fraud in France

In 1984, the French banking sector put a structure in place for card payments based on the bank card economic interest group, GIE Cartes Bancaires.¹ This group assumes the governance of the "CB" (bank card) payment system, as well as providing operational input and technical expertise. Its creation helped to support the development of interbanking for payment cards in France and the group has been given a pivotal role in the operational fight against fraud.

The group's anti-fraud measures involve the following activities:

- implementing tools to identify potentially fraudulent transactions and points at which data may become compromised, using real-time analysis of transaction data on the CB system;
- regularly working closely with law enforcement agencies, providing evidence for investigations;
- analysing and assessing all CB network components (cards, terminals, networks, etc.) via a dedicated subsidiary, the Elitt laboratory;
- certifying equipment authorised in the CB network (e.g. payment terminals, mobile payment solutions, etc.) via a dedicated subsidiary, PayCert.

The Visa, MasterCard and American Express international networks also developed similar tools for the benefit of their members.

Organisational structure of GIE CB and its subsidiaries



¹ GIE CB is an economic interest group consisting of around 130 institutions that provide payment services. Its missions include the governance, security and promotion of the CB system, as well as the development of products and services, and innovation in the field of payment systems in compliance with laws and regulations. As well as the CB system, the Group's objectives include development work and standardising security mechanisms specific to digital luncheon vouchers (hardware support).

structures. Lastly, depending on the matter concerned, bodies outside the banking sector, such as Europol, can be called upon to provide input.

2.3. Contribution of the global monitoring of innovations in means of payment

The Bank for International Settlements' Committee on Payments and Market Infrastructure (CPMI), which in 2014 succeeded the Committee on Payment and Settlement Systems (CPSS), has a mandate that covers retail payment systems and, by extension, means of payment. It monitors innovation in means of payment and is particularly interested in the position adopted by central banks in this field. In May 2012, it published a report on this topic.⁵

The report underscores the importance attached by central banks to promoting the use of secure and effective means of payment, while spurring innovation. It also lists the barriers to payment innovation and other general issues, such as the role of standardisation, the effect of having payment instruments that can be used differently in different countries and the role of the regulator. In terms of security, the report highlights the importance of sustaining users' confidence in payment services. Technology must be used to ensure that a payment instrument is effective. It must also make the payment process more fluid without introducing vulnerabilities in the payment chain that could be exploited by fraudsters, particularly as regards consent to execute a payment transaction.

Along these lines, the report underlines, for example, the progress afforded by EMV technology, such as the authentication of cards and payment terminals. As regards remote transactions, the following areas were singled out for attention:

- security conditions in situations where card data is retained by a merchant and/or its payment service provider;

- the use of powerful authentication mechanisms to effectively combat fraud. In this respect, the CPSS noted the effectiveness of mechanisms based on at least two authentication factors.

These considerations add weight to the regulatory decisions adopted in the European Union, as well as to the work done in France by the Observatory for the Security of Payment Means.

3. The European framework for payment security

3.1. Europe's legal framework for means of payment

The convergence of regulations applicable to the payment sector is a crucial component of Europe-wide integration in the payment sector, building on key policy initiatives such as the introduction of euro currency and the roll-out of SEPA payment schemes.

The first Payment Services Directive (PSD1)

The Payment Services Directive (PSD),⁶ which was adopted on 13 November 2007 and came into force in November 2009, set out common rules for the provision of payment services in Europe. It created a harmonised regulatory framework for payment services, while increasing both consumer protection and competition in the payment sector.

Rules applicable to payment services: by laying down rules for all "payment services" – which can be likened to transactions involving the "provision or management of means of payment" (see "payment services" box) – the Payment Services Directive differs from other legislation in that it is not based on the device used to initiate or accept payment or on the underlying technology. Moreover, it does not draw distinctions based on a payment service provider's legal status. This approach ensures that payment rules are applied consistently across the technologies used as they evolve

⁵ <http://www.bis.org/publ/cpss102.htm>

⁶ Directive 2007/64/EC of the European Parliament and of the Council of 13 November 2007 on payment services in the internal market, <http://eur-lex.europa.eu/legal-content>

Box 6: Payment services as defined in PSD1

The concept of “payment service” is not explicitly defined in PSD1. The Directive does, however, provide a restrictive list of business categories considered to be payment services. These categories, of which there are seven, are as follows:

1. Services enabling cash to be placed on a payment account as well as all the operations required for operating a payment account.
2. Services enabling cash withdrawals from a payment account as well as all the operations required for operating a payment account.
3. Execution of payment transactions, including transfers of funds on a payment account with the user’s payment service provider or with another payment service provider:
 - execution of direct debits, including one-off direct debits,
 - execution of payment transactions through a payment card or a similar device,
 - execution of credit transfers, including standing orders.
4. Execution of payment transactions where the funds are covered by a credit line for a payment service user:
 - execution of direct debits, including one-off direct debits,
 - execution of payment transactions through a payment card or a similar device,
 - execution of credit transfers, including standing orders.
5. Issuing and/or acquiring of payment instruments.
6. Money remittance.
7. Execution of payment transactions where the consent of the payer to execute a payment transaction is given by means of any telecommunication, digital or IT device and the payment is made to the telecommunication, IT system or network operator, acting only as an intermediary between the payment service user and the supplier of the goods and services.

A number of paper-based payment instruments fall outside the Directive’s scope, primarily cheques, postal orders and bills of exchange, the latter being governed specifically by international agreements.

The list of services was amended when the Directive was revised. The second directive (PSD2) includes, in particular, services provided by third-party payment service providers (see below).

and across the various types of provider, while taking into account the specific characteristics of the services concerned.

Some of the Directive’s provisions, such as those covering the revocation of payment orders, payment disputes and transaction execution, draw distinctions between payment services based on how they are initiated. Card payments are defined as

“transactions initiated by the beneficiary”. The other types of transaction are also referred to using generic terms, for example “transactions initiated by the payer” for transfers and “transactions initiated by the payee” for direct debits.

To clarify certain provisions, the Directive refers to the payment instrument used, or, to be more specific, to the presence

of “personalised security features”, i.e. components used to authenticate the payer. The articles concerned mainly refer to transactions made by card, by mobile if the payment application uses personalised security features, and using online banking. Lastly, the Directive provides for “light touch” regulations for “low-value” payment instruments, particularly in terms of disclosure requirements and disputes. These regulations apply only to payment instruments subject to a contractual restriction capping transaction amounts at EUR 30.

Disputing unauthorised transactions: the Directive provides for two arrangements, depending on whether or not the payment was authorised by the payer.

The first arrangement concerns unauthorised transactions: in practice, these include cases involving the loss, theft, or misappropriation (including fraudulent remote use and counterfeiting) of payment instruments. In such cases, the payer has a period of 13 months following the date on which their account was debited to dispute the unauthorised payment. The payment service provider must then, without delay, restore the account to the state in which it would have been had the unauthorised transaction not taken place. As soon as the payer becomes aware of the theft, loss, misappropriation or any unauthorised use of his/her payment instrument, he/she must inform the payment service provider accordingly.

Under the Directive, however, this arrangement does not apply to instruments equipped with personalised security features, which is notably the case of payment cards. In these cases, the payer can be expected to bear losses of up to EUR 150 resulting from any unauthorised payment made after a payment instrument is lost or stolen or “if the payer has not kept their personalised security credentials safe, following the misappropriation of a payment instrument”. Lastly, if a holder is proved to have acted fraudulently or with gross negligence before asking for their card

to be blocked, the holder will not be eligible for this reimbursement arrangement.

The second arrangement for disputing a transaction under the Directive concerns transactions subject to a general authorisation by the payer, where the transaction amount is not specified at the time of authorisation. This arrangement applies to direct debits and card payments made, for example, when booking a hotel or renting a car. In these cases, the payer who authorises a payment transaction has eight weeks from the date on which their account is debited during which to request reimbursement, if the final amount debited exceeds the amount the payer could reasonably expect to pay given their past expenditure, the terms and conditions of their framework contract and other circumstances relevant to the matter. Within ten business days of receiving a reimbursement request, the payment service provider must refund the full transaction amount or provide justification for refusing to refund the payment, indicating the bodies to which the payer may refer if he or she does not accept the justification provided.

Standardisation of reporting requirements associated with the provision of payment services: the Directive specifies the information that payment service providers must provide to their clients for one-off payment transactions and transactions conducted under a “framework contract”. This mainly comprises information on the payment service provider (name and contact details), use of the payment service concerned (consent format and procedure, execution time, ability to set spending limits for the instrument concerned), charges (including interest and exchange rates), reporting (frequency), safeguards and corrective measures (measures to be taken to keep an instrument safe, ability to block the instrument, liability of the payment service provider and payer, conditions for reimbursement, etc.), the amendment and termination of a contract (term of the contract, right of termination) and possible avenues of recourse.

The Directive also set out the terms and conditions for amending and terminating contracts between payment service providers and their users. This was the first time that such provisions had been included in French payment card contracts. The provisions for amending the terms of a contract were broadly in line with those generally used in French account agreements. The Directive states that a proposed amendment must be disclosed by the payment service provider no later than two months before it is scheduled to come into force. Unless the user explicitly rejects the amendment before it comes into effect, the amendment is deemed to have been accepted. If the user rejects the amendment, he or she is entitled to cancel the contract with immediate effect, free of charge, before the date on which the proposed amendment comes into effect.

As regards contract termination, the Directive imposes more substantial regulations, creating a framework that is slightly more beneficial to the users of payment services than that previously in force in France. For instance, a framework contract can be terminated at any time by the client, unless the parties have agreed on a period of notice, which can be no longer than one month. Such terminations do not incur fees if the framework contract has been signed for a fixed term of more than 12 months or if it has been concluded for an indefinite period. In all other cases, termination fees must be appropriate and in line with costs.

The second Payment Services Directive (PSD2)

The second European Payment Services Directive (PSD2), adopted on 25 November 2015,⁷ follows on from PSD1 and broadens the scope of payment services covered to include new services and players, while strengthening the security requirements applicable to participants in the payment sector. It came in to force in France, as in most Member States, on 13 January 2018.

PSD2 creates a payment service provider (PSP) status for third-party providers who access accounts held by “account servicing” PSPs (mainly banks) to initiate payments or consolidate account information:

- payment initiation service providers are intermediaries able to initiate payments, usually credit transfers, from a client’s online bank account. They provide this service to online retailers and their customers as an alternative to card payments or digital wallets;
- account information service providers consolidate information on the various accounts a customer may have with one or more payment service providers.

These activities were previously unregulated and carried a high risk of fraud, because users needed to disclose their online banking identifiers and access codes to a third party.

The Directive also sets out procedures to make payments safer in two key ways:

- strong account holder authentication is required to access accounts or carry out other online processes that carry high risks (such as creating a new beneficiary for transfers via a bank website);
- strong payer authentication is required to initiate electronic payments.

However, the regulations provide for exemptions to the strong authentication requirement in certain legally defined cases where transactions are deemed to be low-risk (e.g. low-value payments or transfers between accounts held by the same person).

Under this new framework, the regulation provides that bank identifiers can be shared with third-party PSPs in a secure manner, in particular by encrypting data. It also provides that third-party PSPs and account servicing PSPs, as well as users, should communicate securely using an interface, the characteristics of which are

⁷ Directive (UE) 2015/2366 du Parlement européen et du Conseil du 25 novembre 2015 concernant les services de paiement dans le marché intérieur, <https://eur-lex.europa.eu/legal-content/FR/TXT/?uri=CELEX%3A32015L2366>

specified in a level 2 regulation associated with the Directive, the Regulatory Technical Standards (RTS).

The European Banking Authority (EBA) was tasked with preparing, in close collaboration with the European Central Bank (ECB), regulatory technical standards setting out: (i) the requirements for, and exemptions from, strong customer authentication for securing transactions and access to accounts; (ii) the requirements for protecting

login identifiers; and (iii) the technical and operational procedures enabling banks, third-party PSPs and their clients to communicate securely. To allow time for players to adapt their IT systems and for the competent authorities to prepare to implement the associated monitoring frameworks, the Directive states that the requirements imposed by the regulatory technical standards will be applicable 18 months after they are adopted and published, i.e. from 14 September 2019.

Box 7: Strong customer authentication

The issue of making online payments safe was raised in 2008, within the Observatory for Payment Card Security at the instigation of the Banque de France. The recommendations issued by the Observatory in its 2009 annual report defined the concept of strong payer authentication and invited players in France's payment card sector to develop and implement authentication solutions in accordance with this definition.

The French example inspired the work subsequently carried out at the European level, firstly by the European SecuRe Pay forum (see below) then by the European Commission in preparation for PSD2. The new Directive defines strong authentication as a set of procedures based on the use of at least two of the following three components:

1. Something only the payer knows:

For example, a password, personal identification code (PIN), etc.;

2. Something only the payer possesses:

For example, a token, mobile phone, chip card, etc.;

3. Something the person is:

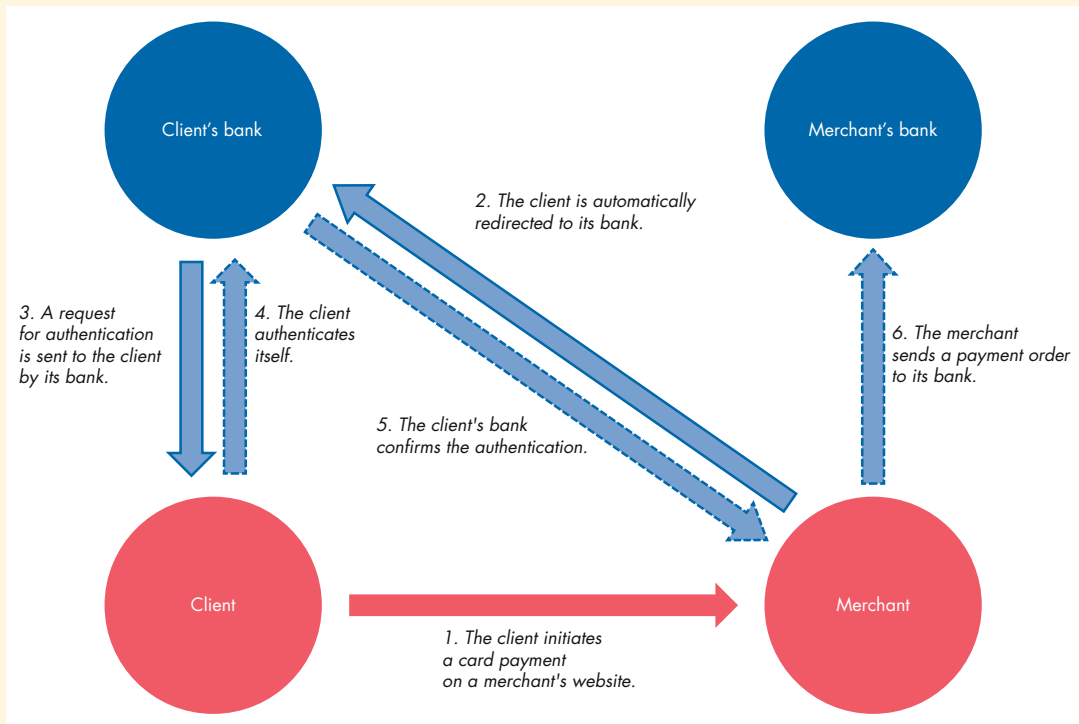
For example, a biometric element such as the payer's fingerprint or voice.

The components selected must be mutually independent, i.e. the breach of one component must not jeopardise the security of the others. In addition, at least one of the components must be non-reusable and non-replicable, i.e. it must not be able to be used in an identical way for two separate payment transactions (except for biometrics). Lastly, the strong authentication procedure must be designed to protect the confidentiality of authentication data.

Currently, the strong authentication component most frequently used for online payments is based on the use of a one-time password (OTP) given to payers using a variety of channels (SMS to a mobile phone, generated on the payer's online banking website, via a card reader or a token embedded in a key fob, etc.).¹ When a payment is made, the website puts the payer in touch with the card-issuing bank so that it can authenticate the payer using the "3D-Secure" protocol, which operates as shown in the chart hereafter.

¹ The Observatory for the Security of Payment Cards 2015 annual report contains a review of the strong authentication techniques most commonly used in France: <https://www.banque-france.fr/sites/default/files/medias/documents/oscp-rapport-annuel-2015.pdf>

Functioning of the “3D Secure” protocol



Box 8: Provisions of the RTS

Following the work carried out by the European payment security forum (SecuRe Pay, see below), which actively sought interaction with the market (publication of a discussion paper, followed by a public consultation), the regulatory technical standards (RTS) for PSD2 were adopted by the European Commission on 27 November 2017, after which date the European Parliament and the Council had three months to review them. Following the review period, delegated regulation (EU) 2018/389 on the RTS was published in the European Union Official Journal on 13 March 2018,¹ marking the beginning of the 18-month period after which the RTS will come into effect, on 14 September 2019.

With respect to strong authentication, the RTS provide for a number of exemptions:

- consultation of accounts (after an initial strong authentication);
- low-value payments (up to EUR 50 for proximity payments and EUR 30 for remote payments);
- payments via transport or parking payment terminals;
- payments to trusted payees;
- recurring transactions (except for the first time such transactions are initiated);
- payments to companies using secure transfer protocols;
- transactions deemed low risk by the institution holding the payer's account.

¹ Commission Delegated Regulation (EU) 2018/389 of 27 November 2017 supplementing Directive (EU) 2015/2366 of the European Parliament and of the Council with regard to regulatory technical standards for strong customer authentication and common and secure open standards of communication: <http://eur-lex.europa.eu/legal-content/FR/TXT/?uri=OJ:L:2018:069:TOC>

.../...

With respect to this last case, PSPs must ensure that the fraud rates on transactions eligible for exemption remain below the thresholds set in the RTS, as a function of the means of payment and amount concerned:

Transactions involving amounts above EUR 500 are not eligible for this exemption. Moreover, if the fraud rate thresholds are breached during two consecutive quarters, the PSP concerned will no longer be authorised to grant this exemption until its fraud rates return below the threshold.

T2: Maximum fraud rate

(%)

	On remote payments by card	On transfers initiated remotely
EUR 250 to 500	0.01	0.005
EUR 100 to 250	0.06	0.010
Up to EUR 100	0.13	0.015

As regards the **security of interfaces between account servicing PSPs and third-party PSPs**, the RTS make it mandatory to set up and use a dedicated interface that facilitates: (i) identification of the third party PSP by the account servicing PSP by means of certificates, as defined in the EU eIDAS Regulation, (ii) use of the authentication procedures provided by the account servicing PSP to the payment service user, and (iii) initiation of payment orders and receipt of the associated payment execution information.

The RTS provide for a six-month trial period for the interface before the regulatory standards come into force. Account servicing PSPs can opt to develop a dedicated interface or to allow third party PSPs to access accounts via the user's interface, once they have identified themselves.

For cases where the account servicing PSP opts to provide a dedicated interface, the RTS set out a number of provisions:

- The dedicated interface must have a similar performance level to that provided by the account servicing PSP to its users. The account servicing PSP must develop performance indicators to ensure that this is the case. The competent national authorities must then ensure that third party PSPs meet their obligation to use these interfaces for access at all times;
- Should the dedicated interface become unavailable (inadequate performance), the account servicing PSP must allow third party PSPs to make use of its client-facing interface (using web scraping or screen scraping methods) with a mechanism to identify third party PSPs. Such access must be provided when an access request has been refused five consecutive times within a 30 second period. When the fallback interface is used, third party PSPs must be able to provide justification for this use to the competent authority in their country and must retain a list of accesses to be provided to their competent authority if it so requests;
- The competent national authorities can, after consulting the EBA, exempt account servicing PSPs from providing fallback interfaces if their dedicated interface meets the RTS standards, especially if it has been tested during the six-month period provided for that purpose and has been in use for three months. This exemption must be withdrawn by the national competent authority if the interface ceases to meet the RTS requirements and if the account servicing PSP is no longer able to resolve malfunctions in a two-week period. In such cases, the account servicing PSP must provide a fallback interface within two months.

3.2. The framework for European oversight and its development

The creation of the Single Euro Payments Area (SEPA, see Chapter 2) makes central banks jointly responsible for the security of means of payment of common interest. The Eurosystem therefore developed oversight frameworks applicable to pan-European means of payment, based on the provisions of the Treaty⁸ and the Statutes of the European System of Central Banks and the ECB⁹ relating to promoting the proper functioning of payment systems:

- In January 2008, an initial oversight framework¹⁰ was developed by the Eurosystem to assess the security and effectiveness of card payments systems. It enabled the Eurosystem's central banks to implement harmonised oversight and obtain a coherent, standardised overview of card payment systems;
- Oversight frameworks for SEPA direct debits¹¹ and credit transfers¹² were established in August 2009 and October 2010, respectively. They rely on a structure similar to that designed for the oversight framework applicable to card payment systems.

Assessment guides were published for each of the three oversight frameworks to clarify the Eurosystem's expectations. They were updated in 2014 and 2015 to include, in particular, the security recommendations for online payments published by the European Forum on the Security of Retail Payments (SecuRe Pay forum, see below), reiterated in the EBA guidelines issued in December 2014.

On the basis of these oversight frameworks, the Eurosystem conducts oversight exercises among market players. Payment cards were the first cashless means of payment to benefit from joint central bank oversight: 2008 saw the launch of a Europe-wide assessment of all national and

international card payment systems in use across the EU. This exercise was repeated in 2016, following the publication of EBA security guidelines for online payments, which have now been incorporated into the oversight framework. More recently, in 2016 the Eurosystem completed an oversight exercise covering SEPA direct debits and launched a similar exercise covering SEPA credit transfers.

As part of their oversight mission, the ECB and national central banks ensure that statistics on payment card fraud, covering all card payment systems in use, are compiled annually at the European level. In the coming years, similar exercises should be rolled out for statistics on fraud involving credit transfers and direct debits.

3.3. Work conducted by the SecuRe Pay forum

Set up in February 2011, the SecuRe Pay forum brings together central bankers and banking sector supervisors. Co-chaired by the ECB and EBA, its purpose is to promote dialogue between national authorities, with a view to establishing a common approach to the security of means of payment.

The first set of recommendations published by the SecuRe Pay forum in January 2013 concerned the security of online payments. The key measure recommended in this first document involved the broad implementation of strong payer identification when initiating online payments, but the forum also addressed a wealth of other measures to make online payments more secure, including the general monitoring and security environment put in place by payment service providers, the building of customer awareness of fraud-related risks and the communication channels used between payment service providers and their customers.

Lastly, the forum also looked at risks associated with the activities of unregulated new players positioning themselves as "third party payment service providers" so

8 Article 127.2 of the TFEU: "The basic tasks to be carried out by the ESCB are: defining and implementing the Union's monetary policy; conducting foreign exchange transactions in compliance with article 219; holding and managing the official reserves of Member States; promoting the proper functioning of payment systems."

9 Articles 3.1 and 22 of the statutes of the ESCB and the ECB.

10 "Oversight framework for card payment scheme standards", January 2008, <http://www.ecb.europa.eu/pub>

11 "Oversight framework for direct debit schemes", August 2009, <http://www.ecb.europa.eu/pub>

12 "Oversight framework for credit transfer schemes", October 2010, <http://www.ecb.europa.eu/pub>

as to offer “payment initiation services” and “account information services”. The forum’s recommendations, aiming to ensure that satisfactory security conditions were in place for the roll-out of these services, were published in March 2014¹³ following a public consultation.

A number of the SecuRe Pay forum’s recommendations were included in the revised version of the payment services Directive (PSD2). It was also through the SecuRe Pay forum that the RTS and the guidelines given to the EBA for its

formulation of the PSD2 requirements were developed.

To ensure consistent implementation of PSD2 across the European Union, the EBA was tasked with developing, in close cooperation with the ECB, not only the regulatory technical standards (RTS) referred to above, but also guidelines covering, among other aspects, the requirements for managing operational and security risks associated with the provision of payment services, and specifications for the framework for reporting major incidents to the competent authorities.

¹³ The recommendations can be consulted on the ECB website: <http://www.ecb.europa.eu/pub>

CHAPTER 4

The economics of means of payment

Updated on 17 December 2018

Means of payment act as vehicles for trade and, as such, are crucial to the mechanics of our modern economies. To drive this point home, just imagine a world that has no means of payment commonly accepted by all economic agents: in a world like this, any buyer or seller would face substantial costs. By giving all economic agents access to standardised means of payment that are widely accepted and sufficiently secure, we break down these barriers, allowing trade to flow much more freely.

Even though means of payment perform such a vital function, most people know little about the role they play in the economy. This chapter purports to shed light on the relationships between means of payment and the economic sphere. It begins by explaining the links between means of payment and economic activity, focusing on the costs to society of various means of payment. It goes on to address the specifics of the retail payments market, listing the factors that drive demand for means of payment and providing details on how the market is structured. Lastly, it describes the market's shortcomings, which justify intervention by public authorities to ensure that the sector functions properly.

1. Means of payment and economic activity

1.1. Means of payment and consumer behaviour

Means of payment perform multiple functions, meeting a range of needs for economic agents, from facilitating one-off payments face-to-face to settling regular bills via remote transactions. Research has shown that some of these functions have a direct impact on consumer behaviour. For instance, US studies identified a link between households' propensity to consume and their use of means of payment that give access to a line of credit (Bounie, 2009). Durkin, in his 2000 report, attributed the increase in credit card ownership among US households

to the fact that these cards had gradually replaced the former consumer loans granted by retailers: based on the US Federal Reserve "Survey of consumer finances", 16% of households polled had a credit card in 1970, but by 1998 the percentage had climbed to 68%, of which 55% had credit lines carried forward from month to month, versus just 37% thirty years earlier.

Even without such credit facilities, French research showed that certain aspects of the means of payment used affect the timing of households' consumption expenditure. Households with deferred debit cards tend to smooth their consumption over the month, while those holding immediate debit cards concentrate their spending in the days after their wages are paid (Bounie, 2009).

1.2. Means of payment and growth in economic activity

Beyond these microeconomic considerations, some empirical studies show that the adoption of electronic means of payment boosts growth. Based on a sample of 12 European countries, Humphrey et al. (2006) found that payment sector-related costs borne by banks fell 24% between 1987 and 1999. The authors attribute this decline to the increased use of electronic payments and the fact that bank counters were being replaced by ATMs. By extrapolating the results obtained for the 1987-1999 period, they estimated that, if all paper-based means of payment were discontinued and all individual bank counters replaced by ATMs, the resulting annual savings would approach one percentage point of GDP. In a 2013 report published by the ECB, Hasan et al. obtained similar results, confirming the positive correlation between the take-up of electronic payment and growth in economic activity. In their model, the correlation is strongest for payment cards: they estimate that a 1.2% rise in payment card use in Europe would increase GDP by 0.07%.

These results directly relate to the question of how much the various means of payment cost society in general, and the banking

sector in particular. The upturn in growth as electronic payment methods are increasingly adopted in place of the formerly prevalent paper-based instruments stems from efficiency gains. One benefit of the new electronic payment methods is that they facilitate fully automated “straight-through” processing of payments, limiting the need for human intervention. A 2003 study by Berger illustrates this point by putting an exact figure on the operating cost cuts achieved at the main US clearing house when it modernised its technical infrastructure: in the space of ten years, its unit cost per trade was divided by almost eight, falling from USD 0.869 to USD 0.176 between 1990 and 2000.

1.3. The cost of means of payment

Studies on the cost of means of payment are few and far between, as it is difficult to obtain reliable information on the costs borne by the various users of means of payment and payment service providers. There has, however, been a resurgence of interest in this topic since the early 2000s.

Based on a survey carried out by De Nederlandsche Bank (the Dutch central bank) among banking sector players and retailers, Brits and Winder (2005) estimated the cost of proximity payments to Dutch society (defined as the sum of the internal costs of all parties in the payment chain) at EUR 2.9 billion in 2002, i.e. 0.65% of the Netherlands’ GDP. They identified cash as the costliest means of payment for society, even though it showed the lowest average cost per transaction. This rather contradictory finding reflects the substantial fixed costs associated with electronic payments which, given their low level of use (at the time of the survey, they accounted for only 14.5% of transactions), could not be amortised over the period considered. Based on variable costs alone, however, electronic payments were found to be less costly to society than cash payments, especially because the values of the underlying transactions are high. Based on Brits’ and Winder’s calculations, if 21% of cash payments were replaced by debit card or electronic money

payments, the resulting savings would total EUR 106 million.¹ The Banque Nationale de Belgique (2005) obtained similar results from a survey carried out in 2003 across the financial sector and points of sale: if 11% of cash payments were replaced by payments using debit cards or “Proton” digital wallets, the cost to society would fall by EUR 58 million.² This represents a saving equal to 2.9% of the overall cost to Belgian society of proximity payment methods, estimated in 2003 at EUR 2.03 billion (0.74% of GDP).

A study published by the ECB in 2012 (Schmiedel et al.) broadened the scope of research, analysing the cost of means of payment in 13 European countries.³ Based on four separate questionnaires for, respectively, central banks, the banking sector (banks and clearing houses), companies in direct contact with consumers⁴ and cash transport companies, the study estimates the social and private cost of the most frequently used means of payment in Europe, i.e. payment cards, credit transfers, direct debits, cheques and cash. It found that cash was the least costly means of payment for society, with a unit cost of EUR 0.42 per transaction, followed by debit cards with a unit cost of EUR 0.70. The authors attribute this finding to the maturity of the cash segment, in which significant economies of scale could be achieved relative to the payment card segment, where the roll-out of payment terminals and ATMs remained limited in some countries covered by the study. The unit costs of direct debits and credit transfers were estimated at EUR 1.27 and EUR 1.92, respectively. Lastly, the means of payment showing the highest costs to society were cheques, with a unit cost of EUR 3.55, and credit cards, with a unit cost of EUR 2.39. The overall cost of means of payment was found to be 0.96% of GDP, of which 51% borne by the banking sector and 46% by retailers. Cash was found to represent almost half of these costs, highlighting its prevalence as a means of payment in the countries covered and the fact that the study’s results are difficult to extrapolate

1 Based on a scenario whereby 500 million payments in cash with an average unit value of EUR 3 are replaced by payments using digital wallets, and 1 billion payments in cash with an average value of EUR 20 are replaced by debit card payments.

2 Assuming that 750 million payments in cash are replaced by 250 million payments with an average value of EUR 5 using Proton digital wallets and 500 million payments with an average value of EUR 20 using debit cards.

3 Denmark, Estonia, Ireland, Greece, Spain, Italy, Latvia, Hungary, the Netherlands, Portugal, Romania, Finland and Sweden.

4 Professional and mass-market retailers, telecom companies, real estate players, public utilities (electricity, water, gas and transport companies).

across the European Union as a whole. The sample used for the study represents only 30% of the cashless payment sector and 45% of the cash payment sector in Europe.

1.4. Means of payment and economic development

When it comes to assessing how the take-up of innovative payment methods affects growth in developing countries, economic research is rather thin on the ground. This is because these countries generally lack the infrastructure needed to put the new solutions in place and, more importantly, they have a much lower percentage of households with bank accounts than developed nations.

The positive impact that migrants' money transfers have on the development of the financial sectors in the countries on the receiving end of the remittances would be stronger if the transfers were made via official channels, i.e. financial institutions. When money transfers take the official route, the institutions involved can obtain more information on the recipient families and can encourage them to open a current account or even take out a loan backed by the remittance flows they receive (Rocher and Pelletier, 2008). The formalisation of money transfers would thus help to promote financial inclusion among the poorest households in developing countries.

Another factor often cited as being conducive to bank account take-up in these countries, especially in Sub-Saharan Africa, is the rising use of mobile phones to make deposits and withdrawals using non-bank networks.⁵ In fact, the mobile penetration rate is particularly high in Sub-Saharan Africa, which, in 2016, had 420 million unique mobile subscribers and 730 million connections, according to GSMA, the global association for mobile network operators. For instance, in 2004, South Africa became the first country to authorise a "mobile money" service (linking a digital wallet to a mobile phone number so that transactions can be conducted using phone numbers).

Given the large pool of potential users, a wealth of pilot schemes were launched following the resounding success of the M-Pesa solution in Kenya, now used by more than 50% of the country's adult population. In 2014, nearly 16% of Sub-Saharan Africa's adult population were using mobile phones to pay bills or send money, versus less than 5% in the rest of the world (Sy, 2014).

Given the lack of research on the macroeconomic effects of these new payment services, we can only rely on inference. For example, as empirical studies have shown a positive correlation between the expansion of financial services and economic growth (Sahay et al., 2015), we can reasonably assume that the development of new payment services – which substantially broaden the financial services available in these regions and increase financial inclusion – has the potential to boost economic activity (CPMI and World Bank, 2016). This assumption should be treated with caution, however, because the case for a linear relationship between financial services development and economic growth remains much debated (Cecchetti and Kharroubi, 2012).

2. Determinants of the use of means of payment

Economic literature tells us that all means of payment are not created equal in terms of their contribution to growth and cost to society. The challenge is therefore to find out which factors influence economic agents when choosing how to pay for a purchase. Put simply, we must identify the factors that cause people to hold and use a means of payment.

In an article published in 2006, Bounie and François present a review of the theoretical and empirical literature on this subject. Apart from demographic and socio-cultural factors – such as education, income and age – they identified three key determinants of the use of means of payment: their cost and the charges associated with their use, the value

⁵ Usually made up of mobile money dealers and partner points of sale.

of the goods or service being purchased, and users' confidence in their security.

2.1. Foundation model: the cost-based approach

As the starting point for their review, Bounie and François take the work done by Baumol (1952) on cash holding. In this seminal work, Baumol devises a simplified model in which a representative agent regularly spends a total amount of money over a given period. For this expenditure, the agent can opt to take out a loan or make cash withdrawals at regular intervals over the period concerned. In both cases, the agent has the same opportunity cost, i.e. the interest rate, plus brokerage commission on cash withdrawals. Assuming that the agent acts rationally, seeking to minimise their costs, the model implies that their cash holding will be proportional to their expenditure level.⁶

In order to extend Baumol's analysis to other means of payment, the associated opportunity costs must be identified. This is difficult to do, however, because means of payment are very often paid for in the form of flat-rate fees covering more than one means of payment at a time. Humphrey et al. (2001) based their work on a pay-as-you-go policy adopted in Norway at the end of the 1980s, so as to estimate the direct impact of a means of payment's pricing on its users' payment behaviour. Their results corroborate the intuitive view that a payment instrument's price has a direct impact on its level of use. They found that price elasticity is statistically significant and negative for cheques and bank cards. In other words, demand for these two means of payment falls if the associated charges increase. The authors also found that point-of-sale card payments had largely replaced payments by cheque (strong cross price elasticity) over the period considered.⁷

6 The cash holding that minimises the agent's costs is equal to the square root of the total expenditure, i.e. $C = \sqrt{(2bT/i)}$. With C = unit withdrawal amount; T = total amount of expenditure; b = fixed brokerage fees; and i = interest rate.

7 The data used in the study covers the period from 1989 to 1995.

Box 1: Cashless means of payment – a rival for cash?

Many specific research studies have explored how a change in the price of one means of payment affects demand for others. Most of them focus on the correlation between the roll-out of payment terminals and ATMs – which reduces transaction costs for card payments – and demand for cash.

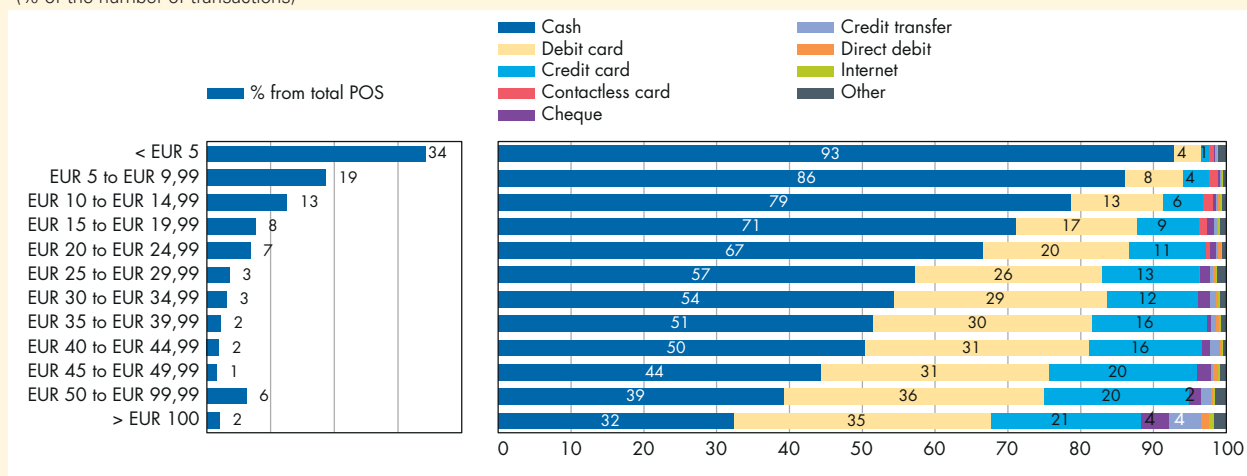
To examine how the modernisation of means of payment affects demand for cash, Drehmann et al. (2002) analysed annual data for 18 OECD countries from 1980 to 1998. Their findings show that the deployment of payment terminals had a negative impact on demand for low-value banknotes, while that of ATMs had the opposite effect. Cabré-Valverde and Fernández arrived at the same conclusion in their 2009 study. Based on data for Spanish banks from 1997 to 2004, they found that the negative impact of the roll-out of payment terminals on demand for cash was stronger than the positive impact of the deployment of ATMs over the same period.

A study published the same year by Columba expressed this relationship in figures. According to the author's calculations, based on money supply data in 95 Italian provinces following the introduction of the euro, a 1% increase in the number of payment terminals results in a 0.36% decrease in demand for cash. Overall, the roll-out of payment terminals and ATMs was found to increase the M1 monetary aggregate and change its composition, with a reduction in monetary assets held in the form of cash holdings and an increase in those in the form of demand deposits.

This substitution effect had already been pointed out in 1996 in a study by Porter and Judson. Based on a sample of 14 countries, the two authors identified a positive correlation between the velocity of money circulation and the number of cashless payments made per capita, supporting the assumption that widespread use of cashless payments reduces cash holding and increases the velocity of money circulation.

Box 2: Means of payment used at the point of sale by purchase amount in Europe

(% of the number of transactions)



Source: European Central Bank

The study on the use of payment instruments by European consumers, conducted in 2016 under the aegis of the European Central Bank, highlights the preferred uses of the different payment instruments. Thus, while cash is predominantly used for the payment of small amounts (93% of payments under EUR 5), it accounts for the lion's share of intermediate payments, up to about EUR 40. Above EUR 45, payment cards become the main means of payment at points of sale.

At the aggregate level, the study shows that cash is used in 79% of point-of-sale transactions and accounts for 54% of amounts traded in the euro area. In France, which ranks among the countries whose consumers have the least recourse to cash, these shares stand at 68% and 28% respectively.

2.2. Purchase value of the underlying goods or services

Another determinant of the holding and use of means of payment is the purchase value of the underlying goods or services. In their review of economic literature, Bounie and François present the theoretical model developed by Whitesell (1989), in which economic agents can opt to hold their assets in the form of cash or place them in an interest-bearing deposit account. The deposit account can be used for cash withdrawals or payments by card or cheque. While holding cash only incurs an opportunity cost linked to the interest rate, the use of cards and cheques involves fixed and variable costs for each transaction, such

as the fees charged for using these means of payment and the time spent entering the PIN when paying for purchases by card. Economic agents must therefore choose between the opportunity cost associated with cash and the transaction costs incurred by the other means of payment. On this basis, the use of cash should be restricted to low-value purchases, for which the opportunity cost is lower than the fixed costs associated with cashless means of payment (Bounie and François, 2006).

This analysis is confirmed by a survey conducted in 2016 by the Eurosystem, which measured the impact of purchase value on the choice of the means of payment used at the point of sale.

These results were confirmed by similar studies conducted in other currency areas:

- In the United States, a study by Klee in 2004 based on more than 10 million transactions conducted across 99 US food stores between September and November 2001, found that almost 93% of purchases under USD 5 were paid for in cash (Klee, 2008). The percentage dropped to 82% for purchases of between USD 5 and USD 10. At the other end of the scale, only 15% of purchases exceeding USD 150 were paid for in cash. Based on this data, Klee estimated that a 10% increase in purchase value reduces the probability of payment in cash by 11%;
- In Canada, in a 2011 study analysing the results of a survey commissioned by the Bank of Canada, Arango et al. obtained very similar results: cash was used in 72.8% of purchases under CAD 15 but only 16.7% of purchases over CAD 50. Beyond the fixed costs associated with cashless payments, the authors attribute this correlation to the limited acceptance of cash alternatives for low-value purchases. They also found that the loyalty schemes operated by banks have a strong influence on the means of payment chosen by users, since, in practice, these schemes reduce the variable cost associated with the use of a given means of payment.

2.3. Users' confidence in means of payment

Lastly, the holding and use of means of payment can be directly affected by the user's perception of how secure they are. Although this is a more recent area of research, most of the work done confirms that there is indeed a link. An empirical study by Kosse in 2010, based on a survey of 2,000 Dutch households, shows that consumers who deem cash unsafe as a means of payment are 16% less likely to use it to pay for purchases. Similarly, consumers are 19% more likely to use cards to pay for their purchases if they consider cash to be unsafe, but 17% less likely to use cards if they consider them vulnerable to fraud.

Consumers' confidence in the security of some means of payment can even have a direct impact on the development of new sectors. In a 2004 study, Bounie and Bourreau conclude that the low level of security of online card payment systems at the beginning of the 2000s made consumers more risk-averse and undermined the development of e-commerce. In other words, users' belief that they were at greater risk of having their bank card number stolen when conducting online transactions had a negative impact on online shopping.

3. Economic structure of the retail payments market

Studies on the factors that prompt consumers to hold and use means of payment show that a payment method's pricing is a key consideration for economic agents when deciding whether or not to use it.

3.1. The retail payments market: a two-sided market

The retail payments market is characterised by indirect network effects between buyers and sellers: the number of buyers that adopt a means of payment will largely depend on the number of sellers that accept it. This is particularly true for cashless proximity payments, which require merchants to have specific devices (payment terminals in the case of cards). This type of market, known as a two-sided market (Rochet and Tirole, 2005), is characterised by the fact that supply and demand on one side is determined by supply and demand on the other. As a result, transaction volumes depend not only on the overall fees charged to users, but also on how the fees are split between the two sides of the market. The two sides of the market are linked through a platform, which applies asymmetric pricing policies to reflect the specificities of the two categories of user. As explained in economic literature, the side of the market that has more power to attract the other side – i.e. the side with the strongest price elasticity – usually pays less (Verdier, 2009).

A good example of this principle is the asymmetric pricing adopted when card schemes were first developed, with the 1950 launch of the first payment card, issued by Diners Club. In its first few years in operation, this card scheme charged consumers who subscribed to it an annual fee of USD 18, while participating merchants paid 7% commission on each transaction. This asymmetric price structure meant that Diners Club generated nearly 75% of its revenues from participating merchants in its early years (Evans, 2003). Such asymmetric pricing can still be seen today – albeit with a gentler bias – in the strategies implemented by most card schemes. For example, the pricing policy adopted by American Express is geared towards attracting and retaining consumers with high purchasing power by offering very attractive fees and reward schemes. The card scheme can then use its customer base to attract merchants that are seeking affluent customers and willing to pay higher subscription fees to reach them (Verdier, 2009).

American Express and Diners Club are both specific in that they are “three-party” schemes (consumer, merchant and card scheme) in which the card-issuer has contractual relationships with both the consumer and the merchant and can impose its pricing policy directly on both sides of the market. This kind of approach is more delicate in a “four-party” card scheme (with direct links between four parties: consumer, merchant, issuer and acquirer, see Box 3 below), in which intermediaries (usually banks) are positioned between the card scheme and its end users. The distribution of costs in these schemes is more complex, because two levels of pricing must be taken into account: charges for services provided by card schemes to banking intermediaries and charges for services provided by intermediaries to users (Verdier, 2009). In order to weight their price structure, four-party schemes usually implement multilateral interchange fees to transfer revenues to the side of the market most reticent to subscribe to their services. These fees take the form of a payment by the

merchant’s bank to the cardholder’s bank, with the aim that the latter will pass them on to the customer either by lowering the customer’s card fee or by awarding reward points. In France, multilateral interchange fees feature in the three most widely used card schemes: Visa, Mastercard and Cartes bancaires (CB).

3.2. Determinants of the level of multilateral interchange fees

The merits of using multilateral interchange fees are addressed in countless research studies, which aim to determine whether the multilateral interchange fees adopted by card platforms genuinely contribute to the proper functioning of the retail payments market and whether they alter the conditions of competition between the players involved. The research available models interactions between the parties involved in four-party schemes, an exercise which proved particularly complex given the large number of parameters to be taken into account, from agents’ preferences to the type of competitive interactions at play in the market considered (Verdier, 2009).

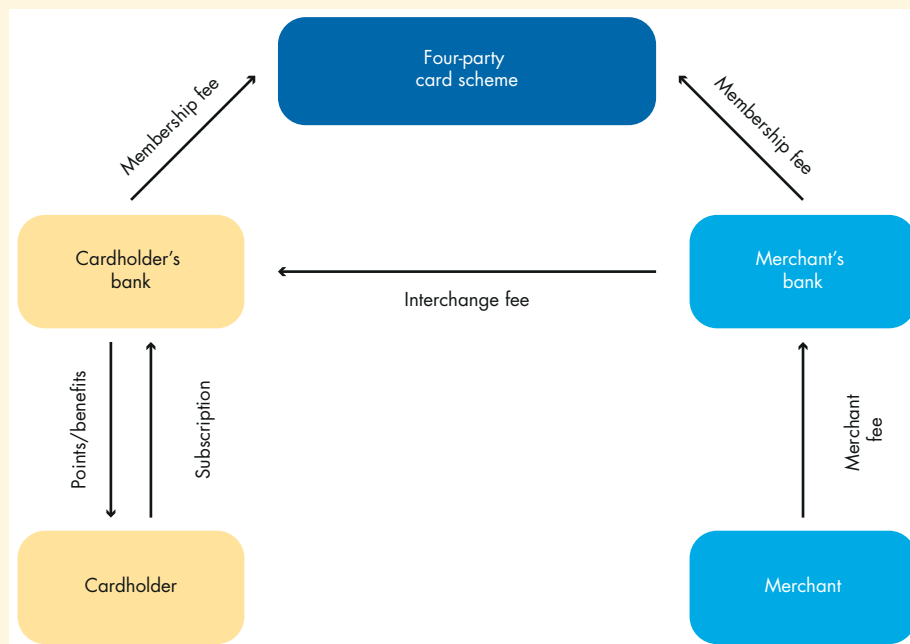
The starting point for these analytical works is the model developed by Baxter in 1983, based on the following scenario: a consumer wants to settle a transaction with a merchant and can opt to pay by card or in cash. While the merchant generates a net gain from the use of payment cards by its customers, the consumer loses money when he/she pays by card because his/her bank passes on to him/her the substantial costs that it incurs as the card issuer. This creates a situation where, although the overall gain generated for society by card payments (the sum of the consumer’s and merchant’s gains) are higher than the associated costs, the consumer will prefer to pay in cash. Baxter demonstrates that the introduction of interchange fees equal to the merchant’s net gain, payable by the merchant’s bank to the consumer’s bank, corrects the usage externality exerted by the consumer on the merchant, thus restoring the social optimum (Verdier, 2011).

Box 3: Multilateral interchange fees: a case study

When a merchant accepts a payment by card, it must pay an initial fee to its bank, known as the “merchant fee”. This is usually a percentage of the transaction amount: if the merchant fee is 1%, for a EUR 100 payment by card the merchant will receive only EUR 99. For the merchant’s bank, this charge covers its costs, margin, fees payable to the four-party card scheme and the multilateral interchange fee payable to the cardholder’s bank.

Unless the cardholder’s bank has adopted pay-as-you-go pricing, the purchase amount (EUR 100) is debited from the holder’s account. On receipt of the multilateral interchange fee, the cardholder’s bank is at liberty to retain the amount on its books or pass it on to the customer, either by paying it directly into the customer’s account or via a point-based reward system, whereby the cardholder can obtain free goods or services as part of a loyalty scheme.

In practice, there are considerable discrepancies between the interchange fees payable by the merchant’s bank and those paid indirectly by the merchant itself. The discrepancies vary significantly between countries and even within the same country, depending on the type of card used and the merchant’s size or business sector. Lastly, different interchange fees can be charged within the same card scheme depending on the various loyalty schemes in use. For example, premium cards usually give rise to higher interchange fees than standard cards, which have less benefits attached for users.



Source: Jean Tirole, “Réglementation des cartes de paiement: une application de l’analyse économique à la politique de la concurrence” (Payment card regulation and the use of economic analysis in antitrust policy), Banque & Stratégie no. 298, December 2011

Although it served as a foundation for subsequent work, this first model is a victim of its simplicity. It assumes that the consumer's bank will pass on the full interchange fee received from the merchant's bank to its customer, whereas, in practice, this only happens in a situation of pure and perfect competition between banking intermediaries (Verdier, 2011). Moreover, it assumes that all consumers and merchants have the same costs and benefits when they use payment cards, which is not the case. These limitations explain why Baxter's model has been subject to many improvements since its publication, based on assumptions adopted by different authors. Rochet and Tirole, in their 2002 study, assume that merchants are homogenous in the gains they obtain from payment cards, whereas consumers are heterogeneous in their use of these cards. Wright (2003) takes a different approach, assuming that both sides of the market are heterogeneous. These two premises produce different estimates of the ideal level of multilateral interchange fees that should be implemented by a payment platform, regardless of the platform's objective: social optimum, maximum volumes or maximum profit (Verdier, 2011).

In the three models described above, the authors assume that there is only one payment platform in the market, which thus has a monopoly and can set interchange fees freely. In most two-sided markets, however, a number of platforms compete with each other to attract new customers. Economic literature shows that the resulting price structure in these competitive markets is determined by the ability of users on both sides of the market to participate in several platforms at once. As a rule, if one side of the market can participate in several platforms,⁸ the platforms compete more aggressively to attract users on the other side of the market, putting downward pressure on prices (Rochet and Tirole, 2003). A telling example of this mechanism, in the United States, is the impact on American Express merchant fees when cards with no annual fees were introduced. Visa and

MasterCard began offering free cards in the early 1990s, which meant that for the first time Amex cardholders had a free alternative to use with merchants that did not accept Amex. As a result, a growing number of merchants turned away from cards issued by American Express, which had particularly high fees at the time. This forced American Express to lower its rates (Tirole, 2011).

3.3. Indifference test

Just as competition between payment platforms affects the pricing structure of two-sided markets, strategic interactions between merchants can result in multilateral interchange fees being higher than necessary to attain the socially optimal level (Verdier, 2011). Given the ubiquitous use of payment cards in developed countries, merchants that don't accept them risk losing customers and, hence, revenues. To avoid this situation, merchants are willing to shoulder costs that exceed the benefits they obtain from payment card transactions, thus financing excessive interchange fees.

In a study published in 2008, Rochet and Tirole propose a simple method to calculate the interchange fees set by a payment platform. Known as the indifference test, this method rests on the assumption that, because cards are attractive as means of payment, merchants are willing to pay high interchange fees *ex ante*, yet it is in their interest to refuse cards *ex post* when customers seek to use them at the checkout.

In the setup described by the two authors, a merchant is serving a tourist who can pay either in cash or by card. As the tourist, by definition, is not a regular customer, the merchant can insist on payment in cash without putting its reputation at risk. The merchant therefore accepts the tourist's payment by card only if the cost of doing so does not exceed the cost of payment in cash. Such a situation could only arise if the multilateral interchange fee set by the card scheme was calculated to render the merchant indifferent to the means

8 Referred to by Rochet and Tirole as "multi-homing", as opposed to "single-homing", where users join a single platform.

of payment chosen by the tourist. By comparing the interchange fee obtained using this method with the level required to maximise the overall profits of consumers and merchants, and with the socially optimal level (factoring in banking intermediaries' profits), Rochet and Tirole conclude that the interchange fee produced by the indifference test is only socially optimal if the issuing banks are in perfect competition with each other. Otherwise, the interchange fee resulting from the indifference test is generally below the socially optimal level.

4. Retail payments market and public intervention

The retail payments market is subject to market failures linked to information asymmetries and the presence of network externalities. Economic theory tells us that such situations warrant intervention by an external regulator, provided that the intervention is based on sound reasoning, weighing the disadvantages of solutions envisaged against their expected advantages.

4.1. The security of means of payment

The confidence that users of a means of payment have in the security of processes put in place by the financial intermediaries that look after their money is crucial to their acceptance of the means of payment concerned and, more broadly, to the successful conclusion of commercial transactions. However, users generally lack the technical knowledge and resources needed to assess the risk management procedures implemented by their payment service providers. This creates "information asymmetry" between users and their service providers, justifying intervention by public authorities to provide external assurance of the security of the various means of payment in use.

As stated in the previous chapter, this role is usually assigned to the central bank. With their independence and expertise, central

banks are well-placed to oversee the retail payments market. They aim to sustain users' confidence in money, while creating an economic environment conducive to trade. The oversight role assumed by central banks usually involves implementing standards and regulations governing the conditions in which payment operations are conducted, the assessment of risks to which sector players are exposed and the production of information likely to influence the market's development.

4.2. Fostering competition

Beyond the action taken by central banks, the proper functioning of the retail payments market is also underpinned by the prudential framework applicable to all payment service providers. At the beginning of the 2000s, however, Europe's lawmakers observed an unintended consequence of their restriction on authorisations to provide means of payment. By authorising only credit institutions compliant with stringent prudential requirements, given their wide business scope, they had made the payment market inaccessible to mid-sized players seeking to focus exclusively on this sector. It was not economically viable for these players to provide payment services, because by doing so, they would be subject to the regulatory requirements applicable to banks.

To remedy this situation, the EU Payment Services Directive (Directive 2007/64/EC or PSD1, see Chapter 3, Section 2) and Electronic Money Directive (Directive 2009/110/EC or EMD2) introduced two new categories of payment service provider alongside credit institutions. These new categories – payment institutions and electronic money institutions – are subject to lighter prudential regimes commensurate with the operational and financial risks to which their operations are exposed. As they provide specialised services restricted to payment instruments, the risks created by these new types of institution are narrower in scope than those inherent in the wider spectrum of credit institutions. It therefore

seems right for them to have appropriate regimes, for example in terms of regulatory capital. The new provisions included in the revised Payment Services Directive (PSD2) are consistent with this philosophy, as reflected in the new rules governing the activities of new categories of third party players that initiate payments from accounts held by payment service providers (PSP) or aggregate information relating to such accounts.

Beyond the desire to tailor prudential regimes to the risk profiles of the various players, Europe's public authorities also wanted to increase the transparency of fees charged by PSPs and make it easier for people to change payment account. Measures such as these reduce the market power of the historical PSPs (Vives, 2001), thus fostering competition in the European retail payments market.

In France, under two laws adopted five years apart, in 2008 and 2013,⁹ all customers must be provided with an annual statement showing a breakdown of their deposit account management fees and, from October 2015, must be notified in their monthly statement of fees relating to irregularities and incidents. The Directive on payment accounts adopted on 23 July 2014 (Directive 2014/92/EU) extended these practices to the European Union as a whole. It stipulates that Member States must ensure that, at least once a year and free of charge, payment service providers issue statements to their customers showing all the fees incurred for services relating to their payment account.

The Directive also requires PSPs to provide services to facilitate banking mobility, in particular by transferring lists of customers' current standing orders and direct debit mandates to their new payment service providers. This service, which has been operational in France since 2009, was made compulsory at the national level by Law 2014-344 of 17 March 2014 on consumption. In this respect, work was done under the *Comité Français d'Organisation et de*

Normalisation Bancaires (CFONB – French Banking Organisation and Standardisation Committee) to standardise the information exchanged between banks when a customer asks to transfer their account. This ensured that the conditions for the provision of banking mobility services were consistent across all French institutions. This service has been fully operational since 6 February 2017.¹⁰

4.3. Oversight of multilateral interchange fees

Measures taken by public authorities to promote competition in the retail payments market logically raised the issue of the optimal level of multilateral interchange fees charged by certain categories of participant, primarily participants in "four-party" card schemes.

An initial approach, rolled out in Australia and the United States, involved capping interchange fees on the basis of the card issuer's costs. In 2011, the US Federal Reserve, responsible under the Dodd-Frank Act for regulating interchange fees on debit cards to ensure that they are "reasonable and commensurate with the transactional cost incurred by the issuer" (Tirole, 2011), capped these fees at a fixed amount of 21 cents per transaction, plus a variable component equal to 5 basis points of the transaction value. Issuers are permitted to increase their fees by 1% if they put a fraud prevention framework in place. Lastly, the Federal Reserve granted an exemption to this rule to issuers whose assets amount to less than USD 10 billion.

The European Commission took a different approach, closely aligned with the indifference test. It aims to ensure that the costs borne by a merchant that accepts a card payment match the benefits of not having to take a cash payment (Tirole, 2011). It was on the basis of this principle that in 2007 the European Commission forced Mastercard to cap its average interchange fees on its "consumer" card at 0.20%. In 2010, Visa aligned its

9 Law 2008-3 of 3 January 2008 and Law 2013-672 of 26 July 2013.

10 For further information on the French banking mobility service, see: <https://particuliers.banque-france.fr/votre-banque-et-vous/le-service-de-la-mobilite-bancaire>

fees payable on cross-border transactions using its “consumer” cards with this rate. This same approach is central to EU Regulation 2015/751 of 29 April 2015 on interchange fees for payment transactions involving cards, which caps the fees on debit and credit cards linked to four-party schemes at respectively 0.2% and 0.3% per transaction. In the case of debit

cards, payment service providers are free to impose merchant fees (including the interchange fee) calculated at a fixed rate of 5 cents per transaction, to which they can add a variable component, provided that the sum of all fees charged over a one-year period does not exceed 0.2% of the sum of transactions conducted at the national level within the same card scheme.

Box 4: The French example: public authorities steered banks towards a reduction in the fixed portion of merchant fees on cards

The work done in 2015 by the national conference on payments (see Chapter 2, Box 7), which paved the way for the national retail payments strategy, included in the final report, with respect to low value payments, a proposal to “[...] examine a further reduction in the level of merchant fees in cases where the contract dictates that a minimum fee must be charged regardless of the transaction amount; in this respect, it seems appropriate for the contractual minimal service charge to be capped at EUR 5 cents, rather than EUR 10 cents, as has been the case to date”¹

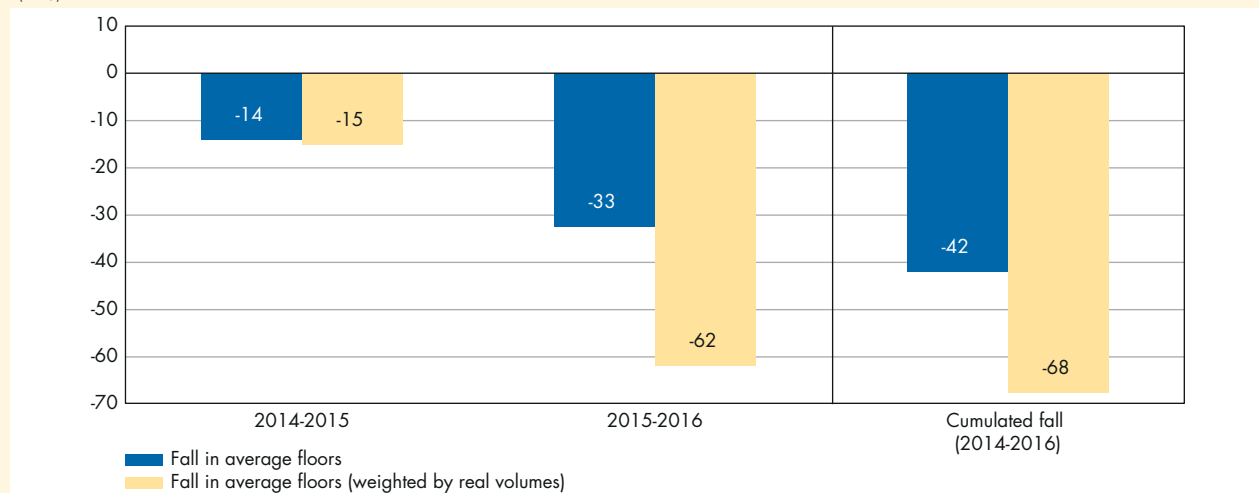
This proposal was included in the objectives set for the national retail payments strategy (“Reduce the minimum merchant fee, if there is one”) and led to banks making a commitment via the French Banking Federation to support “[...] in cases where contractual provisions impose the charging of a minimum service charge, a significant reduction in this minimum amount”²

As part of its mission to implement the national retail payments strategy, in 2017 the National Cashless Payments Committee launched a quantified review of the commitment made by banks. The Banque de France collected data from banks on merchant fees affecting almost 1.5 million French companies.

The information collected showed that the commitments made by the banking community have been fulfilled: the average amount of contractual minimum merchant fees plummeted almost 42% between 2014 and 2016 (see Chart 1).

Change in minimum merchant fees (2014-2016)

(in%)



¹ <https://www.tresor.economie.gouv.fr/Ressources/File/413453>

² <http://www.fbf.fr/fr/files/9X4HFM/Communique-FBF-Assises-des-moyens-paiement-02062015.pdf>

Both these approaches have certain weaknesses. The first approach based on calculating the issuer's costs, which was adopted in Australia and the United States, among other countries, is, a priori, easier to apply than the approach based on measuring the benefits obtained by a heterogeneous population such as merchants. However, regulations based on this principle seem inconsistent with economic theory, which attaches greater importance to the relationship between the merchant and its bank (the payment "acquirer") than to the constraints on the issuer (Tirole, 2011). In comparison, interchange fee regulations based on the indifference test – as reflected in the European Commission's approach in drafting Regulation 2015/751 of 29 April 2015 – seem more in line with the

relevant theoretical works. That said, based on Tirole's analysis (2011), such an approach based solely on the costs borne by the merchant has the drawback of producing a lower estimate for the interchange fee than would be socially desirable, since it overlooks the negative externalities for society of alternative means of payment (e.g. tax fraud in the case of cash) and the need for issuers to sustain the flexibility to promote innovation and, ultimately, the welfare of users.¹¹ On this latter point, it is interesting to note that the theoretical models developed to describe the functioning of two-sided markets rarely factor in the cost of preventing fraud (Verdier, 2006), even though many card schemes adapt their pricing policies to encourage members to invest more in enhancing the security of their applications.

¹¹ With respect to this point, the European Commission took these theory-based objections into account in its impact assessment (European Commission, 2013) by including empirical considerations, whether relating to revenues generated by interchange fees in Europe or national agreements already signed in this area, in particular that between the French competition authorities and *Groupement des Cartes Bancaires* in 2011.

CHAPTER 5

Financial instruments, financial markets and financial market infrastructures

Updated on 14 December 2018

To be well understood, the place and role of financial market infrastructures must be seen in the broader perspective of the financial ecosystem. Financial market infrastructures, such as payment systems, central counterparties (CCPs) or central securities depositories (CSDs) and securities settlement systems (SSS), play a key role in the exchange of the financial instruments that support the financing of the economy. Specifically, financial market infrastructures process not only payment flows, but also securities flows, in combinations that vary depending on the financial instrument.

After describing elements relating to money and payments in the first four chapters, in this chapter we examine the main concepts relating to financial instruments and the market infrastructures that process them, as an introduction to Chapters 6 to 16, in which we look at how the infrastructures are organised and operate.

In this chapter we provide an overview of the main financial instruments and the market environment in which they are traded, and analyse the various stages of the processing of financial instruments, from issuance to settlement. We also explore the main concepts relating to financial market infrastructures, the actors of the infrastructures and the legal principles underlying the functioning of these entities. The infrastructures in charge of processing financial instruments are discussed in detail in Chapters 11 (CCP), 12 (CSD), 13 (SSS) and 14 (TARGET2 Securities - T2S).

1. Financial instruments and markets

1.1. The main financial instruments¹

A financial market makes it possible to bring together economic agents who need financing and economic agents who can offer financing. It is also intended to help manage financial risk by redistributing it among the market participants. The financial system thus makes it possible to allocate

resources while also making allowance for profitability and risks. Financial instruments are created and traded in these markets.

According to Article L. 211-1 of the French Monetary and Financial Code, financial instruments can be grouped into two categories: financial securities, which are instruments for immediate delivery, and futures² (also known as “financial contracts”), which include derivative financial instruments.

1.1.1. Financial instruments for immediate delivery

A spot market is a market in which assets are typically exchanged for cash at prices reflecting the state of the market³ at the time the transactions are made. The purchase and sale of financial assets in a cash/spot market are subject to settlement terms providing for an immediate delivery, i.e. on the “settlement day defined by the rules of said market”. The immediacy of the cash market is indeed relative since the settlement must allow for the processing times of so-called post-trade services. In fact, settlement often takes place on T+1 or T+2, i.e. one or two days after the transaction date, depending on the type of market or instrument. For organised exchanges, in Europe, the CSDR regulation⁴ requires settlement on T+2 maximum, whereas the rule is generally T+3 in the rest of the world. In contrast, for OTC trades, this time frame can be much longer (several months or even years), or shorter (settlement on the day of the trade, often referred to as “T+0” or “same-day settlement”). The different markets (organised/OTC, etc.) and their characteristics are presented later in this chapter.

In a spot market, for the transaction to take place, the seller must therefore possess, on the settlement date, the assets required to settle any orders placed. If the assets are not held when entering into the transaction – which would in that case be called a “short sale” – the seller could also borrow said assets, for example through a securities

1 As this chapter is only intended to provide a general overview of financial instruments and markets to facilitate the understanding of the role of the related infrastructures, we invite readers to refer to specialised literature for a more exhaustive presentation of these instruments and markets.

2 A financial futures instrument is generally a contract that commits a market participant to selling or buying specific assets on a specific date and at a set price. The contract may relate to the security itself, or to a derivative instrument related to that security.

3 Both the overall market parameters and those related more specifically to the issuer of the financial instrument being traded.

4 Regulation No 909/2014/EU on improving securities settlement in the European Union and on central securities depositories, known as “CSDR” (Central Securities Depository Regulation). It is available on the website of the Official Journal of the European Union at the following address: <http://eur-lex.europa.eu/legal-content/>

Box 1: Issuance and circulation of securities - primary & secondary market

Securities markets fall into two categories: the primary market and the secondary market.

The **primary market** is where new securities are issued, in particular in the form of initial public offerings (IPOs), capital increases or bond issues. It is therefore the place where the issuers of securities, e.g. companies or governments, offer these securities to investors in return for the funding that the securities are representative of (debt or capital). It is the market for “new” securities, as opposed to the secondary market, which can be viewed as a market for “second-hand” securities. A capital increase, the placement of a bond issue and the issuance of any new security are carried out in the primary market. In France for example, regarding the debt of the French government, *Spécialistes en Valeurs de Trésor* (SVT) are primary dealers¹ responsible for buying government securities directly from the government and placing them in the markets with end investors or other financial intermediaries. They must participate in all auctions and syndications, in other words all issues of government securities. They also play an advisory role for *Agence France Trésor* - which manages the French state’s cash requirements - in the design and implementation of the financing programme before and after issues.

The **secondary market** is where securities are exchanged after having been issued on the primary market. The existence of a secondary market means, firstly, that the security is transferable and negotiable, and secondly that it benefits from some liquidity, which means that an investor who buys it can resell it to a third party. The more the secondary market is active, the more the security is liquid and the price range between purchases and sales is narrow. The gap between the buying price and the selling price (bid-ask spread) can be quite significant for a very illiquid security because of the small number of market participants. Market liquidity is therefore important to encourage end investors to invest in a security. Lastly, note that new securities are not created in the secondary market and that the original issuer is not a party to any transaction in this market, except in the case of a share repurchase or the redemption of debt before maturity.

¹ Primary dealers are financial intermediaries who have been authorised by the Treasury to process securities issued by the government and who must meet specific requirements to do so.

loan or a repurchase agreement (a “repo”). In such a scenario, a repurchase agreement indeed also allows securities to be received against cash, which securities must be returned on the due date.⁵

There are two basic types of securities that allow companies or governments to raise funds in financial markets: **shares** (equity securities) and **bonds** (debt securities).

A **share** (or stock) is a deed of ownership representing a fraction of a company’s equity. A share may give the holder various rights such as:

- annual dividends depending on the company’s pay-out policy;

- the right to vote;
- preferential subscription rights in the event of a capital increase to avoid dilution of the shareholder’s voting rights.

This security may be:

- unlisted, if the company places its shares directly with investors who provide funds in exchange;
- listed on a stock exchange when there has been a public offering.

A **bond** is a debt security representing debt owed by the issuer (company, government), the nominal amount (face value) of which

⁵ See Chapter 15.

Box 2: Eurobonds

A Eurobond is a bond denominated in a different currency from that of the country of the issuer of the security. The prefix “euro” in “Eurobond” is unrelated to the name of the single European currency, which was launched in 1999, in other words several decades after the emergence of these securities. The first Eurobonds were issued by the Italian company Autostrade in 1963, and were denominated in US dollars. Their volume really expanded in the 1980s, and they have since become a major component of the international financial system.

Eurobonds are attractive for debt issuers because of the flexibility they offer in the choice of the country of issue and the related tax optimisation opportunities.¹ Eurobonds are usually not subject to the taxes and regulations of the country of issue, which can make the Eurobond market more accessible than other bond markets. However, as they are denominated in foreign currencies, Eurobonds usually expose the issuer and/or the investor to currency risk.

Nowadays, the Eurobond market mainly involves large international firms, as well as international organisations, e.g. the World Bank, the European Investment Bank or the European Financial Stability Facility.

Please note: the Eurobonds described here should not be confused with the Euro-bonds project, which has been under discussion for several years in the euro area and would consist in issuing “pooled” sovereign debt instruments of euro area Member States.

¹ When they were created, Eurobonds were seen as a way to circumvent the US Interest Equalization Tax set up in 1963, which had far-reaching consequences for non-US investors in the United States.

is repaid by the issuer at maturity. It bears interest over a term set when it is issued. The key differentiating features of a bond are the interest rate, the issue and redemption terms, the coupon (interest) payment method and the issuer’s rating. There are some variants:

- convertible bonds: bonds that can be converted into shares at any time or during predetermined periods (as provided for in the issue contract);
- bonds redeemable in securities: these bonds are not redeemed in cash but in shares or other securities.

Other more specific securities are also traded in the markets. These include:

Negotiable debt securities, which are short- or medium-term financial instruments traded in the money market. Negotiable debt securities are transferable securities,

the legal form of which is applied to a category of means of payment, specifically promissory notes.

Following an opinion of the European Central Bank dated 30 March 2016,⁶ the reform of the market for negotiable debt securities entered into force in French law following the issuance of the Ministerial Order of 30 May 2016.⁷

Negotiable debt securities fall into three main categories:

- treasury bills;
- short-term negotiable debt securities, which are a combination of the commercial paper issued by companies and of the certificates of deposit issued by credit institutions. The new commercial name chosen by the French market for this category of instruments is “Negotiable European Commercial Paper”;

⁶ https://www.ecb.europa.eu/ecb/legal/pdf/en_con_2016_20_f_sign.pdf

⁷ <https://www.legifrance.gouv.fr>

- medium-term negotiable securities, formerly negotiable medium-term notes.

The **shares and units of Undertakings for Collective Investment in Transferable Securities (UCITS) and collective debt investment funds** are also financial instruments.

UCITS are financial vehicles that allow the collection and investment of savings. They give their subscribers the opportunity to invest in financial markets that would otherwise be difficult for investors to access, for example foreign financial and monetary markets, unlisted equities, etc. The main business of UCITS is to raise funds by issuing securities to various agents, e.g. individuals or companies, in order to acquire financial assets. While attempting to strike the best trade-off between the appropriate risk profile and the expected return, UCITS issue units that can be either dedicated to a single class of instruments or, on the contrary, combine classes of shares and bonds – including along geographical criteria, for example France, Europe or World – as well as convertible bonds or money market funds.⁸ **UCITS** may take two legal forms:

- **Open-ended investment company (OEIC):** a public limited company – with legal personality; its sole purpose is the management of transferable securities. It issues shares as and when requested by subscribers at a subscription and redemption price that must be published daily, and which corresponds to the value of its assets;
- **Unit trust:** co-ownership of transferable securities; unlike OEICs, unit trusts have no legal personality. Their units are issued or redeemed at the request of the unitholders. The number of units increases by the subscription of new units and decreases via the redemptions made by the fund at the request of unitholders.

Collective debt investment funds are Special Purpose Vehicles (SPV) which

result from the securitisation of loans from credit institutions. They issue units that are representative of loans. These units are securities.

The units issued by a unit trust or collective debt investment fund, unlike those of an OEIC, are not transferable (negotiable), but can only be redeemed by the fund concerned.

Exchange Traded Funds (ETFs), also known as “trackers”, are investment funds whose purpose is to replicate the performance of an index, e.g. a stock index.

1.1.2. Derivatives

1.1.2.1. What is a derivative?

A derivative is an instrument or a contract between two counterparties, the value of which is linked to (derived from) the characteristics of an underlying asset or element, such as a share, an interest rate or a commodity. These instruments enable the transfer of the risk related to the underlying asset from one market participant to another. Derivatives are a large and heterogeneous family, as they can take simple or more complex forms (see box below). They can be traded either on organised markets when they are sufficiently standardised or over-the-counter to meet the specific needs of the two counterparties involved.

Derivative instruments were first created in the 19th century in the United States, in the Chicago area. These first instruments were in fact derivatives on agricultural products traded on the Chicago Board of Trade (CBOT). They played a very important role in enabling producers to hedge the price of agricultural products by selling their harvest forward at a firm and known price. A wheat producer, for example, is faced with two constraints: determining the price at which the crop can be sold and ensuring that it is sold. The derivatives market allows the producer to sell the crop forward and to secure this forward sale at a price that has been set in advance.

⁸ Which aim to serve a rate of return related to the ECB's key interest rate.

Derivatives thus offer financial protection to economic agents who buy them and therefore have beneficial effects on the financial markets, even though the 2007 financial crisis highlighted the systemic risks they can cause or compound.⁹ Although these instruments have a stabilising effect by allowing some market participants to dispel uncertainty and mitigate risks by hedging them, the possibility for other actors to use them for speculative purposes, e.g. short sellers or buyers, increases the risk of destabilisation.

1.1.2.2. *The different types of derivatives*

The main types of contracts

The three main types of financial derivative instruments are futures, options and swaps.

A **futures contract** is an agreement to buy or sell an asset at a future date and at a price set in advance in the contract.

Forwards are non-standardised futures traded over the counter (OTC). Unlike forwards, futures are contracts with standardised amounts and maturity dates that are traded on organised markets.

Negotiable options are contracts that give the holder the right (and not the obligation) to buy (known as a call) or to sell (put) an underlying asset at a price set in advance (exercise price or strike) regardless of the market price at maturity. The price of an option (also known as the premium) represents the fixed cost to pay in return for this flexibility. Options are traded either over the counter or on organised markets; the Chicago Board Options Exchange was created in 1973 to trade options.

An option can be exercised on a stated date (it is then referred to as a *European* option), or at any time during the period prior to the expiry date (*American* option). Whether an option is exercised or not depends on the relationship between

⁹ Complex derivatives, in particular CDS (Credit Default Swaps), were highlighted as one of the causes of the 2007-2008 crisis.

Box 3: “Plain vanilla” instruments, “exotic” instruments and structured products

The term plain vanilla describes the least sophisticated standard derivatives, as opposed to non-standard “exotic” derivatives based on more complex financial techniques.

The so-called “**plain vanilla**” financial instrument is the simplest or most standardised version of a financial instrument. These are usually simple options, futures, forwards or swaps. Plain vanilla instruments are those that are the easiest to price because their characteristics are standardised and known to all market participants.

The so-called “**exotic**” financial instruments, in contrast, are more complex than the plain vanilla instruments commonly used in the markets. They usually have several sophisticated parameters for defining the payoff of the instrument, i.e. the formula that determines the gain or loss for the instrument holder.

An exotic product may also include non-standardised underlying instruments developed for a specific client or market. These are then called **structured products**.

Exotic instruments are also more difficult to price than plain vanilla instruments with standardised characteristics and usually require ad-hoc pricing tools. These products are also mostly traded over the counter.

the price of the underlying and the exercise price:

- in the case of a *call* (purchase option): the option will be exercised by the buyer if the price of the underlying asset is higher than the exercise price on the expiry date;
- in the case of a *put*: the option will be exercised if the price of the underlying asset is lower than the exercise price.

A **swap** is a contract for the temporary exchange of financial flows between two parties during a given period and defined in advance. Typically, the calculation of the cash flows is based on the future value of an interest rate, exchange rate or some other market variable.

The most common swaps are:

- the interest rate swap, which allows market participants to “swap” a floating rate against a fixed rate;
- the cross-currency interest rate swap between interest rates denominated in different currencies (also called “cross-currency swap”);
- the Credit Default Swap (CDS), which allows you to purchase protection (insurance) against the credit risk of a bond issuer in exchange for periodic regular payments called premiums;
- the commodity swap, which allows the exchange of a fixed price against a variable price on contracts for raw materials.

Main underlying assets

The main categories of underlyings on which the derivatives market is based are, in descending order of volumes: interest rates, currencies, credit, shares and commodities (see table below).

The largest category of underlyings in the derivatives market is **interest rates**.

There are different classes of interest rate derivatives, the main ones being interest rate swaps, options, futures and forward rate agreements. Interest rate derivatives are widely used by market participants to hedge the risks associated with interest rate fluctuations. They represent the main market of OTC derivatives trading.

Currency derivatives consist primarily of outright forwards,¹⁰ swaps and options. Forwards and swaps alone account for more than half of the currency derivatives market. At the end of 2016,¹¹ three currencies accounted for more than 78% of all underlyings in the interest rate swap market, which represents more than three quarters of the total notional amounts: the US dollar, the euro and the yen.

The main **credit derivatives** are credit default swaps (CDS), whereby a party undertakes periodically to pay a premium through which it buys protection, in return for which the protection seller bears the credit risk on the reference entity for an agreed period in the event of the latter’s default.

Equity derivatives are mainly options, swaps and forwards. Equity options account for nearly 75% of this market. The underlying may be a share or a stock index.

Lastly, **commodity derivatives** represent only a small proportion of the derivatives market, but can be very diverse. There are derivatives on energy products, metals and agricultural products. The corresponding contracts are also very diverse (options, forwards, futures, swaps) and may in some cases be very standardised, or conversely only over-the-counter.

1.2. Financial instrument markets

1.2.1. Organised markets and OTC markets

When two parties, i.e. a buyer and a seller, wish to enter into a transaction, they can do so in two types of markets: (1) an organised market (also called a regulated market),

10 Outright forward: forward exchange transaction of two currencies at a price agreed on the date of the contract for settlement or delivery in the future (more than two business days). This category also includes forward foreign exchange agreement transactions (FXA), non-deliverable forwards, and forward contracts for differences.

11 Source: BIS Triennial Central Bank Survey of derivatives https://www.bis.org/statistics/d12_3.pdf

i.e. a trading platform or (2) an over-the-counter market (OTC). In the over-the-counter market, the transaction is entered into bilaterally, i.e. between the two parties, on terms determined by them, whereas in a regulated market, the parties do not negotiate bilaterally but send buy and sell orders via an exchange, or a trading platform. This distinction has many consequences regarding the risk and the transparency of transactions in the derivatives market.

The organised market is operated by a market operator. A market undertaking is a trading company whose business is to set operating and market admission rules, while complying with the regulations of the authority in charge of regulating the operations of regulated markets. Participation in an organised market is not open to all. It is restricted to authorised members, or participants, who are allowed to trade on the trading platform. Market members are responsible for transmitting the orders of their individual or institutional clients. Only standardised financial instruments are traded in organised markets, i.e. instruments with common and widely used characteristics, such as product features, place of delivery or settlement, contract expiry date, etc. These financial instruments are usually liquid, which means that there is an active market of sellers and buyers for these instruments.

For example, the Paris Stock Exchange is managed by the market undertaking Euronext Paris SA, a member of the Euronext NV group, which currently comprises the French, Dutch, Belgian, Portuguese and Irish stock markets (since the acquisition of the Dublin Stock Exchange by Euronext in 2018). As a market undertaking, Euronext Paris SA is subject to the supervision of the *Autorité des marchés financiers* (AMF – French Financial Markets Authority).

In an over-the-counter market, by contrast, the two parties negotiate the terms of the transaction between themselves. Over-the-counter instruments may therefore

T1 : OTC traded volumes in the derivatives market

(Distribution of over-the-counter derivatives by type of underlying)

Underlyings	Notional (open position) (USD billions) 1st half of 2017	%
Interest rates	415,914	77
Foreign exchange	76,980	14
Credit	9,868	2
Equities	6,836	1
Commodities	1,401	–
Not allocated	31,436	6
Total	542,435	100

Source: BIS semi-annual OTC derivatives statistics (end of June 2017)

be less standardised (especially in the case of derivatives) and the applicable regulatory framework is more flexible. For example, the parties are free to set the terms of the contract that will bind them, in particular the amount (or notional amount)¹² and the end date. The 2007-2008 crisis highlighted the importance of OTC derivatives markets in terms of financial stability, given (i) the bilateral nature of these transactions, which in principle precludes the existence of a central location where transactions are recorded and processed, making controls more difficult; (ii) their specific parameters, which makes their unique risk profile and system-wide risk distribution difficult to grasp, and lastly (iii) the volume of trading in these markets, which grew exponentially in the 2000s.

To make OTC derivatives transactions safer and increase their transparency, the G20 made the following commitments at the Pittsburgh Summit in 2009:

- All standardised OTC derivative contracts should be cleared through central counterparties (see Chapter 11);
- All standardised OTC derivative contracts should be traded on exchanges or electronic trading platforms;
- OTC derivative contracts should be reported to central trade repositories (see Chapter 16);

¹² The face value of the contract, which is not exchanged, but is used to calculate the payment flows, for example the amount of interest in an interest rate swap.

- Non-standardised and non-centrally cleared OTC contracts should be subject to specific capital requirements.

In the European Union and the United States these commitments have led to the implementation of the EMIR Regulation and the Dodd-Frank Act, respectively.

As a result, regulatory developments have gradually subjected OTC derivatives to more rules: for example, even for non-standardised OTC contracts that do not have to be centrally cleared, counterparties are now required to exchange margins to cover their exposures.

1.2.2. The different types of trading platforms

1.2.2.1. The context: from MIF to MIF 2

Until the mid-2000s, European markets were characterised by the existence of domestic trading platforms, each enjoying a quasi-monopoly position.

The Markets in Financial Instruments Directive (MIF), adopted in 2004 and implemented on 1 November 2007, laid down a new organisation for equity markets in Europe. This was aimed at promoting competition by allowing “alternative” trading methods alongside the traditional

platforms (the “stock exchanges”). In addition, to ensure the quality of the price discovery mechanism in a market that had become fragmented, MIF introduced new rules on pre- and post-trade transparency and instituted the “best execution” principle for better investor protection, based on the search for the trading system offering the best price to the client.

MIF has achieved two of its objectives: lower transaction costs in the stock market and the emergence of truly pan-European trading systems. However, its impact on liquidity and market transparency has not been as conclusive.

The review of MIF (MIF 2) began at the end of 2009,¹³ with the primary objective of addressing the identified weaknesses of MIF but also in the context of the 2008 financial crisis and the G20 “road map”. Following a public consultation launched in December 2010, the Commission presented its proposals in October 2011. After an intense and complex debate, MIF 2 (consisting of a directive and a regulation) was adopted in May 2014 and came into effect on 3 January 2018. It aims to restore a level playing field in the competition between regulated markets and alternative trading platforms, enhance transparency and improve investor protection (see box below).

¹³ See the “Fleuriot” report (report to the Minister of the Economy, Industry and Employment on the revision of the Markets in Financial Instruments Directive - February 2010: <https://www.tresor.economie.gouv.fr/Ressources/File/333690>)

Box 4: MIF 2

MIF 2 consists of a directive (MiFID 2) and a regulation (MiFIR). However, beyond these two “level 1” texts, MIF 2 also contains more than 40 “level 2” texts (delegated regulations and implementing regulations) adopted by the Commission on the basis of technical standards developed by the European Securities and Markets Authority (ESMA), as well as a series of “Level 3” documents (Guidelines and Questions/Answers) published by the ESMA.

MiFID 2 has two main components: market organisation and investor protection.

Market organisation

- Extension of the scope of the relevant financial instruments (which, under MIF, was limited to equities) to equity equivalent securities and non-equity instruments: bonds, derivatives, structured products and carbon quotas;

.../...

- Creation of a new category of organised platform (limited to the trading of non-equity instruments): Organised Trading Facilities (OTF);
- Restriction of the scope of over-the-counter trading (compulsory trading of equities and certain derivatives), strengthening of the systematic internaliser regime, prohibition of broker crossing networks;
- Establishment of the principle of non-discriminatory access (“open access”) from trading platforms to central counterparties (CCPs) and vice versa, as well as to benchmark indices;
- Enhanced pre-trade transparency requirements (with possible exemptions calibrated to the liquidity of the instrument and/or the transaction size): publication of bid and ask prices and the size of positions posted at these prices;
- Strengthened post-trade transparency requirements (possible postponements calibrated depending on the same criteria as above), with the establishment of the Consolidated Tape Provider (CTP) and the Approved Publication Authority (APA);
- Increased reporting of transactions to the regulator and implementation of Approved Reporting Mechanism (ARM);
- Establishment of a set of rules for algorithmic trading and high frequency trading to prevent the risk of market malfunction and manipulation;
- Establishment of a set of rules for commodity derivatives markets (position limits and reporting).

Investor protection

- Strengthening product governance through a more detailed definition of the respective responsibilities of the originator (who defines the product characteristics, the target market and the distribution channels) and the distributor (who understands the product characteristics, also determines the target market and ensures its consistency with its own clientele);
- Increased transparency vis-à-vis investors: pre- and possibly post-trade communication of costs and charges relating to services and products;
- Introduction of the concept of “independent” advice, with an obligation for investment firms providing advice to specify whether it is independent or not;
- Strengthening the framework of remuneration and inducements: their receipt is prohibited as part of the provision of an independent advisory service or discretionary portfolio management; it is authorised for other services, provided that its purpose is to improve the quality of the service and that the client is clearly informed of their nature, amount or method of calculation, prior to the provision of the service;
- Establishment of a new regime for the financing of financial analysis;
- Strengthening transparency obligations for “best execution” purposes: transaction execution information must be more detailed and easily understood by the client.

1.2.2.2. Regulated markets

MiFID 2 defines a regulated market as “a multilateral system operated and/or managed by a market operator, which

brings together or facilitates the bringing together of multiple third-party buying and selling interests in financial instruments – in the system and in accordance with its non-discretionary rules – in a way

that results in a contract, in respect of the financial instruments admitted to trading under its rules and/or systems, and which is authorised and functions regularly and in accordance with Title III [of the Directive].”

A regulated market is therefore characterised by the non-discretionary execution of transactions: an order placed on the order book cannot be removed and must be automatically matched with the orders available in the system.

1.2.2.3. *Alternative trading facilities*

Multilateral trading facilities (MTFs)

MTFs, which already existed under MIF, are defined in MIF 2 as “a multilateral system, operated by an investment firm or a market operator, which brings together multiple third-party buying and selling interests in financial instruments – in the system and in accordance with non-discretionary rules – in a way that results in a contract in accordance with Title II [of the Directive]”;

On an MTF, as on a regulated market, transactions are executed in a non-discretionary manner. MTFs usually offer cheaper access than regulated markets, but this access is limited to the more liquid securities, which have the highest volumes processed.

A regulated market operator may also simultaneously manage MTFs to meet specific needs of market participants: Euronext, for example, also manages two Multilateral Trading Facilities (MTFs): **Alternext** (for SMEs and midcaps) and **BondMatch** (for bonds denominated in euros).

Organised trading facilities (OTFs)

OTFs are a new category of organised platform introduced by MIF 2, which defines them as “a multilateral system which is not a regulated market or an MTF and in which multiple third-party

buying and selling interests in bonds, structured finance products, emission allowances or derivatives are able to interact in the system in a way that results in a contract in accordance with Title II [of the Directive].”

Unlike for regulated markets and MTFs, the operator of an OTF has discretion over how transactions are executed: the operator may decide to place or withdraw an order on the OTF, or decide not to match a specific order with the orders available in the system at a given time, which may in particular allow the best execution of client orders. However, the operator of an OTF cannot deal on own account.

Systematic internalisers (SIs)

SIs, which already existed under MIF, are defined in MIF 2 as “an investment firm which, on an organised, frequent systematic and substantial basis, deals on own account when executing client orders outside a regulated market, an MTF or an OTF”.

Unlike an OTF, a systematic internaliser executes the orders of its clients by committing its own capital. However, OTFs are subject to stricter prudential requirements.

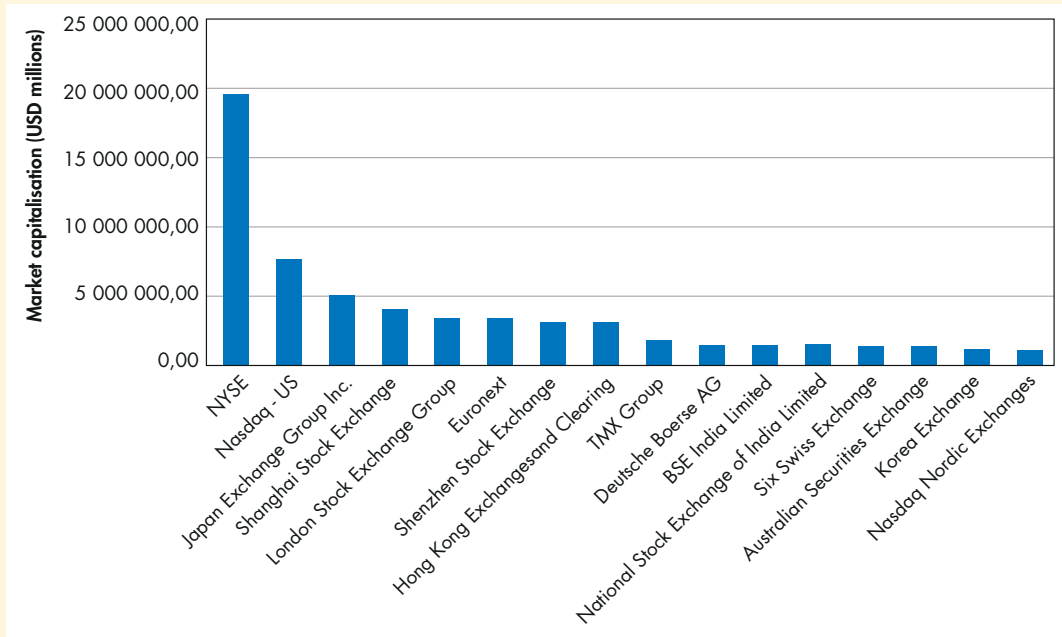
Dark pools

Dark pools are trading systems where there is no pre-trade transparency of orders: due to a regulatory exemption, an order can be placed in the trading system without the pre-trade reporting obligation, i.e. without being disclosed before being executed. The operator of a regulated market can also manage a dark pool. For example, Euronext manages a dark pool called **SmartPool**.

1.2.3. Statistical data: trading platforms

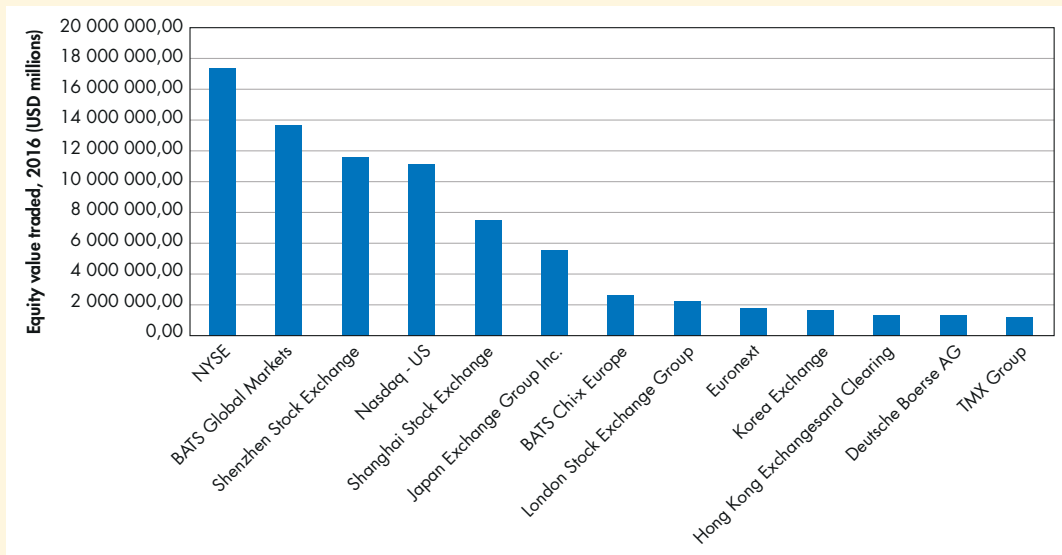
The charts below illustrate the respective positions of the world’s global trading venues, in terms of market capitalisation (Chart 1), and equity value traded (Chart 2).

C1 : Total market capitalisation of the world's main regulated markets (as at 31/12/2016)



Source: World Federation of Exchanges.

C2 : Value traded on equity markets, January to December 2016



Source: World Federation of Exchanges.

2. The life cycle of a financial transaction

2.1. Description of the life cycle of a financial instrument transaction

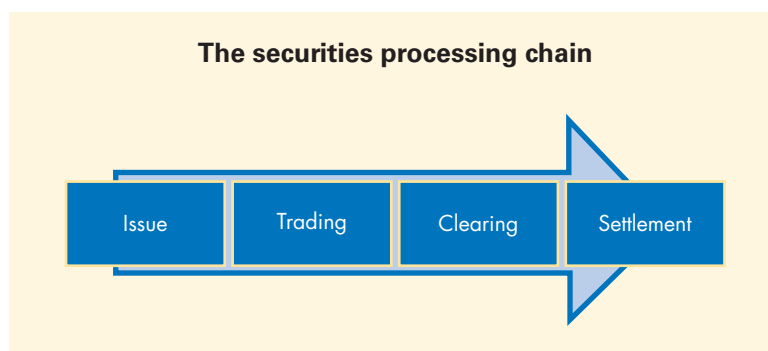
This section details the transaction cycle for financial instruments, which gives rise to cash flows and to securities flows. However, other financial transactions, such as unsecured loans (with no delivery of collateral securities) only give rise to cash flows. As mentioned above, derivative transactions will also most often result in cash flows only.

The processing chain of a security refers to all the tasks implemented to guarantee the successful completion of transactions entered into on a financial market. The processing tasks may vary depending on the nature of the security and/or the type of market (centralised vs OTC), however, they can be grouped into four stages: the issuance when it comes to a security and the first placing on the market of the instrument in question, trading, clearing and settlement.

2.1.1. Issuing

The first step in the life cycle of a security is its issue, which corresponds to the creation of a new security, e.g. a share or a bond. Historically, the creation of a security was materialised by a printed certificate entrusted to the investor, against the simultaneous delivery of funds by the latter. This certificate, which actually represented the investor's claim, was usually deposited in the investor's bank vault. In France securities have been totally dematerialised since 1984. These securities are now issued, safekept and exchanged electronically, via book entries in the accounts opened with a CSD (see Chapter 12) by the issuer and the financial intermediaries (who buy the securities issued either for their own account or on behalf of their clients).

For companies or governments, the issuance of securities is critical for the financing of their funding requirements by



the markets. The issuance of new securities usually occurs in the primary market (see earlier in this chapter):

- for shares: in the context of an IPO (Initial Public Offer) when a company raises funds in the market for the first time, or, more often, in the form of capital increases;
- for bond issues: issuance usually takes the form of competitive bidding between market makers, such as banks dealing on own account or acting on behalf of their clients;
- for sovereign debt issues: government debt securities are issued in France via an auction process managed by *Agence France Trésor*¹⁴ (AFT). The auction takes place in the form of Dutch auctions (or multiple-priced bids and sealed bids auctions) open to a limited number of participants called primary dealers. Before each auction, the AFT sets the amounts it wants to borrow and the desired maturities. Then the primary dealers state the amount of debt they want to buy and the price they are willing to pay. The received bids are then ranked and allocated in descending order of price until the total desired by the AFT has been reached. At the end of 2017, there were 16 primary dealers authorised to participate in the auctions. For the other participants, the bonds are therefore necessarily traded in the secondary market.

¹⁴ Agence France Trésor is a French national authority responsible for managing the State's cash and debt.

2.1.2. Trading

As stated earlier, securities and financial instruments may be traded on organised or over-the-counter markets. In addition, an investor can deal on own account directly in these markets (in which case the investor would be called a dealer), but many investors tend to go through intermediaries (referred to as brokers). **Trading** is the first step of the transaction. During this phase, in over-the-counter markets, the buyer and the seller agree on the terms of the contract.

The step immediately following the agreement of both parties is the **verification** of the details of the transaction. This step is necessary in the securities processing chain as well as for risk management. For transactions on a regulated market, it is the latter which will carry out the verification, since it brings together the purchase and sale orders. In the case of over-the-counter transactions, the two counterparties verify the details of the transaction via their internal systems.

The **confirmation** is the procedure whereby a record of the transaction that both parties have agreed on is created. This is done by one of the two counterparties sending the details of the transaction to the other, who checks the details and signifies agreement. This process can also be done by involving a third party to which both counterparties submit their records.

After the confirmation, the two records are then reconciled via a procedure called **matching** (usually by the central depository - see Chapters 12, 13 and 14).

2.1.3. Clearing

When it exists, the third stage of trade processing is **clearing**. This step is indeed not mandatory for all instruments nor in all markets. As a rule, products traded on organised platforms are cleared. Moreover, since 2012 and reforms such as EMIR or the Dodd-Frank Act, OTC derivatives are increasingly subject to mandatory

From the trade to the confirmation



clearing by a central counterparty. The operation of clearing houses acting as central counterparties (CCPs) is detailed in Chapter 11.

2.1.4. Settlement

The last step in the securities processing chain is **settlement**. This includes the settlement of the reciprocal commitments of the buyer and the seller and the recognition of the transaction in the books to record the definitive nature of the transaction, i.e. the delivery of securities to the buyer, and the payment of funds to the seller, when appropriate.

The management of settlement systems is handled by central depositories (see Chapters 12, 13 and 14).

2.2. Specificities of the regulation of derivatives

Derivatives usually do not give rise to an initial settlement phase but to intermediate flows. Whether listed or traded over the counter, derivatives are settled in two ways on the expiry date:

- **cash settlement**, which involves an exchange of cash flows corresponding to the value of the contract when it expires. This method is used for most derivative contracts. Following the netting process, settlement usually results in net cash exchanges between debtors and creditors;
- **physical settlement**, with the delivery of the underlying asset in exchange for the payment of the price determined in the contract. If the underlying asset is a security, settlement is done via a CSD.

However, the market practice is to avoid physical settlement, so market participants tend to close (offset) their positions before the expiry of the derivatives contract, i.e. before the settlement date, usually by taking an opposite position on the same derivative. Netting these positions allows cash settlements and avoids having to exchange the underlying.

3. Common features of financial market infrastructures

Financial market infrastructures intervene either to settle interbank payments or after a financial transaction has been entered into in the market, whether it be a regulated market or an over-the-counter market. In addition to the settlement of interbank payments, they provide clearing (where applicable), the settlement and delivery of commitments and/or contracts traded on the market. They therefore intervene in the “post-trade” sphere of the life of a financial transaction, and do not include the trading platforms, which are the exchanges.

While safe and efficient financial market infrastructures contribute to preserving and promoting financial stability and economic growth, they also concentrate the risks, albeit in different forms depending on the type of infrastructure (see Chapter 17). If they fail, financial market infrastructures could be the source of financial shocks, such as liquidity disruptions and even losses, or could be a major relay of shocks between domestic and international financial markets. The effects of such a disruption could propagate far beyond infrastructures and their participants, and threaten the stability of domestic and international financial markets and the wider economy. Conversely, robust infrastructures are an asset for the financial markets in that they allow market participants to confidently fulfil their obligations in a timely manner, even in times of stress. For example, during the financial crisis of 2008, financial market infrastructures demonstrated strong resilience and effectively implemented

their risk management mechanisms, thus avoiding contagion to all financial players. With regard to central counterparties (CCPs), the safety and efficiency objectives are even more relevant because national and international authorities have required or proposed, or even demanded in some cases, the mandatory use of a centralised clearing system in a growing number of financial markets.¹⁵

These are the reasons why market infrastructures are considered as “systemically important”.

3.1. Definition of “financial market infrastructures”

The report published by the CPMI¹⁶ and the IOSCO¹⁷ in April 2012 sets out a set of “Principles for Financial Market Infrastructures” (PFMI). A financial market infrastructure is a new concept, defined as “a multilateral system among participating institutions, including the operator of the system, used for the purposes of clearing, settling, or recording payments, securities, derivatives, or other financial transactions”.

This definition emphasises the functions an infrastructure performs, without focusing on the status of the different entities that are involved in the infrastructure. What is important is therefore the service delivered by the infrastructure, which is understandable in an approach aimed at coping with the risks generated by an activity, as the status of the person who carries it out is not relevant.

As will be seen in more detail in Chapter 18, the first international recommendations adopted by the G10 central banks in 1990 (Lamfalussy report)¹⁸ and then in 2001 (Core Principles for Systemically Important Payment Systems), related solely to payment systems. They then expanded rapidly to securities settlement systems (SSS) in 2001¹⁹ and then to central counterparties (CCPs) in 2004.²⁰ The PFMI of 2012 drew the consequences of the observation of

15 Source, PFMI, point 1.15, https://www.bis.org/cpmi/publ/d101_fr.pdf

16 Committee on Payments and Market Infrastructures.

17 International Organization of Securities Commission.

18 Report of the Committee on Interbank Netting Schemes of the central banks of the Group of Ten countries.

19 Because of their multilateral role at the end of the securities processing chain to ensure the effective settlement of transactions.

20 Because of their multilateral role in the middle of the securities processing chain where they assume the financial risks of the transaction and ensure the multilateral clearing of transactions.

the strong interrelationships between these different infrastructures, and of their common points, to define a common framework. As a result, financial market infrastructures include payment systems, securities settlement systems, central securities depositories, central counterparties (CCPs) and trade repositories²¹ (see also Chapter 18 for details).

Lastly, this definition includes the different stakeholders, i.e. the participants and the system operator. The inclusion of the latter is a new element since the PFMI, which makes it possible to impose specific obligations, particularly in terms of governance, on the system operator.

3.2. The actors of financial market infrastructures

As the definition of financial market infrastructures underlines, the actors are the operator - or manager of the system - and the participants.

3.2.1. The operator and its governance

The operator is responsible for the proper functioning of the system. It is the legal entity that manages the system, ensures its governance, defines the rules for participation and risk management, and is accountable for its compliance with the relevant domestic oversight authorities.

With the publication and implementation of the PFMI, the requirements for operators of financial market infrastructures have been strengthened. This is especially the case in the area of governance. In particular, operators must have the explicit objective of ensuring the safety and efficiency of the infrastructure they manage and must explicitly focus their efforts on ensuring financial stability.

Governance differs, especially for ensuring financial stability, depending on whether the infrastructure is organised as a private enterprise with a growth and profit objective, or as a public utility

owned by its participants, or is managed by a central bank. In any case, supporting financial stability must remain an ultimate objective of the infrastructure, which requires different types of effort depending on the organisation chosen to meet this requirement. For example, where the infrastructure has an objective of economic profitability, the generation of profit must not be met to the detriment of financial stability, infrastructure security and efficiency. It is the responsibility of the infrastructure operator to ensure the preservation of this order of priority. The operator cannot in any way diminish the security of the infrastructure (requirement of lower margins for a CCP, or insufficient or absent backup site for a CSD or a payment system, for example), to increase its profitability or reduce the rates charged for its services. In addition, where the infrastructure is owned by its participants, usually direct participants, the interests of the indirect participants must be given due allowance.

When managed by a central bank - which may be the case for payment systems in particular - and if the latter also has a mandate to oversee the security and proper functioning of payment systems, particular attention must be paid to the prevention of any potential or perceived conflict of interest between these two roles. In other words, the PFMI are applicable to all FMIs, whether they are operated by central banks or private sector entities. However, there are some exceptions, i.e. situations in which the PFMI have to be applied in a different way to the FMIs operated by central banks because of legal or regulatory requirements, such as those relating to monetary policy. For example, the principle of governance should not have the effect of constraining the composition of the governance bodies of a central bank. Similarly, the requirements of the PFMI to prepare for a recovery or an orderly unwinding of the business do not apply to a central bank, which is able to ensure the continuity of the operations of a financial market infrastructure irrespective of the financial circumstances.²²

21 Because of their role of repository centralising all the transactions and making it possible to measure the global exposures on the different types of financial activities.

22 <http://www.bis.org/cpmi/pub/d130.pdf>

In addition, the board of directors (or an equivalent body) of an infrastructure must have clear and direct lines of accountability, and the organisation of its governance must be communicated to the shareholders, relevant authorities, participants, and more generally, to the public. The role and responsibilities of the operator's board of directors must be clear, its operation must be described, in particular the ways of identifying and dealing with any conflicts of interest. The performance of the board of directors must be assessed regularly. Its members must have the appropriate skills, and must be given appropriate incentives to fulfil the tasks entrusted to them. This implies in particular the inclusion of independent members on the board of directors. The board of directors should define the system's risk management framework, its risk tolerance, the distribution of responsibilities and crisis management mechanisms. In addition, the roles and responsibilities of management must also be clearly described, and they must have the required skills. Lastly, the board of directors must ensure that the system architecture, its rules, its strategy and the major decisions that are made properly reflect the legitimate interests of all direct and indirect participants and other relevant stakeholders.

3.2.2. Settlement agents

In the context of the FMI, the settlement agent is the institution in whose books the accounts of the direct participants are credited and debited to ensure the final settlement of payment orders. The settlement agent of FMI is either the central bank, which provides a settlement in central bank money, or a commercial bank, which provides settlement in commercial currency.

In the case of payment systems, the payer's bank and the beneficiary's bank, direct participants (or indirect, see Box 5) in the payment system, hold an account in the books of the settlement agent,

and the payment is made in the books of the settlement agent by the debit of the account of the payer's bank and the credit of the beneficiary's account. The payment may be funded either by funds already in the bank account making the payment or by a credit extended by the settlement agent. This example illustrates the crucial role played by the settlement agent, and its relationship with the participating banks in the payment system. Banks are dependent on the operational soundness of the settlement agent but also on its risk policy with respect to the credits it may grant to them, and are exposed to a credit risk regarding the settlement agent. The larger the transaction volumes and values processed by the settlement agent, the more critical its operational reliability and credit quality become.²³

The settlement agent also plays a central role in the smooth functioning of a payment system by providing intraday (or daylight) credit. This is the credit made by the system's settlement agent and repaid by the borrower during a single business day. The provision of intraday credit is intended to ensure a smooth settlement process and to prevent the system from experiencing blocking situations; it is essential for payment systems, especially for large-value payment systems. It helps to mitigate the impact of any disruption in the flow of payments within the system. The repayment of borrowed funds must occur before the end of the day²⁴. This ability to provide intraday credit has become all the more crucial since, with a view to reducing financial risks, the number of infrastructures providing real-time gross settlement (see Chapter 6) and delivery versus payment (see Chapters 12 and 13) has grown significantly.

Given the central role of the settlement agent for the smooth functioning of payment systems and hence of other infrastructures - which ultimately rely on the payment system to ensure the settlement of the transactions they process - its operational

²³ See "The role of central bank money in payment systems, report from the CPSS", August 2003.

²⁴ As regards Eurosystem refinancing operations, in the event of non-repayment, the credit is converted into an overnight credit.

robustness and financial risk profile are essential. This is why Principle 9 of the PFMI recommends that infrastructures should make their payments in central bank money, where possible. Indeed, central banks carry the lowest credit risk, and they are the ultimate source of liquidity for their currency.

3.2.3. Participants

Principle 18 of the PFMI states that infrastructures must have participation criteria that are objective, risk-based, and publicly disclosed. They must also permit fair and open access to the infrastructure. By allowing the selection of participants depending on their risk profile, such participation criteria constitute the first line of defence of the infrastructure against the various financial and operational risks;²⁵ whereas the requirement for fair and open access must ensure the widest access possible to the infrastructure for financial actors. This latter aspect is especially important because regulators can make the use of infrastructures (be it CCPs, central securities depositories or trade repositories) compulsory. This translates, for example, into the fact that infrastructures must use, or at least be able to accept and implement, internationally recognised communication procedures and standards, in contrast to “proprietary” standards that could constitute a barrier to entry for actors who do not use them.

Taking into account the interests of the participants is paramount, since the role of a financial market infrastructure is to serve the markets efficiently and safely. Achieving these goals means that participants should be closely associated with the strategic decisions of the infrastructure, so that their interests are aligned. The terms of this association of participants, including indirect participants, vary depending on the characteristics of each infrastructure. Nevertheless, they must be involved in the decision-making process of the board of directors, for example through the representation of direct and indirect participants on the board, or by setting up user committees, or through a consultation mechanism.

Taking the example of TARGET2 (see Chapter 7), each national central bank operating a national component of T2 implements a consultation procedure and takes into consideration the needs and responses of its participants through a local market group. The views of the participants are then pooled within the Eurosystem, and guide the Eurosystem in its decisions on changes to the payment system.

Similarly, STET, the operator of the CORE(FR) retail payment system (see Chapter 10) organizes the consultation of its participants and the recognition of their opinions and needs via one of its governance bodies, the “client committee”. It is made up of all the direct participants and the representatives of the indirect participants. Its mandate is to validate, in particular, changes to CORE(FR)’s services, its rules, and its annual strategic plan. It is also informed of tariff changes or the suspension or exclusion of a direct participant.

3.2.4. Critical service providers

To run their operations continuously and adequately, financial market infrastructures often rely on various service providers, such as providers of messaging and connectivity, or technology services. One example is SWIFT, which provides a messaging service to the vast majority of infrastructures (see box on SWIFT in Chapter 18).

In view of the criticality for the continuous and adequate functioning of FMIs of the services they provide, the PFMI considers these service providers as critical and has listed specific recommendations for them.²⁶ This ensures that the operations of a critical service provider are held to the same standards as if the FMI provided the service itself. These recommendations address risk identification and management, robust information security management, an appropriate level of reliability and resilience, effective lifecycle management of the technologies used, and seamless communication with users.

²⁵ In this regard, it should be noted that as long as a participant meets the set participation criteria, it remains a participant in the infrastructure, even if it is subject to a recovery or resolution process.

²⁶ <https://www.bis.org/cpmi/pub/d/101a.pdf>, see annex F pp.170 and 171.

Box 5: Indirect participants

Indirect participants are financial actors who access an infrastructure through direct participants. These are clients of the direct participant - in principle banking and financial institutions - who could have had been direct participants themselves but have chosen otherwise (for economic or technical reasons). As a result, they are indirect participants from the point of view of the infrastructure.¹

Direct participants therefore have a contractual relationship with the infrastructure and must comply with its operating rules, whereas indirect participants usually only have a contractual relationship with the direct participant who represents them in the infrastructure. The dependencies and risk exposures (including credit, liquidity and operational risk) inherent in these indirect participation relationships may pose risks to the infrastructure, to participants and more broadly to financial stability. In other words, if an infrastructure has few direct participants and many indirect participants, with large volumes and high-value transactions, a large portion of the transactions processed by the infrastructure will actually come from indirect participants. If the value of transactions from indirect participants is significant in relation to the ability of direct participants to manage their risks, this may increase the latter's risk of default and thereby jeopardize the stability of the infrastructure.

Normally, the identification, monitoring and management of these risks occurs in the relationship between the direct participant and the indirect participant, with the direct participant taking over these oversight and risk management functions. However, there are situations in which relationships with indirect participants are complex, involving a long string of financial intermediaries, which may require the infrastructure to focus on this activity beyond the direct participant and the latter's immediate client.

There is obviously a limit to the ability of the infrastructure to influence the business relationships of its direct participants with their clients. However, an infrastructure often has access to information about transactions made on behalf of indirect participants, and it may also set criteria in its operating rules on how direct participants manage their relationship with their indirect participants, to the extent that these criteria are justified by risk management considerations.²

As a result, PFMI Principle 19 recommends that infrastructures should ensure that their rules, procedures and contracts allow them to collect basic information on indirect participants to identify, monitor and manage any potential material risk.

¹ The European Directive 98/26/EC on settlement finality in payment and securities settlement systems defines an indirect participant as "an institution, a central counterparty, a settlement agent, a clearing house or a system operator with a contractual relationship with an institution participating in a system executing transfer orders which enables the indirect participant to pass transfer orders through the system, on condition that the indirect participant is known to the system operator."

² <https://www.bis.org/cpmi/publ/d101a.pdf>, p 105 and 106.

3.3. The legal framework applicable to settlement risk

A major risk for financial market infrastructures is the settlement risk, which is the risk that the settlement of a transaction will not proceed as planned.²⁷ If such a risk materializes, it could jeopardize some transfer orders and pose significant credit and liquidity risks to the FMI and its other participants, and possibly generate systemic risk.²⁸ It is therefore essential, for the proper functioning of

the infrastructures, that any settlement or transfer (of securities or cash) or clearing or any other obligation settling in a system should be "final" as soon as possible. For this purpose, the transfer of securities or cash should not be subject to any condition that could prevent (or revoke) its execution: the transfer must be "irrevocable" and "unconditional" to become "final". The objective is to establish a legal mechanism to protect against the default of a participant in a payment or securities settlement system.

²⁷ <https://www.bis.org/cpmi/publ/d101a.pdf>, see principle 8 p.64 and following.

²⁸ For example, in the case of net payment systems, the participant who benefited from non-settled transactions may see its original credit balance become a debit balance, which it may not be able to cover, and this could in turn put other financial actors under pressure.

“Final settlement” or “settlement finality” is a legal concept²⁹ intended to minimize the disruption to an infrastructure caused by insolvency proceedings against one of its participants. This concept was adopted in the 1990s to improve the security and efficiency of payment and settlement systems, and to provide special protection against the occurrence of such insolvency proceedings, which prevent the execution of settlements, with a view to financial stability.

In Europe, this legal concept is defined by Directive 98/26 of 19 May 1998, which has been transposed in France by Article L. 330-1 of the Monetary and Financial Code. For a transfer order to become “final” in an infrastructure, two moments must be defined in the operating rules of the infrastructure:

- the moment of submission to the system: determines when the transfer becomes enforceable against third parties, which allows transfer orders to become unconditional; third parties, including the bankruptcy judge, can no longer challenge the transfer order, even if an insolvency proceeding is opened against a paying participant;
- the moment of irrevocability: this is the moment from which the transfer order can no longer be revoked by the party who issued it.

When these two moments have been defined, a transfer order “entered” into a system before the opening of collective insolvency proceedings can no longer be

called into question by the bankruptcy judge. Moreover, when an order has become irrevocable, it must be executed. The transfer order can no longer be challenged during or after its execution, even on the grounds of a legal provision such as the suspension of payments in case of collective proceedings. The “finality” resulting from the definition of these two moments means the transfer becomes enforceable against the decisions of a bankruptcy judge.

This protection is legal. It protects transfer orders that have entered the system and become irrevocable against any challenge by the creditors of the sender or the payer and any claim by the administrator or the judge of the insolvency proceedings.

However, Directive 98/26 does not specify when the cash is effectively paid, or the securities effectively transferred. And yet this is necessary for the transfer order to be executed finally and for the reciprocal obligations to be definitively extinguished. This situation (or “moment”), referred to as the “settlement finality”, is evidenced by debiting the payer’s account and crediting the beneficiary’s account, or in a securities transaction, when the transfer of the securities is effective (usually by the credit of the buyer’s securities account and the debit of the seller’s securities account). In their operating rules, European infrastructures thus provide for three moments: settlement, the submission to the system and irrevocability. These three moments are commonly referred to as “SF1” (submission to the system), “SF2” (irrevocability) and “SF3” (settlement).

29 <https://www.bis.org/cpmi/publ/d101a.pdf>, see principle 8 p64 and following.

CHAPTER 6

Payment circuits and systems: typology

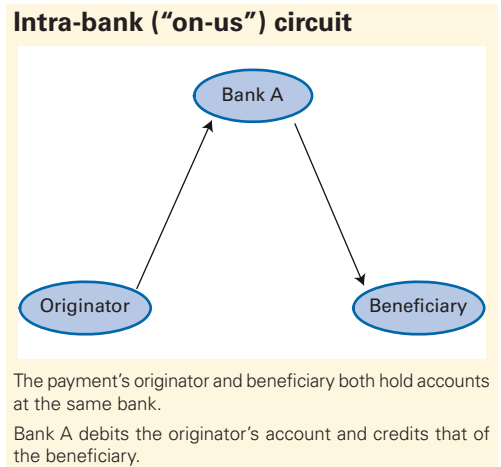
Updated on 17 December 2018

A payment is a transfer of a monetary asset to discharge a debt. A number of circuits can be used to conduct such transfers, depending on the type of payment concerned. These can be either intra-bank circuits or interbank circuits, with the latter taking different forms: bilateral (correspondent banking), multilateral (use of a payment system) or a combination of the two (correspondent banking + use of a payment system).

1. Payment circuits

1.1. Intra-bank (or “on-us”) circuits

An intra-bank or intra-group payment circuit (sometimes called a “quasi-system”) is used to transfer funds between two accounts held by the same institution or group. This type of transfer can therefore take place in-house (“on-us”) without using an interbank payment system. For example, in France, intra-bank and intra-group transfers represented 25% of total payments transferred in 2016, based on both volumes and value.¹



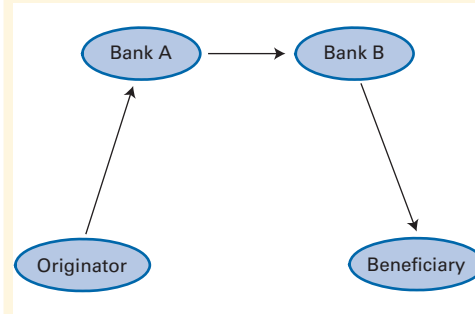
1.2. Interbank circuits

1.2.1. Bilateral interbank circuits: correspondent banking

Correspondent banking is an agreement, generally governed by a bilateral contract,

whereby a bank – called the “correspondent bank” – originates/receives payments to/from a dedicated account held on its books in the name of a client bank, on behalf of that client bank. The dedicated account is called a “loro account” from the correspondent’s point of view and a “nostro account” from the client bank’s point of view.

Bilateral interbank circuit: correspondent banking



The originator and beneficiary hold accounts with two different banks (A and B), which transfer payments between them under a bilateral correspondent banking arrangement using reciprocal accounts.
Bank A debits the originator’s account and credits the mirror account that it holds at Bank B (the “nostro” account). Bank B debits the account that Bank A holds on its books (the “loro” account) and credits the beneficiary’s account.

Correspondent banking is used, in particular, to meet the needs of institutions that lack access to a particular payment system, for example:

- institutions that do not satisfy the conditions for participating in a system, such as when the system is located in a different jurisdiction;
- institutions that do meet the conditions but do not wish to participate in the system, because, for example, their volumes are too low to justify the cost of using the system as a direct participant.

Although correspondent banking can be used for domestic payments, it is primarily used for cross-border payments: the report published by the Financial Stability Board (FSB) in March 2018 illustrates the predominantly international nature of this activity.²

¹ https://www.banque-france.fr/sites/default/files/media/2016/10/06/cmp_2016_fr.pdf
² <http://www.fsb.org/wp-content/uploads/P060318.pdf>

Box 1: Current challenges in correspondent banking

Since 1999, the Eurosystem has carried out biannual surveys on the correspondent banking business conducted in euro to monitor volumes and growth. Correspondent banking is important for the smooth functioning of payment systems as it facilitates payment flows between credit institutions and provides indirect access to payment systems. The survey carried out in 2016¹ across 16 institutions in the euro area found that total business conducted through “lori” accounts (i.e. accounts that “client” banks hold at correspondent banks) averaged 26 million transactions per day, or EUR 878 billion processed. There is a high level of concentration as the market is dominated by four major players.

The lessons drawn from the Eurosystem survey are supported and rounded out by the 2018 update of the Financial Stability Board’s report on correspondent banking² and by the CPMI’s report on correspondent banking published in 2016.³ As the latter report points out, the rising costs of the correspondent banking activity, coupled with uncertainty on the scope of monitoring to be performed on clients, are the main factors cited by respondent banks for scaling back the services they provide in this area. These cutbacks largely affect correspondent banking relationships which are considered to generate insufficient business volumes, or which involve jurisdictions deemed too risky or clients on which the necessary information is not available. In view of this situation, which could lead to the fragmentation of cross-border payments and reduce the options available for conducting them, the report sets out five recommendations:

- Use “know your customer” (KYC) utilities to standardise data collection procedures;
- Use Legal Entity Identifiers (LEIs) to map correspondent banking relationships;
- Initiate information-sharing practices in compliance with national personal data protection regulations;
- Ensure that the information contained in payment-related messages is accurate and provides the necessary transparency;
- Consider using LEIs in payment-related messages.

Along these lines, in January 2016 SWIFT launched its “Global Payments Innovation” initiative (GPI).⁴ The aim was to facilitate and accelerate cross-border payments, while making them more secure, so that payments can be credited within 24 hours and monitored using real-time end-to-end payment tracking from their origination to final settlement. Based on figures published by SWIFT in May 2018, 25% of all SWIFT cross-border payment traffic was being sent via the GPI.⁵

1 https://www.ecb.europa.eu/pub/pdf/other/surveycorrespondentbankingineuro201702_en.pdf?651487aa2ace9afbac36d8d7e7784203

2 <http://www.fsb.org/2018/03/fsb-correspondent-banking-data-report-update/>

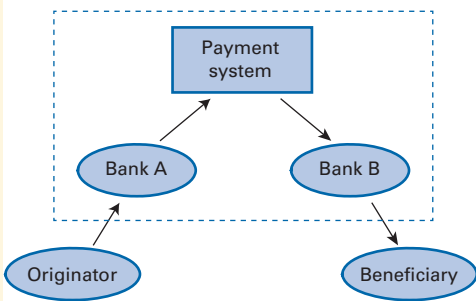
3 <https://www.bis.org/cpmi/publ/d147.pdf>

4 https://www.swift.com/insights/press-releases/45-leading-banks-sign-up-to-swift_s-global-payments-innovation-initiative

5 https://www.swift.com/news-events/press-releases/swift_a-quarter-of-all-cross-border-payments-now-over-gpi

1.2.2. Multilateral interbank circuit: use of a payment system

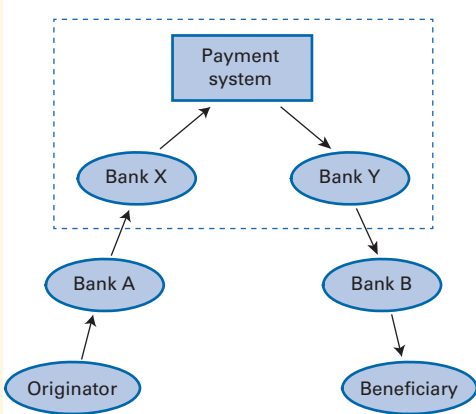
Multilateral interbank circuit using a payment system



The originator and beneficiary hold accounts with two different banks (A and B), which transfer payments between them using an interbank payment system in which they are both direct participants.

1.2.3. Circuit combining correspondent banking with the use of a payment system

Circuit combining correspondent banking with the use of a payment system



The originator and beneficiary hold accounts with two different banks (A and B), which are not direct participants in the payment system concerned, but have access to it via their respective correspondent banks, Bank X and Bank Y (circuit traditionally used for payments in a third currency). Under their respective contractual agreements with Bank A and Bank B, Bank X and Bank Y can grant intraday or overnight credit to Bank A and Bank B so that payments can flow smoothly between them without the accounts of Bank A and Bank B constantly showing substantial debit balances.

2. Payment systems

A payment system (also known as an interbank funds transfer system or IFTS) is a multilateral transfer mechanism defined as “a set of instruments, procedures and rules for the transfer of funds between or among participants”³ It is the most efficient way to make payments when flows transit between several players. By centralising payments in these systems, flows can be streamlined and settlement optimised. Settlement can be performed on a net basis (after netting) or gross basis (without netting).

When transactions are settled on a net basis, payments in the system are offset against each other (or “netted”) to calculate a single balance for each participant (the multilateral net balance) vis-à-vis all the other participants (or the system). As only the net balances are settled, the amounts to be paid are massively reduced, as is liquidity consumption. However, because there is a time lag before the balances are settled, payments do not have immediate finality and can be jeopardised if a participant in the system defaults. Moreover, with settlement on a net basis, each payment depends on the successful completion of all the other payments netted to produce the final position: if a net debit balance cannot be settled, then all the transactions that “contributed” to the net balance are blocked. This is not the case with gross settlement.

With gross settlement, transactions are settled one by one, so payments have immediate finality. Gross settlement thus reduces settlement risk more effectively, but it consumes more liquidity.

³ Définition taken from the Principles for Financial Market Infrastructures (PFMI) : <https://www.bis.org/cpmi/publ/d101a.pdf> (for more details on the PFMI, see Chapter 18)

	RTGS (real-time gross settlement)	DNS (deferred net settlement)
Settlement method	Gross (transaction by transaction)	Net (multilateral netting)
Settlement frequency	In real time (continuously throughout the day)	Discontinuous (at the end of a cycle/the day)
Settlement risk	No	Yes
Liquidity consumption	High	Low

The initial differences between the two types of payment system (net settlement versus gross settlement) have diminished somewhat as mechanisms have been developed to increase the security of net settlement systems and reduce liquidity consumption in gross settlement systems.⁴

This shrinking gap between net and gross settlement systems is mirrored in the field of securities settlement systems (see Chapters 12, 13 and 14), where the benefits of technological progress are clear to see.

2.1. Deferred net settlement (DNS) systems

Deferred net settlement systems were the predominant type of payment system used until the early 1990s. In these systems, participants' multilateral net balances were settled at the end of a predefined cycle, usually at the end of the day. By reducing the number and amount of payments necessary for settlement, netting also reduced consumption of the asset used for settlement, i.e. money (the higher the "netting rate", the more efficient the system). However, as the net balances were only settled at the end of the cycle, participants were exposed to settlement risk throughout the cycle's duration.

In order to overcome this constraint, various mechanisms were incorporated into net settlement systems to make payments more secure. This turned the systems into "hybrid" systems, of which examples are given in Chapter 7.

These changes were brought about by a report by the Committee on Interbank Netting Schemes of the Central Banks of the Group of Ten countries ("Lamfalussy" Committee) published in 1990. This report recommended that "minimum standards" be set, with the aim of reducing the risks associated with clearing systems and interbank settlement systems (see Chapter 18, Box 1) and also stressed that participants are primarily responsible for ensuring that the systems comply with these minimum standards.

2.2. Real-Time Gross Settlement (RTGS) systems

Under the pressure of central banks, using DNS and "hybrid" systems (see Section 2.3) has become less risky but more costly. It has enabled RTGS systems to develop in the G10 member countries in the 1990s, thanks to the lower cost spread between DNS and RTGS systems and the growing importance given to risk management in the design of market infrastructures. At the same time, it became increasingly necessary to draw distinctions between payments, especially in terms of their amount and purpose. Some large-value payments are deemed critical, particularly in the interbank market, and require faster, safer processing.

RTGS systems have the advantage of providing immediate finality for payments, thus eliminating settlement risk. In practice, unlike DNS systems, RTGS systems process payment orders one by one: if the issuer has sufficient funds (or available credit) on the settlement agent's books, the payment is settled with immediate finality. Otherwise, the payment order is placed in a queue.

Within the space of a few years, RTGS systems became key infrastructures for the functioning of the financial system, handling monetary policy operations and interbank transactions, as well as settling positions resulting from transactions in other payment systems or securities settlement systems (known as ancillary systems).

The adoption of RTGS by payment systems is strongly encouraged by central banks, because it makes these systems' settlement processes more secure.

Most central banks, even those outside the G10 member countries, have now opted for RTGS systems, which they generally operate themselves.⁵

However, because payments are settled one by one in RTGS system, the intraday liquidity needs associated with these gross

4 See the Banque de France Financial Stability Review, February 2008: «Recent developments in intraday liquidity in payment and settlement systems» by Frédéric Hervo. https://publications.banque-france.fr/sites/default/files/medias/documents/revue-de-stabilite-financiere_11_2008-02.pdf

5 As part of the development strategy for its RTGS, in May 2017 the Bank of England announced a decision to adopt a "direct delivery model" for the UK's RTGS, with the central bank being directly in charge of operating the system. <https://www.bankofengland.co.uk/media/boe/files/payments/a-blueprint-for-a-new-rtgs-service-for-the-uk.pdf?la=en&hash=56424C6BC6D9E056F05476A96B482D4779377E45>

Box 2: History of France's large-value payment system

Until the 1980s, large-value interbank settlements were performed using paper instruments (credit transfers, endorsements of commercial paper and bills of exchange) exchanged in a clearing house. In this system, the "clearing house" would only calculate net balances from sets of unit ("gross") transactions. This notion differs from the "clearing house" concept commonly used today, which is equivalent to "central counterparty" (the central counterparty acts as an intermediary between the counterparties to a transaction, as well as calculating net balances; see Chapter 11).

From 1984, the SAGITTAIRE¹ system developed and implemented by the Banque de France enabled payment flows to be automated. SAGITTAIRE was a deferred net settlement (DNS) system, to which participating banks transferred their payment orders continuously throughout the day, adopting the formats and network used for SWIFT messages. Participants' net balances were settled on the Banque de France's books at the end of the "accounting day" (which, in practice, was the following morning). The system's rules included a revocability clause applicable to cases where a participant had insufficient funds in their account. This "revocability", however, was regarded in a hypothetical light: participants were convinced that should a problem arise the Banque de France, as the system's settlement agent, would take appropriate measures to avoid a contagion effect (i.e. it would extend an overdraft to the defaulting participant, thus assuming the associated credit risk).

In 1990, as part of a joint review process by the main central banks, the Governor of the Banque de France set out the basis for a new approach that can be summed up in three points: (1) revocability clauses specific to deferred net settlement systems are dangerous and misleading: they increase systemic risk and accentuate the moral hazard issue for the central bank; (2) France's future large-volume payment system would be a real-time gross settlement system; (3) payment systems involving netting that are settled on the Banque de France's books must incorporate self-protection mechanisms (revocability clauses were dropped).

In 1994, following a long consultation period, the Banque de France and French banks agreed on a two-pronged approach (inspired by the US system, Fedwire +CHIPS) for France's future large-volume payment system, whereby a real-time gross settlement system operated by the Banque de France (TBF, for *Transferts Banque de France*) would run alongside a self-protected net settlement system (SNP: *Système Net Protégé*), operated by a private company set up for that purpose and owned jointly by the Banque de France and France's main credit institutions (*Centrale des Règlements Interbancaires - CRI*). The co-existence of two large-value payment systems, one operated by the central bank (TBF) and the other by a private company (CRI), allowed participants to separate their most critical payments from the rest: critical payments were settled via TBF and the rest were handled as a priority by SNP.

In 1997, TBF and SNP came into operation and SAGITTAIRE was closed down.

In 1999, with the switch to the euro, TBF became the "French component" of the European system, TARGET. Also in 1999, SNP was converted from a deferred net settlement system into a continuous net settlement system in central bank money and was renamed PNS ("Paris Net Settlement").

In 2008, the TBF and PNS systems were closed and replaced by the TARGET2 system (see Chapter 7).

¹ An acronym representing: *Système Automatisé de Gestion Intégrée par Télétransmission de Transactions Avec Imputation de Règlements "Etranger"* (automated system for the integrated handling and settlement of foreign transactions by means of telecommunication).

settlement systems are necessarily higher than those of a DNS system, in which payments are settled on a net basis.

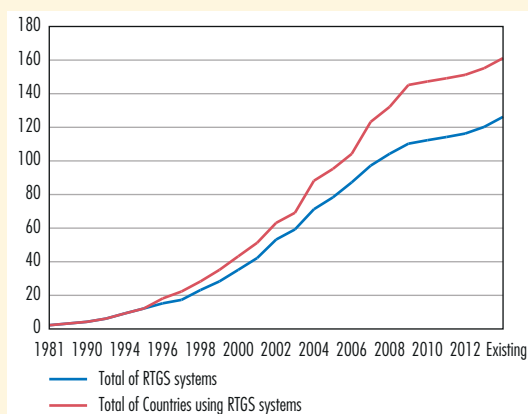
To overcome this constraint, liquidity-saving devices were progressively incorporated into RTGS systems. Examples of these mechanisms are provided in Chapter 7, Section 4 on TARGET2, the Eurosystem's RTGS system.

2.3. Hybrid systems

Risk issues, especially regarding systemic risk, not only triggered wide-scale adoption of RTGS systems, but also prompted many payment systems still using net settlement to develop mechanisms to reduce their risk-related drawbacks. As a result, the use of DNS systems in the strict sense became rarer, especially for processing large-value payments. DNS systems were converted into "hybrid" systems combining the advantages of both settlement approaches.⁶

The key feature of hybrid systems lies in their frequent netting of payments throughout the day, with settlement providing immediate finality. The approach generally adopted is to keep payments in a queue (often centralised) and offset positions continuously or at close intervals. Settlement can take place as soon as the net debit balances are covered. Payments that cannot be settled remain in the queue until the next batch of netting and settlement processes are executed.

C1 : Change in the number of RTGS systems in use worldwide



Source : SWIFT, Reducing risk and increasing resilience in RTGS payment systems (July 2014)
https://www.swift.com/sites/default/files/resources/mirs_white_paper_57023_june2014.pdf

The frequent netting in hybrid systems is intended to limit liquidity needs relative to those of an RTGS system. At the same time, the risk associated with DNS systems is generally limited in hybrid systems because (i) only payments linked to covered net positions are processed in each batch of netting operations and (ii) final settlement of net positions takes place immediately after each batch of netting operations.⁷

These different types of payment system are presented in more detail in the following chapters.

⁶ In May 2005, the CPMI published a review of the various types of systems in use for processing large-value payments. "New developments in large-value payment systems", CPSS, BIS, May 2005: <https://www.bis.org/cpmi/publ/d67.pdf>

⁷ For an example of the hybrid system, CHIPS, see Chapter 8.

CHAPTER 7

TARGET2, the Eurosystem's RTGS system

Updated on 17 December 2018

Among the RTGS systems in use across the world's major monetary areas, the euro area's TARGET2 system provides a good example of the key features described in the previous chapter.

TARGET2 is the real-time gross settlement system owned and operated by the Eurosystem. Implemented in 2007-2008, it is the second generation of TARGET (Trans-European Automated Real-time Gross-settlement Express Transfer system), a system launched in 1999 alongside the single currency and designed to settle large-value payments in euro using central bank money.

The central banks participating in TARGET2 are, in principle, those of the countries that adopted the euro as their currency. However, the central banks of other European Union Member States can also participate so that users of their national RTGS systems can settle euro transactions in TARGET2 (these central banks are then said to be "connected").

At the end of 2017, alongside the European Central Bank (ECB), 24 national central banks (NCBs) were participants in TARGET2: the 19 NCBs of the euro area, plus 5 "connected" NCBs.¹

1. Origin and governance of TARGET2

1.1. Origin

The Eurosystem has had a technically centralised but legally decentralised RTGS system since 2007.

1.1.1. TARGET (1999-2007)

The implementation schedule set for the single currency in the mid-1990s meant that there was no time to develop a shared RTGS system for euro transactions from scratch, since it was imperative for a system to be operational by the start of 1999. It was therefore decided to develop TARGET by

building on the RTGS systems already in use in participating countries, using the SWIFT network to connect them to each other.

The national RTGS systems retained their specific features for processing domestic payments in euro, but also had to incorporate a minimum set of harmonised functionalities relating to access conditions, opening hours, cross-border transaction pricing, intraday credit and security.

TARGET was mainly intended to process large-value payments in euro, in particular operations connected with the euro area's common monetary policy, and to provide final settlement in central bank money of the net balances of euro transactions conducted in ancillary systems.

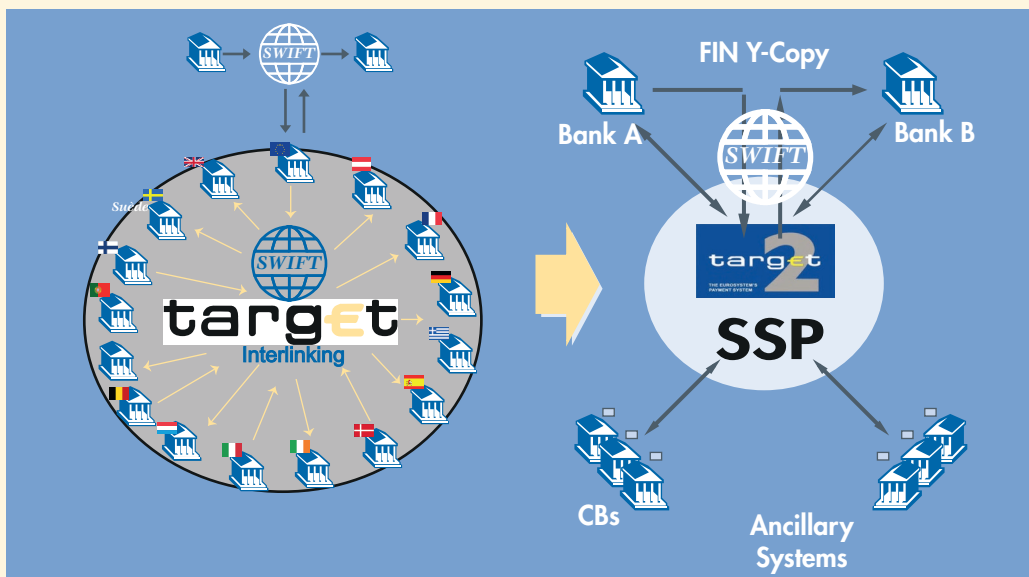
After going live on 4 January 1999, the first-generation TARGET facilitated the implementation of the ECB's monetary policy and the development of a single money market, while growth in cross-border transactions spurred integration between euro area financial markets.

Thanks to the system's reliability and the fact that no minimum amount was set for payments processed, TARGET rapidly came to be used for other types of transaction, such as urgent commercial payments.

However, this configuration soon proved to have limitations for banks and central banks. The large cross-border banking groups were pressing for standardised services and the system was growing increasingly cumbersome – operationally and financially – as the NCBs of new EU Member States were connected to it. The Eurosystem therefore launched a deliberation on the second generation (TARGET2). At the end of 2002, the Governing Council of the ECB adopted a series of guidelines with the aim of better meeting users' needs by harmonising the services offered, while allowing the business relationships between national central banks and their participating banks to remain on a decentralised basis. It also

¹ In 2017, the members of the euro area were: Germany, Austria, Belgium, Cyprus, Spain, Estonia, Finland, France, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Slovakia and Slovenia. The countries with connected NCBs were Bulgaria, Croatia, Denmark, Poland and Romania.

From TARGET to TARGET2



Source: ECB – <https://www.ecb.europa.eu/paym/t2/target/html/index.en.html>

Note: The central banks concerned migrated to the system in three phases from November 2007 to May 2008: Germany, Austria, Cyprus, Latvia, Lithuania, Luxembourg, Malta and Slovenia (Phase 1); Belgium, Spain, Finland, France, Ireland, the Netherlands and Portugal (Phase 2); Denmark, Estonia, Greece, Italy, Poland and the ECB (Phase 3).

launched a public consultation, in response to which Europe's banks expressed their support for the guidelines adopted by the Eurosystem, while stressing that the harmonisation of services would have to go hand in hand with a consolidation of the system's technical infrastructure on a single platform.

These principles were documented in the reference legal framework established by the ECB Guideline on TARGET2 published in 2007.²

1.1.2. TARGET2

Technically, TARGET2 is a single shared settlement platform.

Commonly referred to as the SSP (Single Shared Platform), TARGET2 is accessible in two ways: via the network service provider SWIFT or via the Internet.³ The platform has a modular structure, in which each module is dedicated to a specific activity.

The system's developers chose to:

- impose no upper or lower limit on the value of payments;
- standardise the rules for submitting and processing payment orders via the platform, be it for domestic or cross-border transactions;
- harmonise the services provided in participating countries;
- offer liquidity management optimisation services for participants;
- simplify the regulations applicable to ancillary systems (see Section 3 below);
- adopt a single pricing structure for services provided, aiming to recover the system's costs while factoring in a "public good factor" relating to the positive externalities generated by TARGET2 (see Chapter 19, on the economics of payment systems);

² The legal texts on TARGET2 can be found on the ECB's website <http://www.ecb.europa.eu/ecb/legal/1003/1349/html/index.en.html>

³ National central banks have a third access route, based on a proprietary network for contingency purposes.

- harmonise communication channels and procedures.

1.1.3. Legal framework

Legally, TARGET2 relies on a number of national payment systems that are operated independently but satisfy a set of harmonised conditions.

While, technically speaking, TARGET2 is a single payment platform, in legal terms it remains a decentralised structure because it comprises a number of interconnected national RTGS systems.

Each national RTGS system is operated by the national central bank (NCB), which holds the accounts of banks and financial institutions in accordance with the decentralisation principle underpinning the implementation of the Eurosystem's common monetary policy. The French component system of TARGET2 (TARGET2-Banque de France) is therefore operated by the Banque de France.

The various component systems within the Eurosystem must, however, satisfy a number of harmonised conditions for the opening and functioning of accounts, as set out in the Guideline on TARGET2. These conditions form the basis of the agreements signed between each central bank and its participants when the latter open an account in a TARGET2 component system.

With respect to "connected" NCBs, these banks sign an agreement with the Eurosystem's NCBs,⁴ whereby they undertake to fulfil the harmonised conditions, except for those relating to euro area common monetary policy and intraday credit.

1.2. Governance of TARGET2

TARGET2 is included in the Eurosystem's governance structure for its market infrastructures, i.e. TARGET2 and T2S. The chart below shows how the various decision-making bodies are positioned in the governance structure for TARGET2.

1.2.1. The decision-making body

The decision-making body is the Governing Council of the ECB, which determines TARGET2's strategy and broad operating principles. It takes decisions on the basis of proposals made by two Eurosystem bodies, the Market Infrastructure Board (MIB) and the Market Infrastructures and Payments Committee (MIPC), which address operational and strategic development issues, respectively.

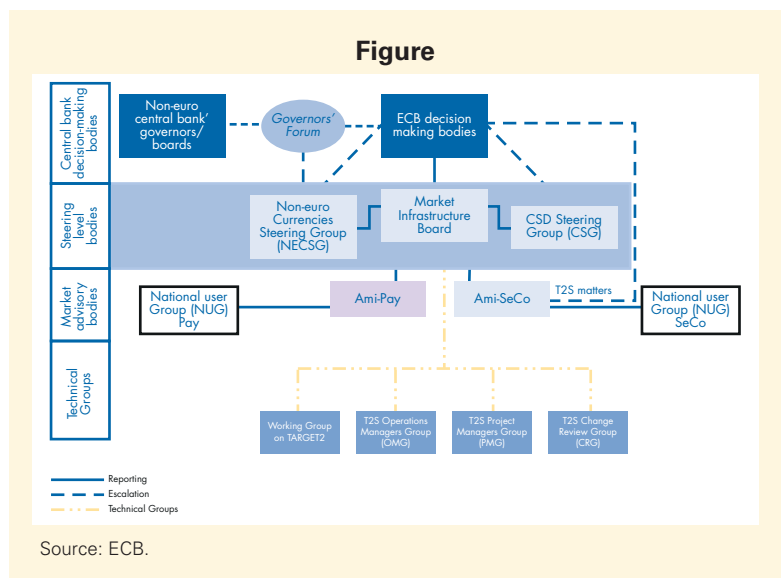
1.2.2. Steering bodies

The steering bodies are the central banks of the Eurosystem (the ECB and euro area NCBs), which own TARGET2. They put harmonised conditions in place for the opening and functioning of accounts and contribute to the system's development.

The various NCBs and the ECB coordinate their work within the MIB and MIPC referred to above, as well as within the Working Group on TARGET2 for technical aspects.

NCBs provide the sole point of contact (the national service desk) for participants in their national communities. This decentralised structure is used for signing account

4 Entitled "Agreement on TARGET2," this agreement must be updated whenever a change in the TARGET2 Guidelines affect its terms.



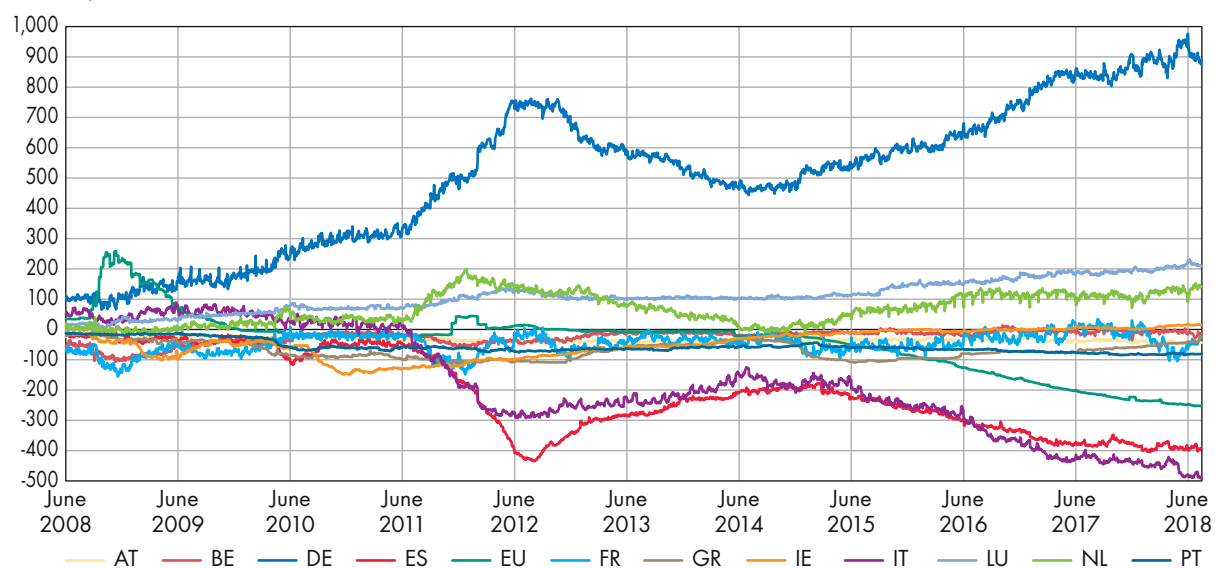
Box 1: TARGET2 balances

TARGET2 balances¹ are the net positions resulting from cross-border payments between euro area countries processed via the TARGET2 decentralised payment system.²

When payments are made between banks holding accounts at different NCBs, the ECB acts as the counterparty to each NCB's position and a multilateral net balance is calculated. These multilateral net balances are booked at the end of each business day in the respective NCBs' accounts at the ECB, in order to account for cross-border flows of central bank money. For each NCB, the net balance of these flows constitutes the TARGET2 balance.

C1: Cumulative TARGET2 balances by country

(EUR billions)



Source: Banque de France.

Note: Data published regularly on this page of the ECB's website: <http://sdw.ecb.europa.eu/servlet/desis?node=1000004859>

The consolidated balance is always zero. The balances in TARGET2 are not payable and as such are never settled. At the end of the day, the balance showing for each NCB is added to the previous day's balance; the sum of the daily balances constitutes the cumulative balance.

As shown in the chart, since 2008 some central banks have accumulated a credit or debit position vis-à-vis the Eurosystem's other central banks.

.../...

1 For further information on TARGET2 balances, see the Banque de France "Focus" of May 2012 and the articles published by the ECB in Bulletins 2013-05 (pages 103 to 114) and 2017-03.
https://publications.banque-france.fr/sites/default/files/medias/documents/focus-06_2012-05-31_en.pdf
https://publications.banque-france.fr/sites/default/files/medias/documents/focus-06_2012-05-31_fr.pdf
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https://publications.banque-france.fr/sites/default/files/medias/documents/be3_2017_fr.pdf

2 During the system's daytime operating hours, NCBs of non-euro area countries ("connected" NCBs) must maintain an overall credit balance vis-à-vis all the central banks in the Eurosystem at all times.

The types of transaction underlying these cross-border payment flows vary significantly, reflecting the diversity of the economic and financial activities performed within the highly integrated monetary area. They can include payments for goods purchased from a foreign supplier, or payments within a given banking group, in which two entities participate in TARGET2 separately through two different NCBs. Cross-border payment traffic could increase if euro area banking groups centralise their treasury management. Flows can also reflect a simple outflow of capital from the national banking system to other banks in the euro area.

Until the sovereign debt crisis in the euro area in 2011, cross-border payment flows in TARGET2, whether between current accounts or investment portfolios, were offset by financing in the interbank market, also on a cross-border basis. However, the climate of distrust created by the financial crisis caused the interbank market – and the offsetting flows it provided – to dry up. Credit institutions then turned to their central banks for the liquidity that had become difficult or impossible to obtain in the interbank market.

TARGET2 balances are therefore indicative of imbalances that cannot be compensated naturally by market funding streams and require intervention by the Eurosystem. They are also useful indicators of the attractiveness and financial health of euro area countries and of monetary solidarity between central banks in the Eurosystem. TARGET2 balances are now monitored as key indicators of the interbank market's normalisation and are often referred to by the President of the ECB during press conferences on monetary policy.

It should be noted that this “balance” mechanism is not specific to the euro area. Similar systems are used in other countries whose payment systems in central bank money are, like TARGET2, based on a principle of decentralisation, such as the Fedwire system in the United States, in which federal reserve banks show positions similar to those of the NCBs in TARGET2.

opening agreements, using the standing facilities associated with the Eurosystem's monetary policy, applying for free intraday credit backed by collateral (see Chapter 15), and crisis management measures.

The ECB, as the operator of a system component, implements the harmonised conditions for TARGET2. It does not, however, open settlement accounts for banks established in the euro area. Its operational role consists of providing settlement services for pan-European payment systems such as EURO1 and STEP2, or international systems like the CLS system (see Chapter 9). In addition, via its service desk, the ECB helps to coordinate the NCBs in their daily use of the single

platform and especially with respect to crisis management.

1.2.3. Advisory bodies

The governance of TARGET2 also relies heavily on regular reporting and dialogue between participating central banks and banking communities, through working groups and advisory bodies at the national and European levels. At the European level, AMI Pay⁵ brings together the Eurosystem and the main European banks that use TARGET2, so that the latter can express their needs as regards the functioning of TARGET2. In addition to AMI Pay, national stakeholder groups provide forums for each national community to discuss TARGET2-related issues.

⁵ Advisory group on Market Infrastructures for Payments.

2. Participation in TARGET2

TARGET2 is open to large-scale participation. Although its guidelines set out conditions for access to the system, thanks to the considerable freedom of interpretation left to the NCBs and, more importantly, the fact that institutions can participate in the system indirectly, more than 50,000 entities across the globe can now settle transactions in TARGET2. These entities are listed in the system's directory (the T2-Directory).

2.1. Direct participation

Direct participation, linked to the opening of an account in central bank money at a NCB participating in TARGET2, is open to credit institutions established in the European Economic Area (EEA) and credit institutions established outside the EEA, provided that they act through a branch established in the EEA.

Although credit institutions may gain access to the system by opening an account at another central bank (remote access), they can only use all the features of TARGET2, notably access to intraday credit, if they open an account at the central bank of a country in which they have an establishment.

Each central bank may also admit the following entities as direct participants:

- investment firms established in the EEA;
- Treasury departments of central or regional governments of Member States active in the money markets, and public sector bodies of Member States authorised to hold accounts for customers;
- entities established in the EEA that manage other market infrastructures known as ancillary systems and acting in that capacity, so that final settlements in central bank money can be performed on an RTGS account;

Box 2: Participation in TARGET2

At the end of 2017, 1,963 accounts were open in TARGET2, enabling transactions to be settled for 1,073 direct participants, 684 indirect participants and 48,443 addressable BIC holders all across the globe. In addition, 79 ancillary systems were settling transactions in TARGET2 (including 25 retail payment systems, 23 securities settlement systems and 4 central counterparties).

In 2016 the average share of transactions submitted to the platform by indirect participants ("tiering") was around 5% based on value and 18% based on volume, with no evidence of significant concentration around a few direct or indirect participants.

- credit institutions or any of the entities listed in the above points, which are established in a country with which the European Union has entered into a monetary agreement (in practice, Andorra, Monaco, San Marino and the Vatican).

2.2. Indirect participation

Indirect participation, which broadens the user base, can take three forms:

- **Indirect participant status, which gives legal certainty:** If they do not wish to open an RTGS account in TARGET2, notably because the cost involved is not commensurate with their transaction volumes in euro, credit institutions established in the EEA can sign a contract with one – and only one – direct participant that is either a central bank in the Eurosystem or a connected central bank or a credit institution established in the EEA, in order to submit payment orders and/or receive payments through the account of said direct participant in TARGET2. When a central bank registers a credit institution as an indirect participant in the TARGET2 directory, the participant obtains full participant status and thus benefits from payment finality (see Chapter 5).

- **Addressable BIC status, which allows extensive participation:** A direct participant can also register entities known as “addressable BICs” in the TARGET2 directory in order for them to submit or receive payment orders via the direct participant’s account. The legal texts do not specify any legal or geographical criteria for such registries. The entity must simply possess a business identifier code (BIC). The entities concerned are generally correspondent banks, clients of entities that hold accounts in TARGET2, or branches of such account-holding entities or of indirect participants. Contrary to registration as an indirect participant, the registration of an institution as an addressable BIC does not give the institution legal status or, by extension, legal security.
- **Multi-addressee access, which facilitates transactions between institutions in the same banking group:** A credit institution may grant access to its TARGET2 account to one or more of its branches and to an indirect participant belonging to the credit institution’s banking group.

2.3. Ancillary systems

Payment systems that handle a substantial share of transactions in euro and settle their net balances in TARGET2 must be operated by an entity established in the EEA and must comply with the oversight requirements applicable to the location of infrastructures providing services in euro, as amended from time to time and published on the ECB website.

At present, payment systems that process a substantial portion of their transactions in euro must be legally established in the euro zone if their daily settlements in euro exceed EUR 5 billion or if they represent, individually, more than 0.2% of the total value of euro transactions settled via interbank payment systems in the euro area.

There is one noteworthy exemption to this rule: the CLS system (see Chapter 9), which was set up to reduce settlement risk on foreign exchange transactions by operating on a payment-versus-payment basis. Transactions in euro processed in this system use TARGET2 for final settlement. Although its operator is overseen by the US federal reserve system, it is subject to collective oversight by the central banks of G10 member countries and by other central banks whose currencies are processed in CLS, thus enabling the Eurosystem to participate in the oversight of CLS as an ancillary system that settles transactions in TARGET2 (for information on the Eurosystem’s policy on the location of infrastructures, see also Chapter 17, Section 3.3.1).

3. TARGET2 functionalities

Once they are admitted to use the TARGET2 platform, all users gain access to the same functionalities with the same pricing structure, regardless of the location in which they operate. At the same time, TARGET2 offers them a range of sufficiently diversified services to meet their respective business needs.

3.1. Harmonised, flexible functionalities

The following operations can be performed on an account opened in a TARGET2 component system:

- interbank payment orders, including monetary policy operations;
- direct debit orders. Unlike the case above, it is the payee who is debited in favour of the order originator;
- liquidity transfers between accounts;
- payments issued by/to a non-bank client. In such cases, payments that are low-value but urgent can be executed.

Each participant holds at least one RTGS account, identified by a BIC. Several

accounts can be held if this is warranted in view of the participant's activity.

For establishments that do not need all the platform's functionalities but are still subject to the minimum reserve requirement, or for entities that do not have access to TARGET2, central banks have the option of using the Home Accounting Module (HAM), which allows "local" accounts to be opened offering limited standardised services: cash management (in relation to cash-based activities, for withdrawals or deposits), management of minimum reserves, access to the Eurosystem's standing facilities, interbank transfers and a co-management service for small institutions that lack the appropriate technical infrastructure, whereby the local account is co-managed by an RTGS account holder.⁶

The size of participating banks is taken into account in the transaction pricing options, which combine a flat monthly fee with a flat or degressive volume-based unit transaction cost.⁷

Technically, TARGET2 enables all payment orders and final receipts of payment to be formatted and processed in a uniform manner. Payment orders are supposed to

be processed one by one, in accordance with their level of priority, on a "first in, first out" (FIFO) basis. In practice, each payment order is assigned a level of priority (highly urgent, urgent or normal) based on their criticality.⁸

If a participant has insufficient liquidity in their account or if their funds are blocked by a TARGET2 function (an exemption from the FIFO principle is granted if offsetting payment orders generate a net increase in the payer's liquidity – see the Section on TARGET2 features below), their payment orders are placed in a queue. At the end of the day, all payment orders that have not been settled before the cut-off time for the type of order concerned are rejected.

A monitoring tool is made available to TARGET2 participants. The ICM (Information and Control Module) provides real-time interactive access to a wealth of information, especially concerning their liquidity in the system and the status of payments they have issued and received (settled or queued). Participants can consult the queues relevant to them at any time and can issue highly urgent payment orders. The ICM is accessible on a U2A (User to Application) or A2A (Application to Application) basis.

6 Under this arrangement, transactions conducted by the RTGS account holder are deemed to have been conducted by the holder of the local account.

7 Since 2013, Option A consists of a EUR 150 flat monthly fee and a unit transaction cost of EUR 0.80; Option B consists of a EUR 1,825 flat monthly fee and a degressive transaction fee based on monthly volumes, ranging from EUR 0.60 to EUR 0.125 (see also Chapter 19).

8 Assigned by the participant itself or based on the type of payment order concerned. For example, payment orders issued to CLS are always rated highly urgent.

Box 3: The TARGET2 business day

The TARGET2 business day begins on the evening of the previous business day (D-1) at 19:00 CET.

A night-time settlement procedure is available from 19:30 to 07:00 CET the next day, with a three-hour stoppage for technical maintenance between 22:00 and 01:00 CET. The night-time window is used for settlement by certain ancillary systems.

Daytime settlement operations begin at 07:00 CET and end at the following times:

- 17:00 CET for customer payments;
- 18:00 CET for interbank payments.

During this time, ancillary systems carry out one or more settlement operations using one or more of the procedures provided by TARGET2 (see below).

.../...

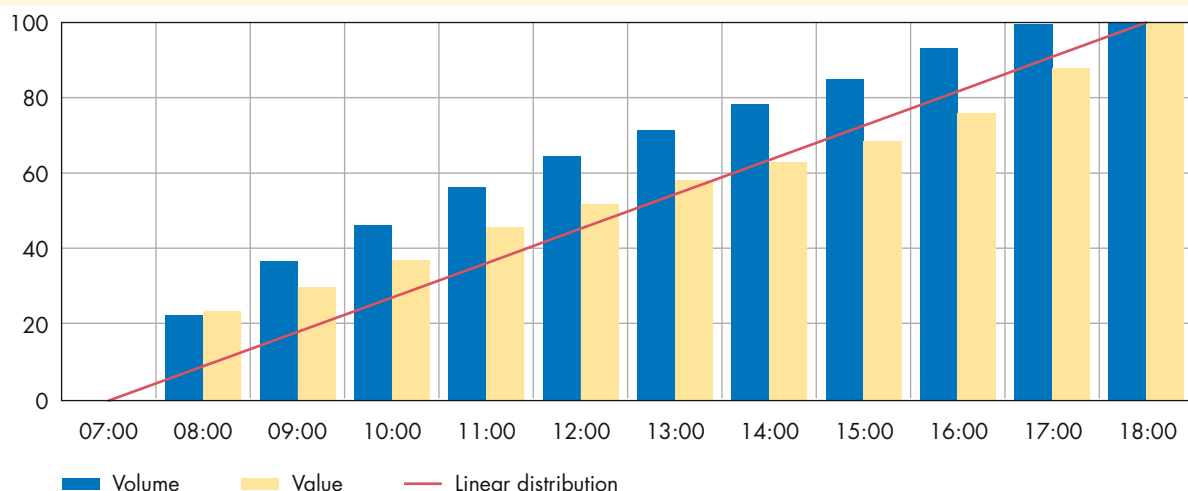
Between 18:00 and 18:15, depending on their liquidity position, participants based in the euro area can make use of the Eurosystem's standing facilities.¹

The day usually ends at 18:15, followed by preparations for the next business day.

The chart below shows that more than 50% of payment orders, based on value, are executed by 12 noon, reflecting higher activity levels in the morning.

C2: TARGET2 traffic Intraday distribution in

(%)



Source: ECB – TARGET annual report 2017.

¹ Lending facility or deposit facility, depending on whether the participant has a net credit or debit position.

The TARGET2 platform is accessible via SWIFT or the Internet. When a participant connects via SWIFT, it can use all the platform's functionalities. Some credit institutions, however, especially the smallest among them, do not have access to SWIFT, which is why an alternative internet-based connection route was developed in 2010. Users of this route have access to a more restricted range of services. For example, they cannot issue direct debit orders or participate in a group of accounts. This access route is intended particularly for small, low-volume credit institutions, for which the cost of accessing the SWIFT network would be disproportionate to their business levels.

TARGET2 operates every day except Saturdays, Sundays and six public holidays⁹ (between 255 and 257 days a year overall).

3.2. Services for ancillary systems

The multitude of financial players that participate in financial market infrastructures all depend on the proper execution of payment orders. Timely settlement of ancillary systems' transactions in TARGET2 is thus crucial for financial stability.

TARGET2 enables financial market infrastructures established in the EEA offering services in euro (central counterparties, securities settlement systems, retail

⁹ New Year's Day, Good Friday, Easter Monday, 1 May, Christmas Day and Boxing Day.

T1: Comparison of settlement procedures

Settlement procedure ¹	Procedure title	Description
Procedure 2	Real-time settlement	Transfer between the accounts of two direct participants.
Procedure 3	Bilateral settlement	The ancillary system sends debit and credit transactions simultaneously on the participant's T2 account. Each transaction is processed separately.
Procedure 4	Standard multilateral settlement	Debits and credits are recorded simultaneously on the participant's T2 account but all debit transactions must be settled before credit transactions.
Procedure 5	Simultaneous multilateral settlement	Debits and credits are recorded simultaneously on the participant's T2 account but must be verified before settlement to ensure that they are settled on an "all or nothing" basis
Procedure 6	Dedicated liquidity and cross-system settlement	Standing or one-time orders, for the purpose of managing the liquidity reserved for settling (interfaced model) or prefinancing (real-time model) an ancillary system's transactions, can be submitted by the TARGET2 participant or the ancillary system in which it participates. The real-time model enables instant payments to be settled in TARGET2. ²

1 The procedure column begins with Procedure 2 because Procedure 1 was discontinued in 2017.

2 Procedure 6 can be used during the business day or the night-time window. The real-time model went live in November 2017. It gives TARGET2 participants a level of flexibility when arranging the pre-funding of their positions in instant payment systems (see Section 6 below and Chapter 10).

payment systems) to settle their transactions by opening one or more RTGS accounts with their central bank to settle euro transactions conducted by their participants. These accounts can then be used to settle the cash positions that their participants hold in their RTGS accounts, facilitating final settlement in central bank money.

A dedicated interface module, the Ancillary System Interface (ASI), was developed to facilitate the submission and settlement of payment instructions. It provides a range of pre-defined standard services.

With all their transactions rated "highly urgent", each ancillary system uses the processing procedures appropriate for its needs, together with additional services if necessary (establishment of a reporting period on the beginning or end of a settlement cycle, use of a guarantee fund).

TARGET2 offers participants five different settlement procedures, which satisfy the ancillary systems' various needs:

Each ancillary system's profile and settlement time in TARGET2 is shown on the ECB website.

3.3. Liquidity management mechanisms

In order for TARGET2 to function smoothly as an RTGS system, participants must at all times maintain sufficient liquidity to allow the payments they submit to be settled within a satisfactory timeframe (90% of transactions are settled in under 39 seconds and 50% in under 26 seconds).

Given the importance of liquidity for the proper execution of large-value payments, liquidity management tools are given careful consideration in TARGET2. The aim is to give participants access to the most powerful liquidity management mechanisms currently available.

At any time during the business day, a participant's liquidity comprises the balance of its account(s) in the system at the start of the day, the difference between the value of payments received and payments issued since the start of the day, and the value of any intraday credit obtained from the NCB of the country in which it is established.¹⁰

Based on the subsidiarity principle, with which TARGET2 is in strict compliance,

¹⁰ As they are not blocked, regulatory reserves can be used during the day to make payments.

only the NCB of the country in which the participant is established can grant it intraday credit. This credit is free of charge but must be guaranteed (collateralised) and repaid before the end of the day (hence the term “intraday credit”).¹¹ Eligible collateral for intraday credit is the same as that for the Eurosystem’s monetary policy transactions and is subject to the same valuation and risk control rules. In practice, the collateral used to secure intraday credit is the portion of the collateral deposited with NCBs that is not used to guarantee monetary policy refinancing operations.

From 2011 to mid-2017, the average daily value of intraday credit consumed amounted to 4.7% of the average amount of collateral available for use.

Among the system’s participants, only counterparties eligible for Eurosystem monetary policy operations can obtain intraday credit. At the end of the day, the failure by such counterparties to repay their credit is considered as a request to use the marginal lending facility. Such requests are automatically granted by the Eurosystem, at the rate in force set by the ECB.

Other entities admitted to participate in TARGET2 can obtain intraday credit,¹² provided that a guarantee is in place to ensure that the credit will be repaid at the end of the day. This is the case, for example, of investment firms established in the EEA, provided that they have an agreement with a counterparty to Eurosystem monetary policy operations to cover any residual debit positions at the end of the day.

In all cases, institutions that fail to repay their credit are subject to penalties.

3.3.1. Liquidity pooling

For institutions that choose to have several accounts, or participating banking groups established in several countries, if they connect via SWIFT¹³ the TARGET2 platform allows them to pool their liquidity by creating

“groups of accounts”. These can take two forms:

- **Consolidated account information (CAI) groups:** Group managers have a simple overview of the total liquidity of the accounts in their group. They can, however, transfer liquidity from one account to another.
- **Aggregated liquidity (AL) groups:** As well as having an overview of the total liquidity of the group’s accounts, as above, these groups centralise their liquidity (in a virtual account), facilitating the integrated management of intraday liquidity for all the accounts in the group. A transaction on any of the accounts can be settled as long as the virtual account balance – i.e. the sum of the individual account balances plus any credit lines – is sufficient. This means that an account in the group can show a debit balance during the day, provided that the overall position for the group of accounts remains in credit.

3.3.2. Optimisation of payment order management

Assignment of priorities: Issuing participants can change the priority level assigned to urgent and normal payments, but highly urgent payments must remain classified as such.¹⁴

Changes to transaction queues: Each account has three payment queues, corresponding to the three priority levels. In order to optimise their liquidity, participants can change the order of their payments in each of these queues.

Transfers with specified settlement times: transfer orders can be assigned a specific settlement time, up to five business days in advance.

Liquidity reservation: TARGET2 participants can reserve liquidity to settle certain transactions, either by assigning it on the basis of transaction priority or by transferring

11 Annex I to Guideline ECB/2011/14.

12 These institutions are as follows:

- credit institutions established in the EEA that are not eligible counterparties for Eurosystem monetary policy operations and/or do not have access to the marginal lending facility;
- investment firms established in the EEA;
- institutions that manage ancillary systems, acting in that capacity, provided that the agreement under which the institution can be granted intraday credit has previously been submitted to and approved by the Governing Council.

13 Accounts that are connected to TARGET2 via the Internet cannot belong to a group of accounts.

14 Highly urgent payments are those connected with central bank operations and those conducted by ancillary systems.

funds to sub-accounts used to settle transactions for certain ancillary systems.

Limit-setting: Direct participants can set a limit on the maximum value of payments they are willing to settle without receiving advance funding. These limits can be bilateral (relating to one other participant) and/or multilateral (relating to all other participants). The minimum amount for any limit is EUR 1 million.

3.3.3. Liquidity-saving algorithms

Participants also benefit from optimisation processes built into the platform in order to save liquidity.¹⁵

While a payment order is being processed, an optimisation process based on “offsetting checks” attempts to clear the transaction immediately against other queued transactions. For example, if participant A submits an instruction to pay participant B, the system will seek offsetting transactions submitted by participant B which, if they are settled simultaneously with participant A’s order, will reduce both participants’ liquidity needs.

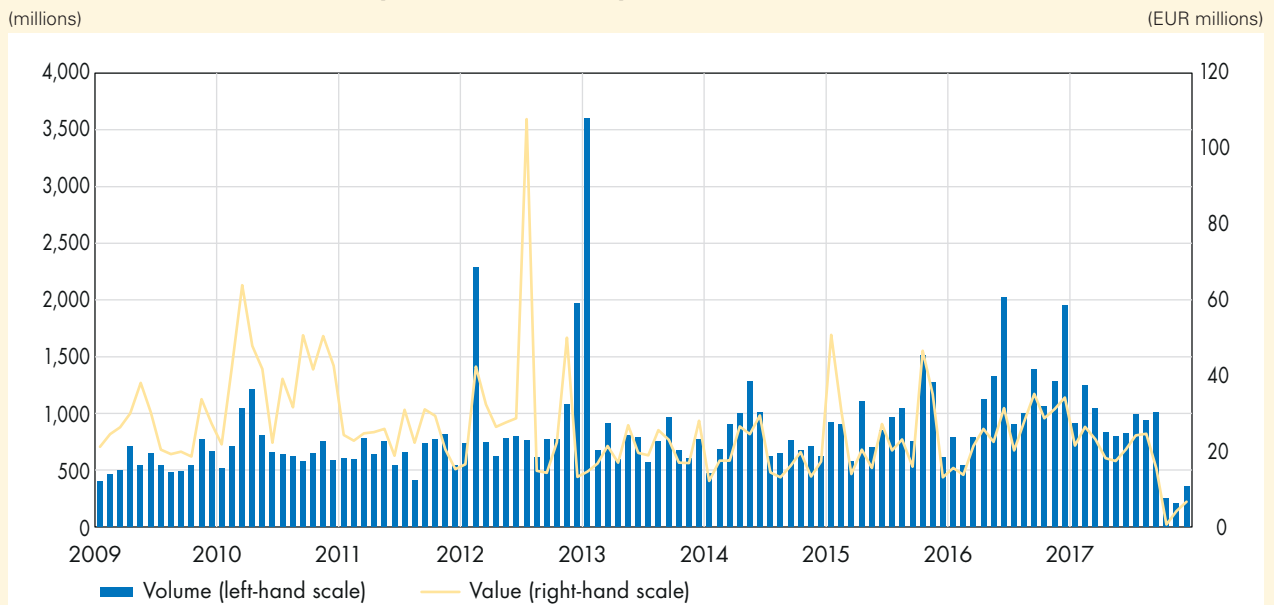
The processing of queued payment orders depends on the priority assigned to them by the issuing participant and the settlement algorithms take this into account.

15 The different algorithms and their uses are presented in Appendix I of the TARGET2 Guidelines “Technical specifications for the processing of payment orders”.

Box 4: Non-settled payments by the end of the day

Transactions not settled by the end of the day, due to insufficient liquidity on a participant’s account or a limit breach, are small in number. In 2017, they made up only 0.3% of the total daily volume in TARGET2 and 1.0% of the total daily value. This is because the vast majority of payments are settled without recourse to intraday credit (on average, less than 3% of transactions in value terms are settled using intraday credit)..

C3: Transactions not settled by the end of the day



Source: ECB – Transactions not settled at the end of the day – TARGET 2017 Annual Report.

Payment orders in the “highly urgent” and “urgent” queues are settled using the offsetting procedure alone. Payment orders in the “normal” queue are processed on a continuous basis, using algorithms designed to resolve any blockages.

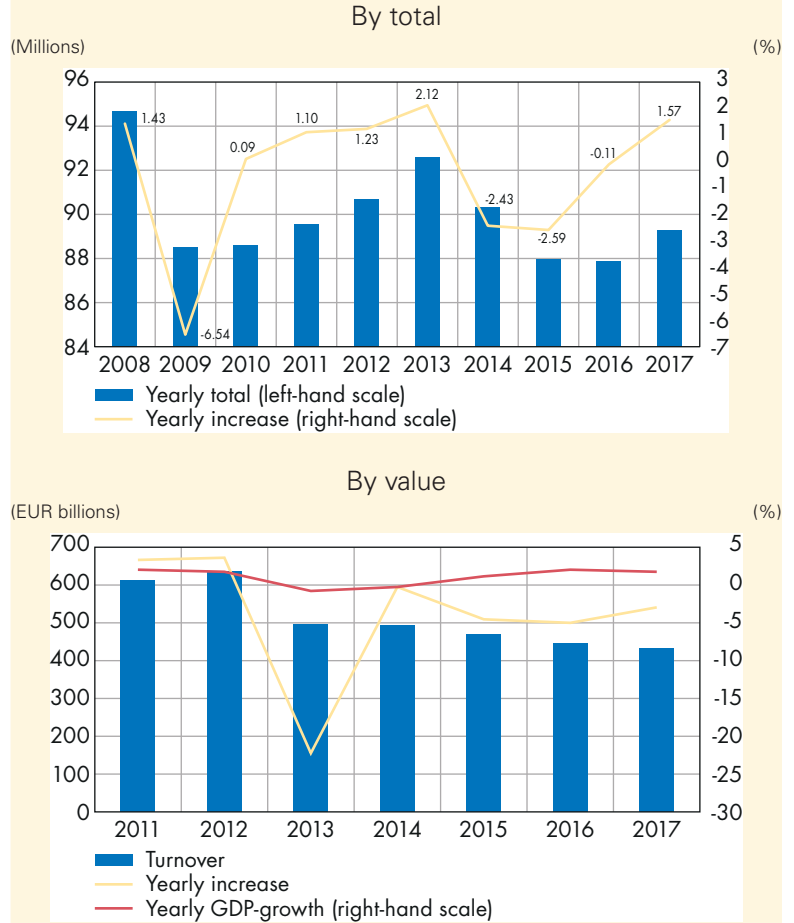
4. TARGET2 performances

4.1. Activity based on volume and value

In the wake of the 2008 financial crisis, TARGET2 saw its business plummet in 2009, reflecting the gloomy economic and financial environment. In 2014 and 2015, the direct use of the platform for certain transactions decreased as the migration to SEPA redirected these flows to other payment systems.¹⁶ Then, from 2015 to 2017, the successive waves of migration to T2S also reduced the traffic in TARGET2: CSD transactions previously settled in TARGET2 are now settled in T2S and are no longer recognised as transactions processed by TARGET2.

In 2017, over 255 business days, the number and value of transactions settled in TARGET2 totalled 89.3 million and

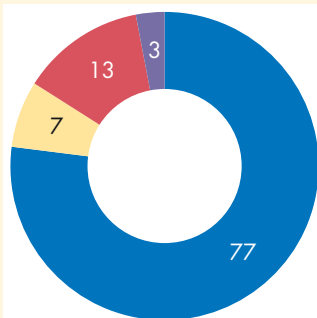
C4 and C5: Transactions settled in TARGET2



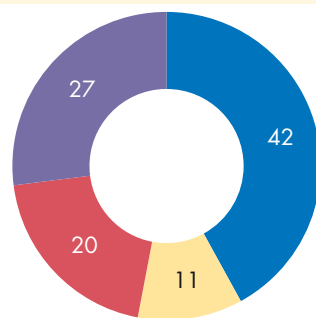
Source: ECB – TARGET 2017 Annual Report.

C6: Types of transaction

By total



By value



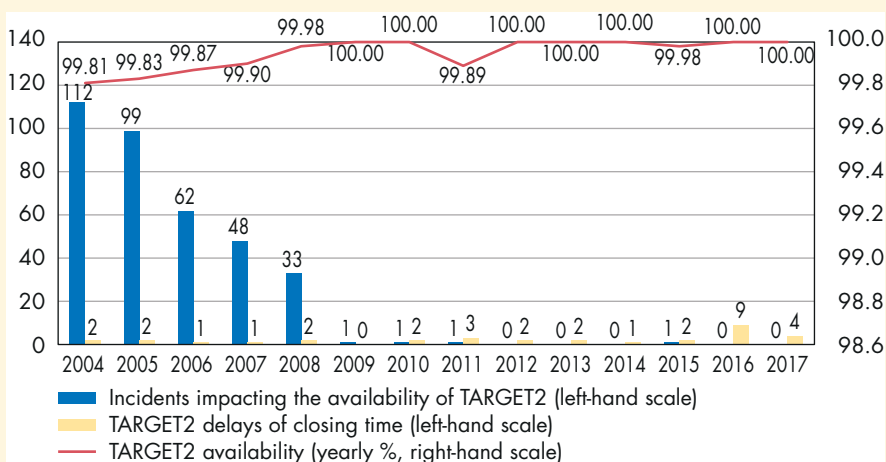
- Payments between market participants
- Payments related to operations with the central bank
- Payments related to exogenous settlement systems
- Payments related to fund transfers

Source: ECB – TARGET 2017 Annual Report.

¹⁶ Even though these systems use TARGET2 for the final settlement of their net positions, this additional business cannot compensate for the number of transactions subject to gross settlement.

C7: Incidents and delays of closing time in TARGET2

(in total; %)



Source: ECB – TARGET 2017 Annual Report (data for TARGET to 2007, then TARGET2).

EUR 432,781 billion respectively, giving average daily figures of 350,106 transactions and EUR 1,697 billion. In less than seven days, TARGET2 processes the equivalent of the annual GDP for the entire euro area, making it one of the largest RTGS systems in the world.¹⁷

At the European level, TARGET2 is the only system used for operations connected with the Eurosystem's monetary policy and transactions relating to settlements for ancillary systems operating in euro. In 2016, these transactions represented respectively 7% and 15% of total business based on volume and 12% and 26% based on value.

TARGET2 also handles the vast majority of other large-value payments in euro, be they interbank or commercial transactions, processed in payment systems.¹⁸ Each year, these represent around 60% based on volume and 90% based on value, the remainder being processed in the EURO1 system.

4.2. Service level

With the launch of the single platform in 2007-2008, the service provided by the TARGET system became even more stable. TARGET2 provides a very high level

of service: for instance, in 2017, 100% of payments submitted were settled in less than five minutes, thanks to a 100% availability rate.¹⁹

5. Oversight of TARGET2

Within the Eurosystem, payment systems are governed by the ECB regulation on systemically important payment systems.²⁰ This regulation transposes the Principles for financial market infrastructures (PFMI, see Chapters 17 and 18) into the Eurosystem's rules for payment systems. TARGET2 was identified as a systemically important payment system (SIPS) by a decision of the ECB Governing Council of August 2014. It must therefore meet stringent requirements, especially in terms of risk management and governance.

The ECB was appointed by the Governing Council as the competent oversight authority for TARGET2, working within a cooperative framework. In practice, all the national central banks are invited to participate in oversight activities for TARGET2.

In 2015, an assessment was carried out of the platform's compliance with requirements under the ECB regulation on systemically

17 As regards the French component system, in 2017 TARGET2-Banque de France processed 8.2 million transactions with a total value of EUR 66,840 billion, giving daily averages of 32,166 transactions and EUR 263 billion (reaching the equivalent of GDP in just under 10 days).

18 The figures do not include large-value transactions relating to correspondent banking arrangements or clearing houses.

19 The system's technical availability is measured on the basis of its daytime processing hours between 07:00 and 18:45 CET (or 19:00 on the last day of the minimum reserve maintenance period), taking into account any extension in operating hours due to problems within TARGET2 or ancillary systems for which the final settlements were implemented via the platform.

20 ECB Regulation 795/2014 of 3 July 2014, amended by ECB Regulation 2017/2094 of 3 November 2017.

important payment systems, overseen by the ECB together with those euro area central banks that volunteered to participate in the exercise. Since then, the assessment has regularly been updated and published on the ECB website.²¹

5.1. Resilience of the technical architecture

Because TARGET2's technical infrastructure relies on a single platform, the platform is subject to very strict requirements in terms of security and efficiency. From the outset, the platform's architecture was designed to meet these requirements, which were subsequently confirmed and codified by the ECB regulation on systemically important payment systems (see Chapter 17).

In order to ensure the system's operational continuity, TARGET2 (like T2S, see Chapter 14) relies on extremely robust technical architecture. The settlement platform was developed in two regions several hundred kilometres apart, each of which has two sites far enough apart to have different "risk profiles" but sufficiently close to be able to operate in synchronous mode. The regions operate on a six-monthly rotating basis, making sure that experienced,

fully operational teams are on hand in case a crisis situation develops.

If a whole region is affected by a problem, it must be possible to resume operations within two hours by switching to the other region. Moreover, participants' most critical transactions can be processed by central banks without waiting for normal operations to resume, by activating the contingency module in the region that is still available.

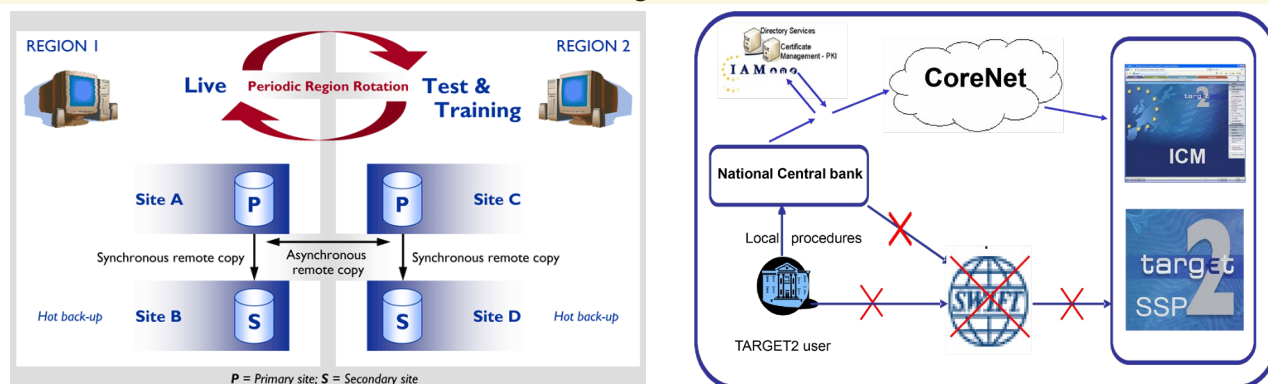
As part of its deliberation on potential cyber-attacks on the banking and financial sector, the Eurosystem is discussing strengthening the contingency module to offset the effects of incidents that could prevent TARGET2 from operating for more than a day.

Moreover, should the SWIFT messaging system become unavailable, the Eurosystem has a closed network known as CoreNet, which connects all the NCBs with each other and the ECB and enables them all to connect to the TARGET2 platform.

Duly authorised central bank personnel would therefore be able to execute highly urgent payments on behalf of their users (credit institutions or ancillary systems).

21 See the report entitled "TARGET2 Summary of the self-assessment against the principles for financial market infrastructures" published by the ECB in May 2018: <http://www.ecb.europa.eu>

Figures



Source: ECB – <https://www.ecb.europa.eu/paym/t2/professional/contingency/html/index.en.html>

5.2. The role of central banks

In the event of a malfunction affecting the TARGET2 platform or one or more of its participants, central banks can intervene to ensure the system's operational continuity.

5.2.1. Continuous support (national service desk)

In order to provide high-quality service to its user community and to ensure that the platform operates properly, each central bank has a single point of contact: the national service desk or help desk.

The national service desk handles any questions regarding accounts opened in TARGET2, regardless of their category. The teams can be reached throughout the TARGET2 business day and are available continuously between 06:45 and 19:15 CET. The national service desk can extend its hours when required (for the launch of new applications, when business hours are prolonged, etc.). As regards the French component system of TARGET2, the Banque de France makes a dedicated extranet site²² available to its participants, which handles all questions on TARGET2-BF participation, operational issues, evolution, reference data and connectivity.

Every day, each national service desk ensures that transactions are processed smoothly in their TARGET2 component system, focusing particularly on payments qualified as critical or systemically important (e.g. transactions for ancillary systems). If a user has difficulty communicating with the platform, the service desk can submit payment instructions on their behalf.

Each national service desk is run by a settlement manager, who is responsible for the day-to-day management of transactions and represents the central bank in an ad hoc unit made up of all the SSP's settlement managers and services managers (representatives of the 3CB,²³ which supply the platform's technical architecture and are responsible for its operation, and

managers of the SSP's service desk) and the ECB's TARGET2 coordinator (see chart below, "Organisation of TARGET2's operational continuity").²⁴

5.2.2. Crisis situations

Each NCB also appoints a crisis manager, who must hold a more senior position at the bank and be involved in crisis management at the level of the Eurosystem.

In general, the measures taken in the event of an incident are:

- workaround solutions: support procedures to sustain the minimum level of business necessary to limit an incident's impact;
- delays in TARGET2's operations, especially end-of-day procedures (for TARGET2 as a whole);
- operational continuity measures, e.g. switching the system to a secondary site or to the other region;
- contingency measures to facilitate a limited number of critical transactions using the contingency module.

The contingency module, accessible only to central banks, is activated if a platform module becomes unavailable, making an inter-regional switch necessary. It enables the settlement of a small number of critical transactions that cannot be put on hold until the switch is finalised. It involves providing external liquidity to TARGET2, as the positions of participants' accounts are set to zero. It does not have mechanisms to manage queues or groups of accounts.

By its nature, this module is intended to handle settlement for critical ancillary systems, in particular CLS, which operates under very tight time constraints covering all the time zones.²⁵

A reporting framework has been established for crisis situations.

²² <https://www.target2bf.fr/>

²³ The national central banks of France, Germany and Italy.

²⁴ The unit relies on a permanently available teleconference procedure.

²⁵ A processing delay affecting CLS's transactions in a given geographical region could have knock-on effects across the globe.

In the event of an incident, TARGET2 participants communicate with their usual contacts at their respective central banks, in particular their settlement managers, via their national communication channels.

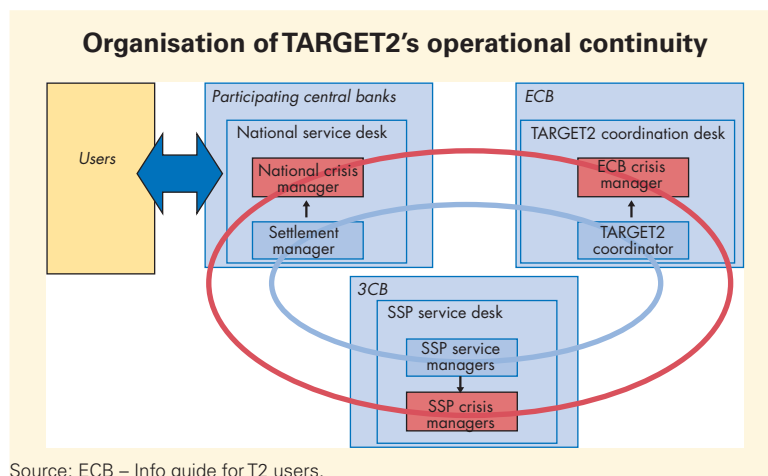
Incidents with potential systemic effects, however, are subject to coordinated management. The Eurosystem has established operational procedures to deal with any potentially abnormal situation, together with a communication framework that must be complied with in order to provide information in real time.

Various contingency units have been set up and can be activated when required:

- **Crisis units:** actively involved in managing liquidity-related issues, notably during the launch of new services, these units step in to manage crises that develop in the TARGET2 system, ancillary systems or participating institutions affecting liquidity, timelines for operations processed in a national component system, or involving systemic risk;
- **Crisis managers' teleconference:** This crisis unit within the Eurosystem enables TARGET2 crisis managers to communicate remotely so as to:
 - (i) take decisions assigned to them under TARGET2 procedures, e.g. allowing payments not rated "highly critical" to be processed in the contingency module;
 - (ii) take decisions relating to aspects of crisis situations not covered by TARGET2 procedures, referring the matter to the ECB Executive Board if so warranted.

5.2.3. Continuous monitoring of TARGET2's operations

The monitoring and ex-post analysis of participants' operations is carried out through TARGET2's Info centre (or Customer Related Services System – CRSS) and simulator.



The CRSS contributes to the reliability of TARGET2. Accessible only by central banks, it provides a complete overview of the activities of their TARGET2 component system²⁶ and can show all transactions executed from the launch of TARGET2 until the previous day.²⁷

The CRSS is also a crucial decision-support tool. It enables NCBs and the ECB to perform in-depth analyses of domestic and cross-border transactions settled in TARGET2, provides insight into interbank payment flows within the euro area and meets the oversight requirements to which the system is subject as a systemically important payment system.

The CRSS also facilitates detailed knowledge of participants and their activity in TARGET2 in the short and long term, notably in terms of liquidity management, recourse to intraday credit and collateral mobilisation, and allows central banks to exchange highly accurate detailed information with their participants.

The Eurosystem also has a simulator, which has been operational since 2009.²⁸ By combining actual TARGET2 data extracted from the CRSS with the system's various operational mechanisms, it can replicate previous days' business, producing results very close to the actual data, and assess the impact of potential crisis situations.

²⁶ For reasons of confidentiality, a central bank only has access to detailed data on participants in the TARGET2 component system that it operates. Certain anonymised reports, which facilitate comparisons between the activities of the different national banking communities, are, however, accessible to all the central banks.

²⁷ In the CRSS system, activity data is stored and is available the next day in the CROSS module (see the appendix to this chapter).

²⁸ Like TARGET2, the simulator, which is developed and managed by the 3CB and the central bank of Finland, is governed by an agreement, approved by the ECB Governing Council, between these four central banks and the central banks that use the system.

While it is difficult to simulate a participant's actual behaviour in a crisis situation or to anticipate the extent of any knock-on effects on other market infrastructures, the simulator makes it possible to assess the impact of scenarios involving changes in data or parameters (removal of a participant or algorithm).

Various studies have been conducted using the TARGET2 simulator by working groups made up of supervisors, operators and researchers. They have covered, inter alia:

- technical failure by a major participant,
- different levels of withdrawals of available intraday credit lines,
- the share of traffic relating to indirect participants and its concentration among direct participants (tiering),
- the identification of interdependencies in TARGET2.

The Eurosystem establishes an annual list of critical participants in TARGET2.

These are credit institutions and ancillary systems which, should they experience a security breach in their own infrastructures, could have a significant impact on the overall functioning of TARGET2 (systemic risk). Critical participants are subject to more stringent requirements in terms of operational continuity (annual self-certification), testing and crisis management.

The Eurosystem qualifies a credit institution as critical if its average daily business represents 1% or more of the overall volume of traffic in TARGET2. In 2014 another criteria was added: a credit institution can be qualified as critical, even if its volumes are below the specified threshold, if, based on a simulated technical failure by the participant, the resulting non-settled payments average 1.5% of the total volume of transactions processed in TARGET2. Around 20 credit institutions are qualified as critical participants each year.

Ancillary systems for which final settlement is performed in TARGET2 can be classified as critical participants based on the nature of their activity and the degree of systemic importance assigned to them by the Eurosystem. The systems concerned are large-value payment systems, securities clearing and settlement systems and systemically important retail payment systems (SIPS, see Chapter 17). Around 30 ancillary systems are qualified as critical participants each year.²⁹

6. The Eurosystem's strategy for developing its infrastructures

In 2015, ahead of the launch of TARGET2 Securities (T2S), the Eurosystem initiated a strategic deliberation, "Vision 2020", on the evolution of European market infrastructures, particularly its "own" infrastructures. This process, conducted in close collaboration with users, led to the launch of three projects corresponding to the strategy's three pillars:

- Instant payments, with the Target Instant Payment Settlement (TIPS) project;
- RTGS services, with the TARGET2-T2S consolidation project;
- Collateral management, with the Eurosystem Collateral Management system (ECMS) project (see Chapter 15).

6.1. Consultation with users

"Vision 2020" was presented in October 2015 at the SIBOS conference.^{30 31} In February 2016 the Eurosystem launched a public consultation on the first pillar of the strategy (RTGS services).³² The responses received were summarised in a document published in July 2016.³³

In September 2016³⁴ the Eurosystem reached another milestone with the launch of an "investigation phase" to define user requirements for each of the three pillars and ensure that a business case was

29 <https://www.ecb.europa.eu>

30 Annual conference on banking and financial services organised by SWIFT.

31 "The future of Europe's financial market infrastructure: the Eurosystem's Vision 2020" (speech by Yves Mersch, a member of the Executive Board of the ECB, at the SIBOS conference in October 2015 in Singapore).

32 *Eurosystem's vision for the future of Europe's financial market infrastructure RTGS services – consultative report*

33 *Consultation on the future of RTGS services – summary of feedback received*

34 "The next steps in the evolution of the Eurosystem's market infrastructure" (speech by Yves Mersch, a member of the Executive Board of the ECB, at the SIBOS conference in September 2016 in Geneva).

available. To this end, user Task Forces were set up. Information on their work can be found on the ECB's website.³⁵

In January 2017, the Eurosystem launched a public consultation concerning TIPS user requirements and estimated volumes.³⁶ In June 2017, in view of the responses received, the ECB Governing Council decided to launch the TIPS project. The system is expected to go live in November 2018.³⁷

In May 2017, the Eurosystem launched another public consultation on the future RTGS services.³⁸ In light of the responses received, in December 2017 the Governing Council decided to launch the TARGET2-T2S consolidation project, as well as the ECMS project.³⁹ On the same occasion, it was announced that the Deutsche Bundesbank, Banco d'España, Banque de France and Banca d'Italia (collectively known as the "4CB") would act as service providers for these two projects.

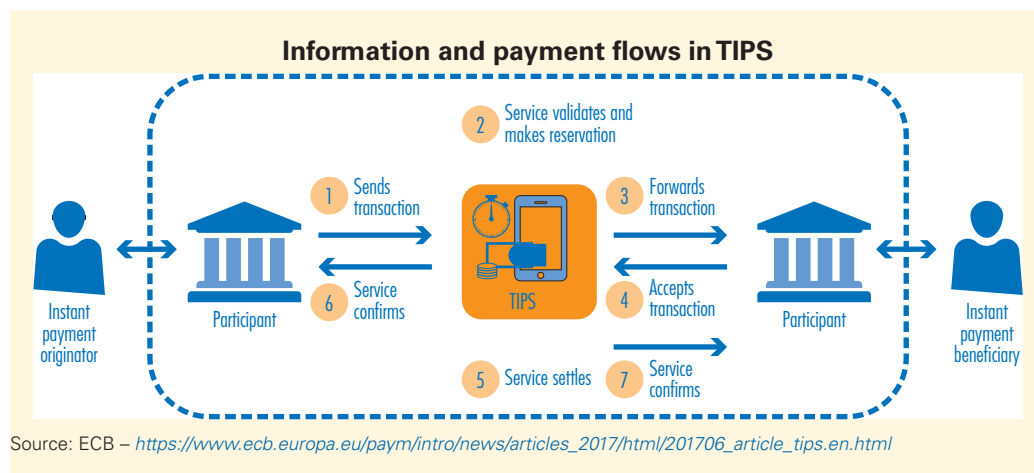
6.2. The Target Instant Payment Settlement (TIPS) project⁴⁰

For the Eurosystem, as a catalyst for European financial market integration, a major challenge is ensuring that the introduction of instant payment services does not reintroduce fragmentation into the European retail payments market, with the

development of national, non-interoperable solutions. To counter this risk, the Eurosystem took two successive measures:

- improvements were made to TARGET2, with the November 2017 introduction of a new settlement procedure for ancillary systems, "ASI 6 Real-Time", intended to support retail payment systems (ancillary systems for TARGET2) that clear instant payments. Payment systems offering an instant payment service can now proactively manage the liquidity reserved for pre-funding their participants' instant payments during TARGET2's daylight operating hours and night-time processing window;
- considering that this would not be enough to ensure the reachability of instant payment solutions, the Eurosystem went one step further and proposed an instant payment settlement service in central bank money, operational since November 2018: Target Instant Payment Settlement (TIPS). As its name suggests, this new service was designed as a functional extension to TARGET2. It will, however, rely on a new technical platform in order to meet the needs specific to instant payments (notably in terms of processing speed, volume and 24/7/365 availability).

The chart below presents information and payment flows in TIPS.



35 See the section on "Payments & Markets/Ongoing initiatives" on the ECB website.

36 TARGET instant payment settlement Public consultation on the draft TIPS user requirements

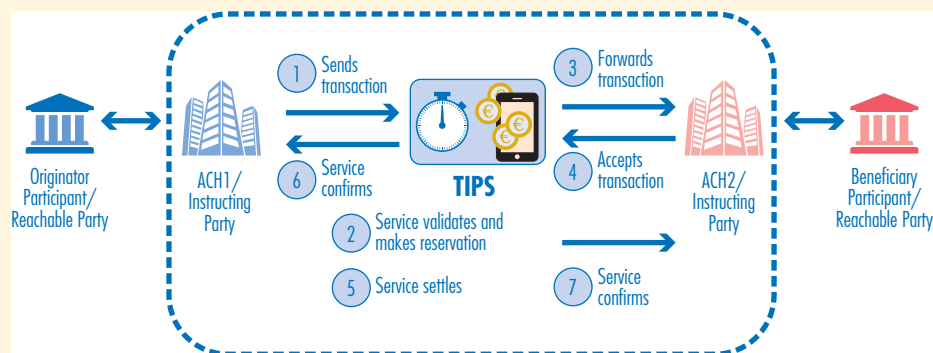
37 ECB to develop a service for the settlement of instant payments (ECB press release of 22 June 2017).

38 ECB consults on the user requirements for the future RTGS service in the context of the T2-T2S consolidation

39 ECB approves major projects in field of large-value payments and collateral management (ECB press release of 7 December 2017).

40 For a more detailed presentation of the TIPS service, see the following article on the ECB website, published in MIP on line (June 2017), the final version of the TIPS User requirements (June 2017) and the presentations made at the Focus session of July 2017 and at SIBOS in October 2017, together with the note on the coexistence of TIPS with other instant payment services

TIPS flows with payment systems acting as "instructing parties"



Source: ECB.

As the rules for participating in TIPS are the same as those for TARGET2, TIPS can draw on a vast network of participants (direct participants, indirect participants and addressable BICs), which should facilitate pan-European reachability for instant payment services. Moreover, as shown in the chart above, retail payment systems (also called Automated Clearing Houses or ACH, because they calculate a net balance from gross transactions) can represent participants in TIPS, acting as instructing parties to submit instant payment instructions in TIPS on their behalf.

A retail payment system can thus directly process instant payments between two of its participants using the ASI6 Real-Time procedure to settle them in TARGET2.

However, if the credit institution of the instant payment's beneficiary does not participate in the same retail payment system as the credit institution of the instant payment issuer, but both institutions are participants in TIPS, then the retail payment system of the issuer's credit institution can use TIPS on behalf of its participant.

6.3. The TARGET2-T2S consolidation project⁴¹

Although the term "consolidation" might suggest that this project is largely technical in nature, it also has a strong "business"

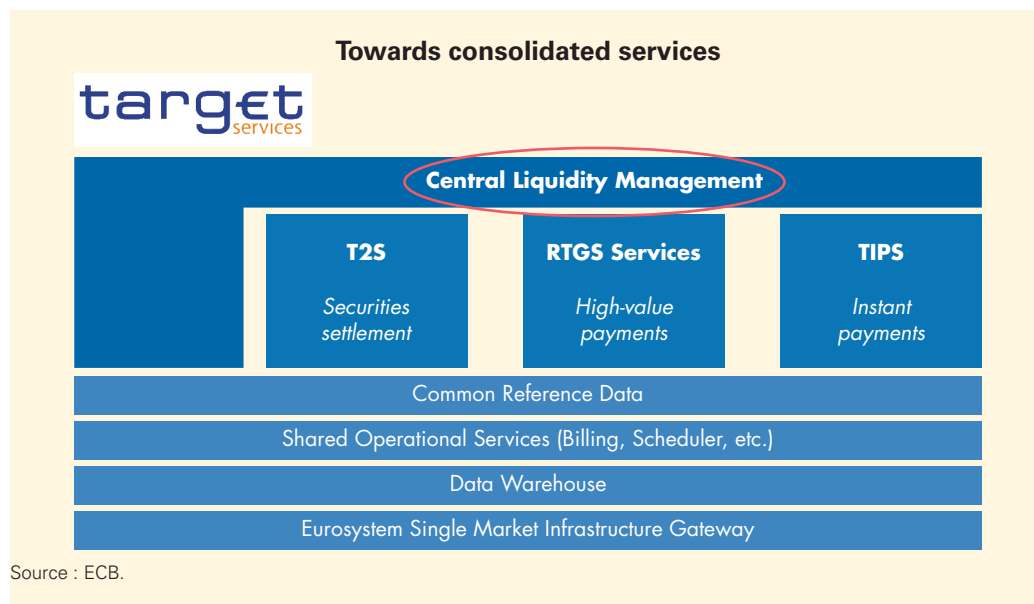
aspect. The consolidation project aims to bring TARGET2 into line with T2S,⁴² optimise the synergies between the two services, cut their costs through economies of scale and strengthen their resilience (notably in terms of cyber security). It also aims to offer users a new set of services to meet their needs expressed during public consultations and the work done by the Task Forces set up by the Eurosystem. The consolidated system should be operational in November 2021.

The chart below provides an overview of the future Target services. Features to note include:

- the introduction of a Central Liquidity Management (CLM) mechanism. This is the main organisational change in the services provided by the Eurosystem in terms of market infrastructures. The centralised mechanism allows participants to allocate liquidity to the Eurosystem's various settlement services, i.e. T2S, TIPS and RTGS (for the settlement of large-value payments);
- additional services that will bring a range of improvements, namely in terms of payment management, interfaces with ancillary systems and interaction with users;
- the introduction of a number of shared services, including a single portal

⁴¹ For a more detailed presentation of the TARGET2-T2S consolidation project and new RTGS services, see the ECB website for the documents produced following the [public consultation in May 2017](#), the presentations made at [SIBOS in October 2017](#) and the [Focus session of December 2017](#)

⁴² Namely to enable TARGET2 to use the latest financial messaging format, ISO 20022, as T2S does. At present, TARGET2 uses the older, more basic format, ISO 15022.



providing access to all the Eurosystem’s infrastructures (Eurosystem Single Market Infrastructure Gateway – ESMIG).

Additional improvements that the future system will make include:

- migration to the ISO 20022 standard;
- the possible extension of opening hours if the need is expressed;
- the ability to provide a settlement service in currencies other than the euro if central banks outside the euro area (which participate in the system as connected NCBs) so request.

CHAPTER 8

Large-value deferred net settlement systems – Three examples of “hybrid” systems in Europe, the United States and Canada

Updated on 17 December 2018

As referred to in Chapter 6 (Payment circuits and systems), all the G20 member countries currently have RTGS systems, except for Canada.¹ In addition, in the United States and the euro area, a key feature in the landscape of large value payment systems (LVPS) is “cohabitation” between an RTGS system operated by the central bank and a deferred net settlement (DNS) system operated by a private entity, as is the case with CHIPS² in the United States and the EURO1³ system in Europe.

This chapter focuses on these two systems, together with Canada’s LVTS.^{4,5} Although these are all DNS rather than RTGS systems, they handle large amounts and are therefore deemed to be systemically important for the smooth functioning of the financial system. In view of this, each of the three systems has put specific solutions in place to facilitate settlement in near real-time and reduce credit risk exposure, without overly inflating the liquidity needs inherent in RTGS systems. As a result, these systems can now be qualified as “hybrid” systems (see Chapter 6).

1. The key functionalities of EURO1, CHIPS and LVTS

1.1. EURO1

EURO1 is a large-value net settlement system for payments in euro. It was developed by Europe’s major credit institutions, working within the Euro Banking Association (EBA), together with EBA Clearing, which has been the operator of EURO1 since it went live on 4 January 1999 with the launch of the euro currency. The system currently counts 51 banks as direct participants (and also shareholders in EBA).

With EURO1, the aim was to develop a pan-European payment system with settlement in euro, so as to provide Europe’s credit institutions with their own LVPS alongside the RTGS operated by the

Eurosystem. EURO1 was designed to settle payments on a net basis, providing greater liquidity-efficiency than an RTGS system. This “dual” arrangement is similar to that in place in the United States with CHIPS and Fedwire and in France with PNS and TBF (see Chapter 6).

EURO1 operates alongside TARGET2. Banks generally prefer to use TARGET2 for their most critical payments so as to benefit from all the advantages it offers: a robust operational risk management framework, efficiency and the security provided by real-time settlement in central bank money. EURO1 is a net settlement system used for less critical large-value payments, whether domestic or transnational. Compared to TARGET2, the private system operated by EBA Clearing enjoys the liquidity efficiency afforded by netting payments.

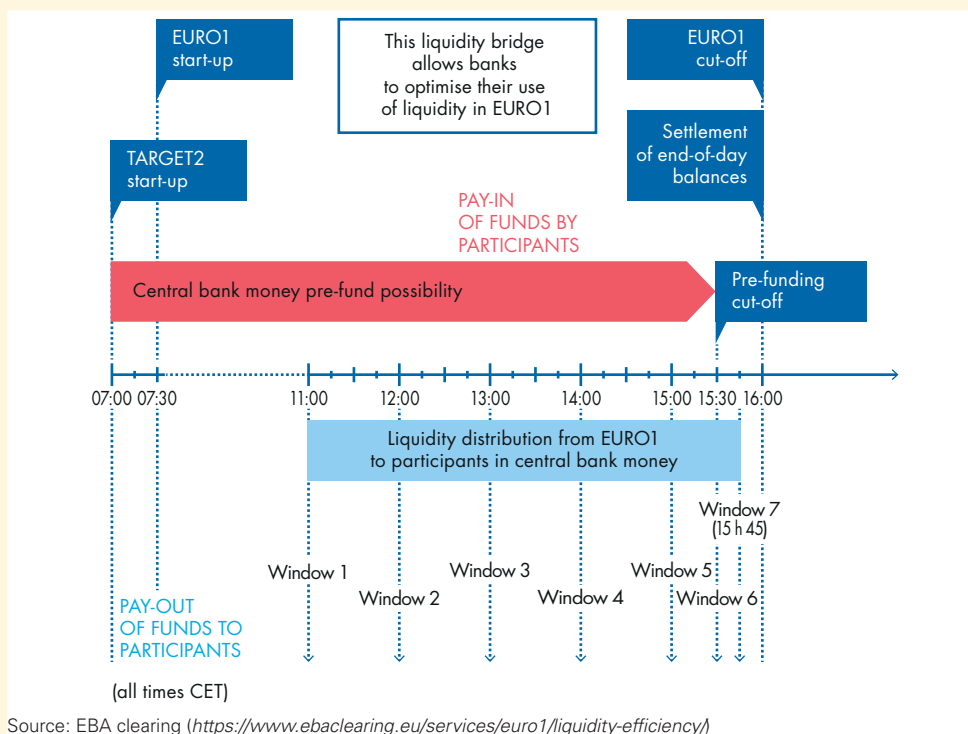
Relative to other DNS systems (such as, at present, France’s retail payment system, CORE(FR) – see Chapter 10), EURO1 – as well as CHIPS and LVTS – are specific in that payment finality is achieved on a continuous basis, without waiting for participants’ net positions to be settled at the end of the day.⁶ In other words, these systems provide “immediate intraday finality.”⁷

This model is based on a “single obligation structure,” a specific legal basis applicable to the relationship between a given participant and the community formed by all the other participants. It means that, at any given time, each participant has only one single obligation/claim to/on the system as a whole, which is adjusted automatically in real time every time a payment is processed.

Finality is achieved when transactions are allocated to the participant’s single claim or single obligation vis-à-vis the rest of the community. At that point, payment orders become irrevocable and unconditional (they can no longer be cancelled, even if a participant defaults when the time comes to settle their position in TARGET2). This stage corresponds to settlement finality stage two (SF2), as described in

- 1 As part of the initiative to modernise Canada’s payment system, the LVTS will be replaced by an RTGS system called Lynx in 2020. For further details, see the Bank of Canada’s website: <https://modernisation.paiements.ca/le-plan/systeme-de-paiements-de-grande-valeur/> <https://modernization.payments.ca/the-plan/high-value-payments-system/>
- 2 The Clearing House Interbank Payments System, see: <https://www.theclearinghouse.org/payments/chips>
- 3 For further information, see: <https://www.ebaclearing.eu/services/euro1/overview/>
- 4 Large Value Transfer System, see: <http://www.bankofcanada.ca/core-functions/financial-system/canadas-major-payments-systems/>
- 5 See the report published in May 2005 by the CPMI, New developments in large value payment systems, <http://www.bis.org/cpmi/publ/d67.pdf>
- 6 Positions are settled in TARGET2 at EURO1’s cut-off time.
- 7 Committee on Payment and Settlement Systems Payment, Clearing and settlement systems in the CPSS countries, BIS, 2012, pp. 99 – 101: <https://www.bis.org/cpmi/publ/d105.pdf#99-101>; <https://www.bis.org/cpmi/publ/d105.pdf>

Box 1: Liquidity optimisation in EURO1 and settlement of EURO1 net balances in TARGET2⁸



8 The concepts in this chart are explained in Section 2.2.

9 Default by the two largest participants in the system.

10 In practice, payments are processed one by one and when a payment has been processed by the system it can no longer be cancelled: this is the immediate intraday finality provided by EURO1 for each payment processed. A payment becomes irrevocable when the asset for settlement is transferred to the TARGET2 account, i.e. at the end of the day. This arrangement is based on a German legal principle known as the “single obligation structure”, whereby each participant has a single obligation towards the system as a whole and this obligation is updated each time the participant sends or receives a new payment.

11 See also the May 2005 CPSS report “LVPS report”, Box 5: <http://www.bis.org/cpmi/publ/d67.pdf>

Chapter 5, when neither of the two parties to a transaction is permitted to modify it. This arrangement works using a specific mechanism combining a liquidity pool with a loss-sharing agreement. The liquidity pool is set so that the system is able to complete settlement in the event of a default, or even a “dual failure”.⁹ If the losses incurred by a failure exceed that level, the portion not covered by the liquidity pool is distributed jointly among the surviving participants.

Although payments are processed in real time in EURO1, until final settlement is completed at the end of the day (in central bank money in TARGET2), participants that have a claim on the community are exposed to a very low degree of settlement risk.¹⁰ This type of risk is by nature absent from a gross settlement system such as TARGET2. However, the settlement risk involved in EURO1 is highly theoretical: it would only materialise if a failure resulted

in losses exceeding the “dual failure” level, the liquidity pool was insufficient and the surviving participants were unable to pay their share without defaulting themselves. Moreover, admission criteria and risk management procedures have been established to mitigate this risk (see Section 2). Apart from settlement risk, the main constraint facing EURO1 participants is that the funds they receive cannot be reused immediately outside EURO1. The funds only become available for use outside the system following the end-of-day settlement procedure in TARGET2.

1.2. Clearing House Interbank Payment System (CHIPS)¹¹

CHIPS is a net settlement system for large-value payments in US dollars, which is owned by the main US commercial banks and operates alongside the Fedwire system.

Fedwire is used to settle urgent large-value payments such as interbank settlements and clearing operations, as well as for tax payments. CHIPS, with its liquidity-saving mechanisms, is used for large-value commercial transactions.

CHIPS provides real-time payment finality throughout the day as payments are settled, using a centralised queuing arrangement. In contrast with EURO1, this real-time finality is not achieved on the basis of a legal (guarantee) structure, but thanks to the use of a pre-funding mechanism: as a precaution against risk, CHIPS requires participants to deposit a pre-established funding amount¹² in the system each day before operations commence.

The 45 members of CHIPS (US commercial banks and foreign banks – see eligibility criteria below) are thus required to transfer this prefunding amount or “opening position requirement” to a specific deposit account held at the Federal Reserve Bank of New York for the joint benefit of all participants who contribute to the pre-funded balance (“Funding Participants”). The opening position requirement (pre-funding) is calculated by the system on the basis of a participant’s previous activity. It can be transferred any time between the opening of CHIPS and Fedwire at 21:00 ET and 09:00 ET the following day. It then remains blocked in the system until the end-of-day closing procedure takes place. Until their opening position has been transferred, participants cannot make a payment via CHIPS. During the day, participants can transfer supplemental funds to their CHIPS account as and when necessary.

Throughout the day, payment orders are placed in a queue. An optimisation algorithm regularly searches the queue for payments that can be settled by offsetting them against other payments. A participant may at no time hold a debit position that exceeds the amount of their security deposit. Payments accepted by CHIPS are therefore irrevocable and unconditional. Finality is achieved at the end of the day.

At 17:00, after a final attempt to optimise the queued payments, the system uses the deposited funds to clear all the remaining payments on a multilateral net basis. The resulting multilateral net balance for each participant is combined with their current position to calculate their closing position. After clearing, the final payments are settled and CHIPS sends each participant that has a credit position a Fedwire payment order in the amount of their balance from its prefunding account. The sum total of all the payment orders issued is equal to the balance of the CHIPS prefunded account.

1.3. Large Value Transfer System (LVTS)

Canada’s LVTS system (launched in 1999, owned and operated by the Canadian Payments Association – an association of Canadian banks and the Bank of Canada¹³) is also a net settlement system providing real-time payment finality. In this system, once a payment successfully passes the real-time risk controls for the appropriate tranche (see below for details on the “tranche” concept), the original payment obligation between the issuing and receiving participants is extinguished and replaced by an obligation of the issuing participant to the system and an obligation of the system to the receiving participant. This mechanism (“netting by novation”) combines a novation arrangement with a transaction netting process. Under LVTS rules, the final beneficiary receives funds on a final and irrevocable basis within a pre-defined timeframe.

A feature specific to LVTS is that participants can opt to make payments using one of two procedures:

- **Tranche 1 payments:** These payments (the net balance of payments sent and received) are fully secured by assets held by the participants at the Bank of Canada. In other words, with tranche 1 payments, participants pledge collateral to limit the risk that they pose to the community.

¹² The prefunding amount is determined using a formula “reasonably designed to facilitate the [CHIPS payment message] release methodology”; see p6: <https://www.theclearinghouse.org/-/media/files/payco%20files/standards%20self%20assessment%202016.pdf?la=en>

¹³ Payments Canada is the business name of this association, which is established under the Federal Canadian Payment Act.

- **Tranche 2 payments:** At the start of each day, each participant determines the bilateral credit limit that it is willing to grant to each of the other participants during the day’s processing cycle (the amount can be set at zero).

To guarantee settlement of the multilateral net position resulting from tranche 2 payments, each participant pledges assets to the system’s operator as collateral, in proportion to the highest bilateral limit that it has granted. Participants’ net debit positions cannot be higher than a specified percentage (30%) of the total bilateral limits granted to them.

If a participant defaults, the system first uses that participant’s collateral (tranche 1) then the tranche 2 collateral pledged by other participants, in accordance with the bilateral limit that they granted to the defaulting participant. The collateral amounts required are calculated to ensure that the collateral pool will always cover a default by the largest participant (minus the bilateral limits granted to it).¹⁴ With tranche 2 payments, participants therefore pledge collateral to limit the risk of another participant failing.

In the event of a default, the surviving participants must absorb the associated losses (after the defaulting participant’s collateral has been used to fulfil its obligation, at least partially). This arrangement distributes default risk among the system’s participants.

Participants can therefore use either one of the two payment tranches in the system. The tranches are processed in the same way, but participants are not subject to the same limits. For tranche 1 payments, participants cannot have a multilateral net debit position higher than their tranche 1 net debit cap, while with tranche 2 payments, both bilateral and multilateral debit caps apply.

A key distinction between the two tranches is the way in which their exposure

to intraday credit risk is controlled. While debit caps apply in both tranches, in tranche 1 the multilateral net debit cap is fully collateralised by the issuing participant, but in tranche 2 the overall exposure to credit risk is partly covered by a collateral pool provided by the surviving participants, with the remainder being covered by the central bank’s guarantee to settle the positions.

During the daily payments cycle, between midnight and 19:30, payments are charged to participants’ accounts on a net basis.¹⁵ At the 18:30 payment cut-off time, and by 19:30 at latest, the Bank of Canada books each participant’s multilateral net position in their settlement account at the central bank. So in practice, it is only at the end of the day that participants’ net balances (whether positive or negative) resulting from the day’s transactions are entered in their accounts at the central bank.

2. Risk management in these three systems

Every day EURO1 processes transactions totalling around EUR 200 billion. The figure is around USD 1,560 billion¹⁶ for CHIPS and CAD 140 billion for LVTS. Given the huge amounts handled by these systems and the fact that financial risk cannot be completely eliminated in the environments in which they operate. All three payment systems have therefore adopted solutions to enable them to achieve real-time payment finality while controlling their settlement risk using ad hoc mechanisms. This gives them some of the advantages offered by RTGS systems at a lower cost, particularly in terms of liquidity. It should be noted, however, that while the settlement risk associated with these systems is reduced by their specific mechanisms, none of the systems considered have zero settlement risk (in RTGS systems, which settle payments one by one in real time, settlement risk is effectively zero). As explained above, risk management tools have been put in place.

14 In the event that limits are set to zero by all participants, no tranche 2 payments can be made. Only tranche 1 payments can be made and these are fully secured by the collateral pledged by each participant.

15 When a payment is submitted, the system calculates the net position of each participant in real time (payment inflows minus outflows). The net positions of tranches 1 and 2 are combined to produce a single multilateral net LVTS position for settlement.

2.1. Participant selection criteria

In general, net settlement systems have fewer participants than RTGS systems. This is the case for CHIPS, which has 45 participants versus 7,500 for Fedwire, and for EURO1, which has 51 participants versus over 1,000 for TARGET2. As for LVTS, it has only 17 participants.

2.1.1. Eligibility criteria for EURO1

In order to be eligible to participate in EURO1, a bank must satisfy certain legal, financial and operational criteria.

- **Legally**, a bank must be authorised to conduct banking business, be a member of the EBA (Euro Banking Association), have its registered office or a branch in a Member State of the EU and provide a capacity opinion (a legal opinion on its ability to meet its obligations). Each banking group can have only one participant authorised to use the system.
- **Financially**, a bank must have own funds of at least EUR 1.25 billion and a short-term credit rating of at least P2 (Moody’s) or A2 (S&P) or equivalent.
- Lastly, to satisfy the **operational criteria**, a bank must have direct access to TARGET2 (and hence an account at the central bank) and adequate technical and operational facilities, including back-up facilities, and staffing for the purposes of participation in the system.

2.1.2. Eligibility criteria for CHIPS

In order to be admitted as participants, “depository institutions” and foreign banks must: (i) have an office located in the United States that is subject to regulation by a federal or state regulator,¹⁶ (ii) be a “financial institution” governed by the Federal Deposit Insurance Corporation Improvement Act, (iii) be able to send and receive messages via a “connection” to CHIPS that complies with the CHIPS

Rules and (iv) maintain primary and back-up computer facilities as required by the CHIPS Rules.

Pre-funding participants must also satisfy pre-funding criteria: they must be a foreign bank or depository institution, hold an account on the books of a Federal Reserve Bank and be able to send and receive fund transfers via Fedwire.¹⁷

2.1.3. Eligibility criteria for LVTS

The CPA (Canadian Payments Association) admission criteria for direct participants in LVTS require that a bank must:

- be a member of the CPA;
- use the SWIFT messaging network;
- have appropriate back-up facilities for their LVTS operations;
- hold a settlement account at the Bank of Canada;
- enter into agreements to take loans from the Bank of Canada and pledge eligible collateral.

2.2. Risk management: pre-funding, limits and liquidity pools

The systems considered use the following tools for the purpose of risk management (pre-funding, bilateral and multilateral limits) and risk reduction (liquidity pools).

2.2.1. Risk management mechanisms for EURO1

All EURO1 participants are exposed to credit risk arising from a default by another EURO1 participant. To contain this risk, a framework of bilateral and multilateral limits on payments processed in the system has been established. Payments entered in the system can only be considered final if they do not increase the participant’s bilateral position above the set limit.

16 “Subject to regulation by a federal or state depository-institution regulatory authority.”

17 Extract from the CHIPS “Core principle self assessment”; <https://www.theclearinghouse.org/payments/chips> “Participation in CHIPS is available to any depository institution or foreign bank that meets the requirements detailed in the CHIPS Rules, which are publicly available. Pursuant to CHIPS Rule 19, a participant must (i) have an office located in the United States that is subject to regulation by a federal or state regulator, (ii) be a “financial institution” covered by the Federal Deposit Insurance Corporation Improvement Act, (iii) establish a “connection” to CHIPS that meets the requirements of the CHIPS Rules, and (iv) maintain primary and back-up computer facilities as required by the CHIPS Rules. In addition, each participant must have access to sources of credit and liquidity sufficient to enable it to pay its opening position requirement and its closing position requirement promptly, and it must be able to manage its operations in a way that will not delay or complicate the operations of CHIPS. CHIPS participants that are foreign banks must agree that the obligations that they incur on CHIPS are obligations of the entire bank, not just its branch or agency in the United States.”

Each participant grants bilateral limits to each of its counterparties. These limits comprise a mandatory limit and a discretionary limit. The mandatory limit is equal to the participant’s liquidity pool deposit divided by the number of participants in the system, minus one. Participants can set the discretionary limit at any level between zero and EUR 50 million. Participants can adjust these limits each day before the system opens for processing. The discretionary limit can be said to represent the level of credit risk that a participant is willing to assume vis-à-vis each of the other participants. In the event of a default, discretionary limits form the basis for calculating loss allocations to the surviving participants.

Taken together, the bilateral limits granted by a given bank to each of the other participants form the multilateral net receiving limit (credit cap) of the grantor bank. Conversely, the total bilateral limits accorded to a given bank by the other participants form the multilateral net sending limit (debit cap) of the grantee bank. The bilateral limits do not restrict the bilateral payment flows between individual participants. Banks can send payments to any other participant within the limit of the total amount of their debit cap.

Unlike bilateral limits, which vary over time and differ from one participant to another, the upper multilateral debit limit, or maximum debit cap, is a single limit that applies system-wide to all participants.¹⁸ The current maximum debit cap is EUR 500 million. The liquidity pool amounts to twice the maximum possible exposure in the system/maximum debit cap (EUR 1 billion). In the event of a failure, any losses over and above the cap are distributed among the surviving participants in accordance with the discretionary limits set by each participant.

The framework of bilateral and multilateral limits therefore makes participants accountable and limits the system’s exposure to financial risks.

If the liquidity pool has to be used for reasons other than a participant’s bankruptcy,

then the participant that made such use necessary (because it experienced technical problems, for example) is responsible for topping up the liquidity pool.

2.2.2. Risk management mechanisms for CHIPS

As a precaution against risk, every day before operations commence CHIPS requires participants to deposit a pre-established funding amount in a specific deposit account held at the Federal Reserve Bank of New York for the joint benefit of all CHIPS participants. This arrangement is referred to as pre-funding. During its daily processing hours, CHIPS keeps all the payment orders that it has been unable to debit to the participant’s account in a queue. A participant’s net balance can never be in debit. Payment orders are final at the point when they are released from the queue. All CHIPS participants must have access to Fedwire to open their positions and close them at the end of the day. Participants must be subject to regulation by a US state, the Federal Reserve or the Office of the Comptroller of the Currency to ensure that they are monitored regularly. PaymentsCo, the operator of the CHIPS system, ascertains whether a future participant has the necessary liquidity to participate in CHIPS by looking at credit quality reports produced by recognised rating agencies and by assessing the potential participant’s financial situation. For existing participants, PaymentsCo monitors the punctuality of their funding deposits and uses credit quality reports, if necessary, to identify any changes in their financial health that could affect their ability to finance their positions in CHIPS.

2.2.3. Risk management mechanisms for LVTS

Canada’s large-value transfer system LVTS provides real-time finality and calculates each participant’s net position (fund inflows minus outflows) in real time as payments are entered, even though the multilateral net positions are settled only at the end

¹⁸ The sum of the bilateral limits can be lower or higher than the maximum debit cap. When payments are entered in the system, they are therefore checked against both these limits.

of the day on the Bank of Canada’s books. As it provides immediate finality, LVTS can be considered as a near equivalent to an RGTS system. Moreover, it limits the amount of collateral that banks have to post, relative to a traditional RGTS system: participants’ exposure to intraday credit risk is partly covered by a collateral pool pledged by survivors and the Bank of Canada guarantees settlement in the unlikely event that more than one participant defaults during the same day and the sum of their net debit balances exceeds the amount of the securities pledged as collateral to the Bank of Canada.

LVTS thus benefits from collateral pledged to, and a guarantee provided by, the Bank of Canada:

- the net amount that a participating financial institution can owe is subject to bilateral and multilateral limits;
- participants deposit eligible collateral with the Bank of Canada, the value of which must be at least equal to the net debit cap authorised for them. The collateral pool is large enough to ensure that, should a participant default, sufficient funds could be made available for the system to settle;
- as explained above, if a participant defaults, the system first mobilises that participant’s collateral (tranche 1), before using the other participants’ tranche 2 collateral in accordance with the bilateral limit granted by them to the defaulting participant;
- the Bank of Canada guarantees settlement in the unlikely event that more than one participant defaults during a single LVTS processing day and the sum of their net debit balances exceeds the total amount of securities pledged as collateral to the central bank. In such cases, the Bank of Canada extends loans to the defaulting institutions to cover the portion of losses not covered by the securities pledged as collateral

by the LVTS community. The Bank of Canada’s guarantee is not applicable to tranche 1 payment streams, because these are fully collateralised by the issuing participants;

- the two-tier model provides protection against settlement risk for priority and systemically important payments (relating to monetary policy, securities systems, CLS, etc.). Tranche 1 is fully collateralised by participants. Moreover, within tranche 1 some payments are covered by reserved collateral transferred to the Bank of Canada. To be more specific, when using Canada’s securities settlement system (CSDX), LVTS participants can make a specific type of payment (T1R) secured by reserved collateral (e.g. eligible securities purchased and pledged as collateral by the participant during the CDSX cycle).

3. The prospects for these “hybrid” payment systems

Large-value payment systems operating on a deferred net settlement (DNS) basis have remained in use despite the development of RTGS systems, which are more secure. They have addressed their lower level of security by establishing robust risk management frameworks that greatly reduce their financial risks. The longevity of these hybrid systems is linked to the specific environments in which they operate.

In the case of EURO1 and CHIPS, the fact that a large-value net settlement system for payments in a single currency using central bank money has continued to operate alongside an RTGS system can be explained by the “dual” structure of the large-value payment markets in these systems’ monetary areas. The term “dual” structure refers to the co-existence of two systems in a market, where one is operated by a public institution and the other by a private entity. The environments in which EURO1 and CHIPS operate also have a number of similarities.

Banks use EURO1 rather than TARGET2 for less urgent payments to save costs. In practice, participants in these systems weigh up the costs and urgency of their payments, together with their sensitivity, in order to decide which large-value payment system to use.

Consequently, the values of payments processed are much higher in RTGS than in DNS systems. This is the case in the euro area with TARGET2 and EURO1 and in the United States with Fedwire and CHIPS (see table 1).

In the euro area, the distribution of large-value payments between TARGET2 and EURO1 in terms of volume is relatively even, with TARGET2 processing around 60% of payments and EURO1 around 40%. In terms of value, however, TARGET2 handles 90% of the total amount of payments processed, versus just 10% for EURO1. This shows that for urgent and very large-value payments,²⁰ participants prefer the RTGS system, which has operating procedures better suited to these large transactions, especially in terms of liquidity management.

As regards LVTS, the system is set to evolve significantly in the coming

T1 : Daily transactions in RTGS and DNS systems

	Average daily transactions (volume)	Average daily transactions (value)
TARGET2	250,000	EUR 1,330 billion
EURO1	150,000	EUR 117 billion
Fedwire	420,000	USD 2,028 billion
CHIPS	310,000	USD 1,077 billion

Source: Bank for International Settlements (CPMI statistics).

years, culminating with its replacement in 2020 by its successor, Lynx.²¹ Canada’s new large-value payment system will operate in real time and provide payment finality. It will be based on a “cover all” credit risk management model, whereby each participant fully collateralises all their transactions. Consequently, the residual guarantee provided by the Bank of Canada in the LVTS system will no longer be required.

According to the Bank of Canada, Lynx will be a large-value payment system that complies with its standards for systemically important payment systems, which in turn are based on the Principles for Financial Market Infrastructures (PFMI, see Chapter 18).

20 Payments whose value exceeds the limits set in EURO1.

21 <https://modernization.payments.ca/the-plan/high-value-payments-system/>

CHAPTER 9

Systems operating on a payment versus payment basis: focus on the CLS settlement system for foreign exchange transactions

Updated on 17 December 2018

This chapter deals with settlement on a “payment versus payment” (PvP) basis, focusing particularly on the CLS (Continuous Linked Settlement) system, which is used to settle foreign exchange transactions on a PvP basis, currently in 18 eligible currencies. After addressing the need to manage settlement risk in foreign exchange transactions (section 1), we go on to present the CLS system (sections 2 to 4). What makes a PvP system like CLS different is that it offsets positions in different currencies against each other and completes the final stage of foreign exchange transactions.

1. The need to manage settlement risk in foreign exchange transactions

1.1. Settlement risk in foreign exchange transactions

Settlement risk in foreign exchange transactions is defined as the risk of delivering the currency sold without receiving the currency purchased (or vice versa). Let’s consider an example where Bank X and Bank Y are counterparties in a dollar (USD)/euro (EUR) foreign exchange transaction. Bank X is selling euros to Bank Y in exchange for dollars. It must therefore deliver euros to Bank Y (the “euro leg” of the

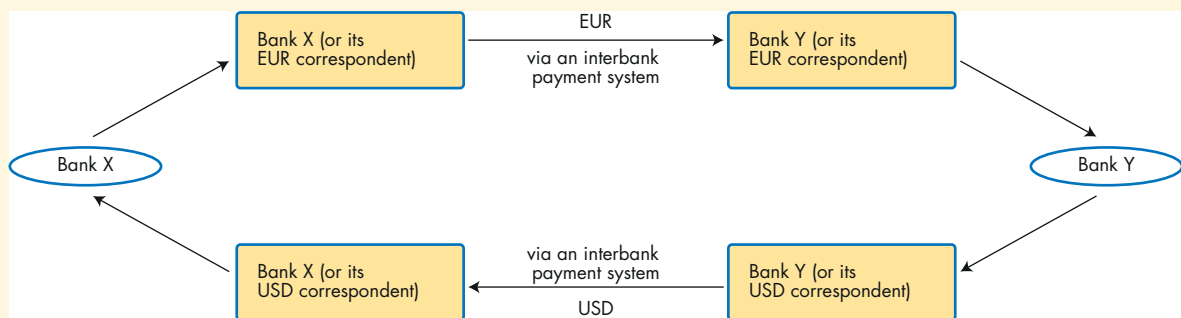
trade) in exchange for receiving dollars (the “dollar leg”). At the same time, Bank Y must deliver dollars to Bank X and will receive euros in exchange.

Traditionally, each leg of a foreign exchange transaction was settled separately and independently, using a network of correspondent banks (with each counterparty to the transaction using its correspondents in the currencies involved) and interbank payment systems in the currencies concerned. Under this system, settlement is generally not simultaneous, given in particular the different time zones involved and differing local banking practices for cross-border payments.

Each of the counterparties to the transaction, Bank X and Bank Y, is exposed to settlement risk vis-à-vis the other. Settlement risk arises as soon as the payment instruction for the currency sold becomes irrevocable, i.e. when it can no longer be cancelled unilaterally. It ends with the final and irrevocable receipt of payment for the currency purchased. Several hours can lapse between the irrevocable payment in EUR by Bank X and the irrevocable corresponding payment in USD by Bank Y.

A foreign exchange transaction thus carries not only risk arising from exchange rate fluctuations (market risk), but also settlement

Box 1: Settlement of a foreign exchange transaction using the traditional network of correspondent banks and interbank payment systems in the currencies concerned



risk, which has two components: principal risk and replacement cost risk. Principal risk materialises in the event of a definitive default by one of the two counterparties: the non-defaulting counterparty has delivered the currency that it sold, but has not received the currency that it bought. In this situation, the amount at risk is not a portion of the transaction's underlying value but its principal, i.e. the trade's nominal amount, or the total amount of the currency purchased. Replacement cost risk materialises in the event of a temporary default by one of the two counterparties: the non-defaulting counterparty must replace the initial trade with a new trade at the prevailing market price, which could prove costlier. In the rest of this chapter, the term "settlement risk" refers to principal risk.

A historical episode that highlighted settlement risk on foreign exchange transactions took place on 26 June 1974, with the failure of German bank Herstatt.¹ Although small in size, the bank was very active in the foreign exchange market. On the day in question, it was forced into liquidation by the German regulator at 15:30 CET (central European time). Earlier that day, several of its counterparties had issued irrevocable instructions for payment in Deutsche Marks (DEM), but had not yet received the countervalue in dollars (USD) because the US financial markets had just opened. When the bank's liquidation was announced, its New York correspondent (Chase Manhattan Bank) immediately suspended all payments in USD owed by Herstatt, thus causing the bank's counterparties, who were owed USD because they had already paid the corresponding amounts in DEM, to incur losses. Other banks refused to issue payment instructions before receiving confirmation of receipt of the countervalue. Despite the German bank's small size, its closure triggered major disruption in payment systems and the foreign exchange market. For fear of further bankruptcies, the US payment system (CHIPS²) was suspended. The value of transactions

T1: Losses sustained by some London banks as a result of Herstatt's failure

(USD millions)	
Williams and Glyn's	9 (deposits)
Chase Manhattan	5 (swaps)
Moscow Norodny	365 (swaps)
Union Bank of Switzerland	25 (swaps)
Hill Samuel	21 (swaps)
United Bank of Kuwait	190 (swaps)
First Wisconsin National Bank of Milwaukee	10 (swaps)
Antony Gibbs	1.25 (swaps)

Source: Catherine R. Schenk (2014).

through the system plunged almost 60%³ over the following days and the settlement of interbank transactions was affected for several months. Confidence in the foreign exchange market rapidly began to crumble,⁴ interest rates in the eurodollar market surged and international banking activity contracted as banks around the world repatriated their assets.

1.2. Measures taken by central banks and the banking industry to mitigate settlement risk

Given the increasing amounts traded daily in the foreign exchange market, settlement risk on foreign exchange transactions was a particular concern for central banks, due to its potentially systemic effect. In the 1980s and 1990s, the G10 countries' central banks carried out a number of studies on the systems in use for cross-border and multi-currency payments. The first report published was the Lamfalussy report⁵ in 1990, which contained a recommendation to "continue to review possible measures that central banks might take to improve efficiency and reduce risks in the settlement of cross-border and multi-currency transactions". The second report was the Noël report,⁶ published in 1993. As a follow-up to the Lamfalussy report, the Noël report examined the services that central banks could consider providing to mitigate the risks and increase the efficiency of cross-border and multi-currency transactions.

- 1 Following this incident, settlement risk commonly became known as "Herstatt risk" in the banking industry.
- 2 Clearing House Interbank Payment Systems (CHIPS) was launched in April 1970, when nine large US banks joined forces to form a major system for the settlement of international transactions in USD (for more details on the CHIPS system, see Chapter 8).
- 3 See Berger A. Molyneux P. and Wilson J.O.S (2015).
- 4 Several small banks were squeezed out of the foreign exchange market and, following Herstatt's failure, clearing banks in New York introduced a "recall of funds" clause, reserving the right to recall funds transferred to correspondent banks until 10:00 (EST) the following day.
- 5 Report of the Committee on Interbank Netting Schemes of the G10 central banks (1990). For more details on the Lamfalussy report, see Chapter 18.
- 6 Central bank payment and settlement services with respect to cross-border and multi-currency transactions (September 1993) <https://www.bis.org/cpmi/publ/d07.pdf>

The risks in question related to the fact that the two legs of a foreign exchange transaction required the use of different payment systems for each currency involved. The report examined and assessed the following four options: (i) modifying or making available certain home-currency payment and settlement services, (ii) extending the opening hours of home-currency large-value funds transfer systems, (iii) establishing cross-border operational links between these payment systems, (iv) developing multi-currency payment and settlement services. Without stating a preferred option, the report recommended that each central bank assess the implications of each option in the light of monetary policy, the adequacy of private sector sources of liquidity to cover settlements in each currency, and the impact on systemic risk. Other factors to be assessed when looking at the various options included the legal basis, the effect on competition in financial markets, cost-effectiveness, and acceptability from the central bank's perspective.

The key study on settlement risk in foreign exchange transactions is the Allsopp report⁷ published in March 1996. This report established that settlement risk was not widely recognised and, hence, the two components of settlement risk, i.e. the duration and size of the exposure, were significantly underestimated. Exposure

to settlement risk can effectively last for up to several days,⁸ which means that the total exposure - sometimes to a single counterparty - could equal, or even exceed, an institution's equity capital. In view of this, the Allsopp report recommended a three-pronged strategy:

- action by individual banks to improve the measurement and management of settlement risk associated with foreign exchange transactions;
- action by industry groups (i.e. the private sector), which are encouraged to devise and implement "risk-reducing multi-currency services»;
- action by central banks to foster rapid private sector progress and, where appropriate, support the efforts of the private sector by improving the services provided by their RTGS⁹ payment systems. Netting mechanisms that reduced the amounts at risk already existed, but in practice there remained a residual exposure equal to the net amount resulting from the netting process. The payment versus payment (PvP) concept was based on the delivery versus payment¹⁰ model already in use for securities transactions. With PvP, the two legs of a foreign exchange transaction are settled simultaneously subject to the following condition: one

7 Settlement risk in foreign exchange transactions : <https://www.bis.org/cpmi/publ/d17.pdf>

8 Contrary to the generally accepted idea that settlement risk on foreign exchange transactions is simply linked to time zone differences and thus lasts no more than a few hours and only applies to the counterparty adversely affected by the time lag, the Allsopp report showed that settlement risk on foreign exchange transactions generally lasted for several days. This finding, based on a study carried out in 1994-1995 across 80 banks in G10 countries, was derived by adding up all the time lags present across all levels of the settlement channels used for the two currencies concerned, in particular the in-house processing procedures of the two counterparties, their respective correspondents in the two currencies and the operating rules of the interbank systems through which payment instructions are routed.

9 The Allsopp report considered that the private sector was best placed to design and set up multi-currency settlement services, but that the success of such services required close cooperation between market participants and the central banks. The central banks were thus prompted to extend the operating hours of their RTGS (Real-Time Gross Settlement) payment systems to increase the overlap between the three main monetary time zones (North America, Europe and Asia).

10 For more details on delivery versus Payment, or DvP, see Chapter 3.

Box 2: First initiatives to reduce settlement risk in the foreign exchange market: FXNET, ECHO and Multinet

The first private sector initiatives aimed at reducing settlement risk involved clearing mechanisms for foreign exchange transactions on a bilateral (FXNET) or multilateral (ECHO and Multinet) basis.

FXNET was a bilateral netting service for foreign exchange transactions (spot and forward), created in 1987 by a consortium of international banks operating in the London foreign exchange market. The system enabled users to carry out cross-border trades with counterparties in 13 countries. FXNET matched trade confirmations and novated trades by replacing the original transactions with a netted payment obligation.

.../...

ECHO (Exchange Clearing House Organisation) was a clearing house providing users with multilateral netting services for spot and forward (up to 2 years) foreign exchange transactions. It began operating in 1995 in 11 major currencies traded between the main international banks. Transactions between users were matched by SWIFT Accord¹ then transmitted to ECHO for clearing and settlement. ECHO netted new transactions with previous ones in rolling accounts then, after the final cut-off time, calculated and sent to each member its multilateral net position with the clearing house. To settle the positions, ECHO debited the accounts of members showing short positions on its books as soon as funds became available and issued instructions to pay members showing long positions. However, settlement was not immediate and the settlement risk that this created could last up to a day (24 hours). In order to manage credit and liquidity risk, ECHO continuously monitored incoming funds throughout its operating hours and set credit exposure limits for members. It also had available a “pool” of securities deposited by users to provide the necessary liquidity in foreign currency (via a foreign exchange swap for USD) should the member with the largest debit position on a given day default. A mechanism for the allocation of losses was also included in the system’s rules.

Multinet was formed by eight North American banks in 1992 and operated in a similar way to ECHO.

These multi-currency clearing systems did not prove to have viable business models, due to high investment and risk management costs. Their assets were transferred to CLS when it was set up in 1997.

¹ SWIFT Accord was a confirmation matching service for foreign exchange transactions developed by SWIFT and offered to its users (including ECHO members).

leg can be settled if and only if the other leg is also settled. The recommendations set out in the Allsopp report were taken up in two follow-up reports in 1998 and 2008.¹¹

The practical implementation of a PvP settlement system, with the creation of CLS (Continuous Linked Settlement), took several years (1997-2002) due to its complexity.¹² During the same period, the Basel Committee on Banking Supervision, working closely with the Committee on Payments and Settlements Systems and drawing on the Allsopp report, issued guidelines¹³ to help banking supervisors to improve their assessment of the management and oversight of settlement risk associated with foreign exchange transactions. These guidelines were updated in 2013.¹⁴

2. Legal structure of the CLS Group and the CLS system

2.1. Legal structure of the CLS Group

The CLS Group’s structure comprises CLS Group Holding AG, a holding company governed by Swiss law,¹⁵ representing the system’s shareholders. This company in turn owns CLS UK Intermediate Holding, a limited liability company under UK law, which provides various services (financial, legal, human resources, audit and communication, etc.) to its subsidiaries, CLS Bank International and CLS Services Ltd. CLS Bank International, based in New York, holds the accounts of the Settlement Members. CLS Services Limited, a limited liability company based in London, provides CLS Bank International and its subsidiaries¹⁶ with operational and back-office services.

11 “Reducing foreign exchange settlement risk, a progress report”, July 1998 <https://www.bis.org/cpmi/publ/d26.pdf> and “Progress in reducing foreign exchange settlement risk”, May 2008 <https://www.bis.org/cpmi/publ/d83.pdf>

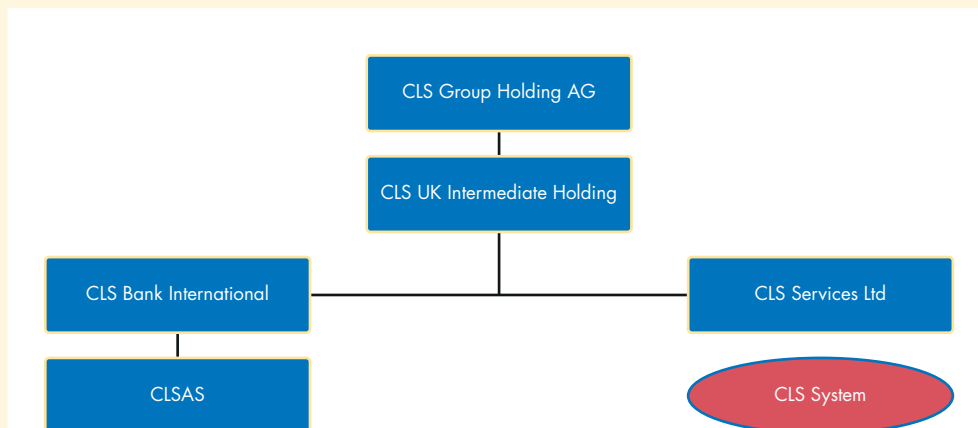
12 Beyond its apparent simplicity, the “payment versus payment” method involves highly complex issues when it comes to implementing it for foreign exchange transactions worldwide. It had to be ensured that the elimination of settlement risk did not create or exacerbate other types of risk, such as liquidity risk. This partly explains why the CLS project took significantly longer than initially anticipated.

13 “Supervisory guidance for managing settlement risk in foreign exchange transactions”; BIS (BCBS), September 2000.

14 “Supervisory guidance for managing risk associated with the settlement of foreign exchange transactions”; BIS (BCBS), February 2013.

15 Companies with this status hold and administer stakes in other companies. Under Swiss law, companies with this status benefit from specific tax provisions under certain conditions.

16 CLS Bank International holds a 51% stake (in a joint venture with Traiana, a subsidiary of the ICAP group) in CLS Aggregation Service (CLSAS) LLC, a company based in the state of Delaware, which provides an aggregation service for foreign exchange transactions. It makes the settlement of large-volume orders more efficient, meeting the needs of high-frequency traders in the foreign exchange market.

Box 3: Legal structure of CLS

Source: CLS.

The CLS system is owned by CLS UK Intermediate Holding and its operating rules are governed by UK law, while the account management agreement between the system's members and CLS Bank International is subject to US law (State of New York).

The CLS system began its settlement operations in September 2002, with seven eligible currencies: the US dollar (USD), euro (EUR), yen (JPY), pound sterling (GBP), Swiss franc (CHF), Australian dollar (AUD) and Canadian dollar (CAD). At the end of 2018, it had 18 eligible currencies¹⁷ and 72 direct members.¹⁸

2.2. How CLS works

Operating on a PvP basis, CLS settles payment instructions for transactions in the spot foreign exchange market, some listed derivatives (exchange-traded futures) and currency swaps (swaps, forward swaps, overnight swaps, tomorrow-next day swaps, etc.). Each of the system's members holds a multi-currency account with CLS Bank containing its positions in the currencies processed in the system. Under the payment versus payment approach, both sides of the transaction are settled simultaneously, but CLS acts only as a

settlement agent: it does not substitute the counterparties as a central counterparty (CCP) would (see Chapter 11). CLS Bank holds accounts with the central banks that issue the currencies processed and the direct participants of the CLS system (the settlement members) have opened foreign currency accounts with CLS Bank. The settlement members replenish their CLS account denominated in a given currency by crediting the CLS Bank account in the books of the central bank that issues that currency ("funding"). They can reduce their position with the CLS Bank by performing the opposite transaction ("defunding"). The system ensures that members' accounts show sufficient balances in the currencies to be delivered.

Taking all the instructions entered on a gross basis in the system, CLS calculates a single net position for each member in each currency (a "pay-in" balance if the net position is negative or a "pay-out" balance if it is positive). The net position is then settled in a single payment in central bank money, irrevocably and in real time, via the RTGS systems of the currencies involved. Members' payment instructions generally result from multi-currency transactions involving various maturities and counterparties. The net positions obtained

¹⁷ The latest currency to become eligible for the system was the Hungarian forint (HUF) in November 2015.

¹⁸ Direct members of CLS are called settlement members (see Section 2.1). They are nearly all shareholders in the company that operates the system.

by routing all the instructions through a single exchange and settlement system are thus substantially lower than the amounts they would have to settle on a gross basis using several settlement mechanisms. In other words, members benefit from a very strong netting effect for the financing of their positions.¹⁹

There are various stakeholders in the CLS system:

- (i) The central banks whose currencies are processed by the system provide CLS with account management and settlement services. Each central bank has an account in the name of CLS on its books and positions in the relevant currency are settled in central bank money using the RTGS system.
- (ii) Settlement Members are direct members of the CLS system, to which they submit payment instructions for their transactions directly. They pay the currency amounts that they must deliver into their accounts with CLS, and the currency amounts due to them are paid out by CLS. Payment instructions are only executed when the risk management tests have been successfully completed.²⁰ Settlement Members are shareholders of CLS,²¹ must be subject to appropriate banking supervision and must comply with operational and financial robustness requirements. Settlement Members can provide services to other banking or non-banking entities (not eligible for direct membership)²² who do not use the system directly (acting as third-party service providers). At the end of 2017, CLS had more than 60 Settlement Members, almost half of which also qualified as third-party service providers, offering the service to more than 11,000 entities, representing 22% of the value and 16% of the volume of trades settled by the system.
- (iii) Most of CLS's Settlement Members do not have direct access to the RTGS

systems of the central banks whose currencies are eligible for the system. Those members usually rely on "nostro agents" to deliver and receive their CLS payments in the relevant currencies. The nostro agents assume the traditional role of a correspondent bank, but play an important part in the CLS system by providing access to the local RTGS through which the net positions of many members are settled. They must demonstrate unfailing operational reliability, as well as the ability to provide liquidity at very short notice.

- (iv) Lastly, for each currency processed in the system, CLS has Liquidity Providers ready to step in should a Settlement Member be unable to settle its pay-in balance. In such cases, CLS calls upon the Liquidity Providers, who have agreed to deliver the needed currency in exchange for currencies in which the defaulting Settlement Member has a credit balance. Liquidity Providers are likely to be called in by CLS at a fairly late stage in the operating hours of the settlement system, as the operator first seeks to obtain the missing funds from the defaulting Settlement Member. Liquidity Providers must thus be ready to respond to requests from CLS at very short notice.

2.3. Risk management mechanisms used by CLS

To maximise the system's efficiency, instructions can be settled even if the counterparties involved show debit balances with CLS in the currencies sold. However, risk management systems have been set up to limit the size of debit balances and guarantee that instructions can be settled even if a Settlement Member defaults. Moreover, CLS's ability to pay out net credit balances depends on the liquidity available, i.e. the pay-ins it has received.

A payment instruction can settle only if each of the two members involved holds a **sufficient** position in its account with

19 Including in/out swaps (see Box 5), the netting effect can be as high as 99%. In such cases, the net position to be settled in the system represents just 1% of the initial gross amounts of the transactions.

20 See Section 2.3.

21 With a few exceptions (central banks), CLS recently changed its membership rules and now allows several entities within the same banking group to participate directly in the system. These entities do not become shareholders but must pay for admission rights. In this way, CLS is seeking to extend its member base and improve members' resolvability by clearly separating the payment instructions of the various entities in the system.

22 Investment funds, insurance companies and some big non-financial companies that enter into foreign exchange transactions.

CLS Bank in the currency to be delivered. This can even be a debit position, as long as the following three conditions are satisfied:

- (i) **all currencies combined**, the balance of the member’s multi-currency account is positive or zero,
- (ii) the member’s debit position in a given currency must not exceed a specified limit known as the “**Short Position Limit**” (SPL),
- (iii) the member’s aggregate debit positions, taking all currencies together, must not exceed a specified limit known as the “**Aggregate Short Position Limit**” (ASPL).

If these three conditions are met, the payment instruction is settled immediately and irrevocably. If not, the payment instruction is rejected.

Lastly, CLS applies haircuts to debit and credit balances to hedge against market risk (i.e. foreign exchange risk). This is because a credit position with CLS in a given currency, used to guarantee a Settlement Member’s debit position in

another currency, can depreciate due to exchange rate fluctuations.

2.4. A typical settlement day in the CLS system

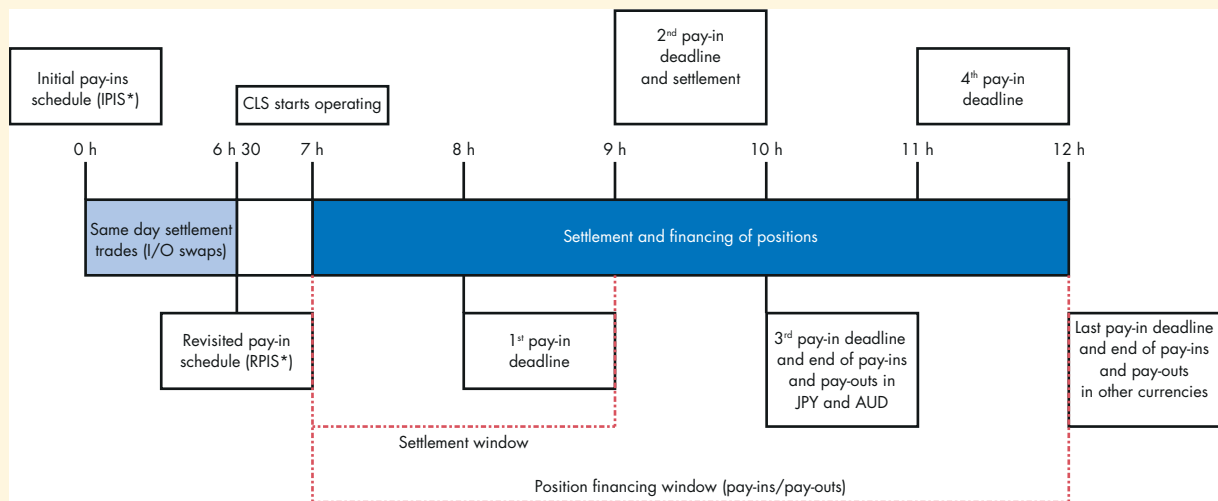
Every day, payment instructions in CLS must meet stringent requirements in terms of payment deadlines to ensure that Settlement Members receive the funds due to them on the effective settlement date, while at the same time minimising pressure on Settlement Members’ liquidity.

Settlement Members can submit (and unilaterally cancel) their instructions²³ to CLS until the day prior to the transaction date (D-1) at midnight (CET).²⁴ CLS calculates each Settlement Member’s multilateral net position based on all the foreign exchange payment instructions submitted on the value date. For currencies showing a negative multilateral net position, the Settlement Member is required to make payments or “pay-ins”. CLS produces an initial pay-in schedule that can be modified by members bilaterally until 6:30 CET on the settlement date. Between midnight and 6:30 CET, Settlement Members can bilaterally submit additional instructions or cancel instructions

23 Payment instructions are in the form of SWIFT messages including the information required for settlement. They should not be confused with the foreign exchange transactions that they are intended to settle.

24 Central European Time (GMT+1).

Box 4: A day of settlement in CLS (all times are CET)



* Initial and revisited Pay-In Schedule (IPIS, RPIS).

Source: CLS.

submitted previously. These transactions essentially serve to reduce the amounts of pays-ins featuring in the initial payment schedule via in/out swaps (see Box 5).

CLS disseminates the final pay-in schedule to Settlement Members at 6:30 CET, stating the minimum amount that Settlement Members must pay in

Box 5: CLS's pay-in schedule and the use of in/out swaps

CLS calculates the pay-in schedule for each Settlement Member based on the provisional positions once all the members' payment instructions have been processed. In the example below, the Settlement Member has credit positions (pay-outs) in Canadian dollars (CAD), yen (JPY), pounds sterling (GBP) and Swiss francs (CHF), and debit positions (pay-ins) in Australian dollars (AUD), euros (EUR) and US dollars (USD). CLS breaks down the debit positions into several payments to be made by the set deadlines. Payments in the Asia Pacific region's currencies are given priority and are made by 10:00 CET, to take into account the closing time of the local RTGS systems. Pay-ins in Australian dollars (AUD) thus end at that time. Payments are not broken down evenly, because CLS's risk management procedures must be complied with and all instructions must be processed at 9:00 CET. In this example, the USD pay-in at 9:00 shows a fairly high amount (USD -3,600 million) and payments coming in at 10:00 CET must be sufficient to enable CLS to cover its pay-outs in JPY.

Pay-in schedule for a settlement member

(aggregate amounts in millions for each currency)

Currency	Provisional net position	8 h CET	9 h CET	10 h CET	11 h CET	12 h CET
CAD	500	0	0	0	0	0
AUD	-250	-100	-200	-250	-250	-250
EUR	-550	-100	-250	-350	-450	-550
JPY	200,000	0	0	0	0	0
USD	-4,800	-900	-3,600	-4,000	-4,500	-4,800
GBP	900	0	0	0	0	0
CHF	3,500	0	0	0	0	0

Sources: CLS, ECB.

As shown in the example above, CLS Settlement Members are required to make payments, sometimes for very large amounts, in accordance with a strict pay-in schedule. To reduce this demand for liquidity, banks use an automated tool which enables them to transfer the positions they hold in CLS outside the system. They buy currencies in which they hold large debit positions in CLS outside the system, and sell currencies in which they have credit positions.

A Settlement Member will thus enter into a foreign exchange transaction with same day settlement in CLS with another Settlement Member who has the opposite needs. To offset changes in positions, the Settlement Members may also enter into opposite trades with same day settlement outside CLS. These transactions, known as in/out swaps, give Settlement Members a day to raise sufficient liquidity to cover their payments, which can be very substantial. However, these transactions have a major drawback in that the leg of the swap settled outside CLS is exposed to a form of settlement risk, where the level of risk is high and the amounts at risk significant. The introduction of new settlement sessions for trades with same day settlement would, however, solve this problem.¹ Such sessions are already operational for North America for same day settlement in US dollars (USD) and Canadian dollars (CAD).

¹ See section 4.3.

each currency at a stated time,²⁵ so that all payment instructions can be settled before 9:00 CET. The system starts to call for funds at 7:00 CET. This process ends at 12:00 CET. Settlement Members begin to settle their debit positions (via pay-ins) and, as soon as there is sufficient liquidity and the risk tests have been successfully completed (i.e. overall net positions are strictly positive), CLS settles the credit positions (via pay-outs). There is no set schedule for pay-outs, but in general, the Asia Pacific region's currencies are given priority (as the RTGS systems for these currencies close first), as are the largest balances. The settlement system's daily operating hours cover the operating hours of the RTGS systems of central banks whose currencies are processed so that CLS can settle pay-ins and pay-outs on its accounts with central banks.

2.5. Management of defaults and allocation of losses in CLS

CLS has several procedures in place to ensure that it is able to settle the instructions accepted for settlement and that each Settlement Member receives the currencies due to it as a result of settlement of instructions, even if one of the Settlement Members defaults.

As a rule, as soon as a Settlement Member misses a pay-in deadline, CLS suspends all pay-outs to that member until it meets its obligations. In all cases, Settlement Members that fail to make payments on time are subject to financial penalties.

If a Settlement Member fails to make all payments due by the 8:00 CET deadline, CLS issues a pay-in call requesting it to top up its account. At 9:00 CET,²⁶ CLS rejects all instructions not yet processed involving the late-paying Settlement Member. The provisional currency positions of the counterparties to the said transactions therefore change (i.e. some positions could show higher provisional debit balances than before in certain currencies, or positions that initially showed credit balances may

now be in debit). CLS sends them "pay-in calls for settlement," so that the system can immediately process queued transactions. Lastly, CLS sends a "pay-in call for currency close" to Settlement Members still showing debit positions in currencies whose markets will soon be closing.²⁷

If the Settlement Member fails to respond to the call and there is insufficient liquidity to cover the remaining pay-outs, CLS contacts its liquidity providers to obtain the needed currency via a swap.²⁸ If the liquidity committed is still insufficient, notably in the event of defaults by several Settlement Members (and nostro agents) and/or liquidity providers, CLS settles the pay-outs in other currencies in which it still has liquidity. As a last resort, it can carry the amounts remaining to be settled forward to the next business day.

CLS can sustain losses if a Settlement Member defaults and its credit positions depreciate below the haircuts set, so that they are no longer sufficient to offset its debit positions. In such cases, the resulting losses are allocated among the Settlement Members involved in transactions with the defaulting member on the day of default.²⁹ CLS activates a second loss allocation mechanism³⁰ if at least two Settlement Members are unable to contribute to the first mechanism. The amount of losses that can be allocated to each Settlement Member is capped at USD 30 million.

3. Oversight arrangement for CLS

3.1. Role of the US Federal Reserve in the supervision of CLS

CLS Bank International, based in New York, is a US banking entity to which the status of "Edge Act Corporation" was granted in 1999, limiting its business scope (it is qualified as a "single purpose bank»). The bank's sole purpose is to settle foreign exchange transactions. Its operations are regulated by the Federal Reserve Board (FRB), with

25 Pay-in deadlines are set at 8:00, 9:00 and 10:00 (CET) for the Asia Pacific region's currencies and at 8:00, 9:00, 10:00, 11:00 and 12:00 (CET) for other currencies.

26 The theoretical cut-off time for processing transactions.

27 10:00 (CET) for the Asia Pacific region, 12:00 (CET) for Europe and North America.

28 CLS and the liquidity provider(s) enter into a swap in the desired currency in exchange for another currency in which they have a surplus in their accounts. On the next business day, CLS and the liquidity provider carry out the opposite transaction.

29 Combined Loss Allocation.

30 General Loss Allocation.

support from the Federal Reserve Bank of New York (FRBNY), which is responsible for the prudential oversight of CLS Bank, as well as providing secretariat services and coordinating the work of the Oversight Committee (OC) in charge of the cooperative supervision of the CLS system.

As regards cooperative oversight, CLS as a system must meet the international standards applicable to systemically important payment systems set out in the Federal Reserve's Board's policy on risk in payment systems.³¹ The Principles for Financial Market Infrastructures (PFMI, see Chapter 7) were adopted in the United States with "Regulation HH" under the Dodd-Frank Act (DFA).³² The regulation gives the Federal Reserve enhanced oversight powers, enabling it to prescribe more stringent risk management standards for market infrastructures and payment systems such as CLS, which are qualified as systemically important Financial Market Utilities (FMU) by the Financial Stability Oversight Council (FSOC).³³

Lastly, CLS is exempted from the location policy adopted by the Eurosystem in its oversight framework³⁴ (see Chapter 17). The Eurosystem agreed not to apply the location policy to CLS, which, given its foreign exchange transaction settlement activity, settles a large portion of all transactions in euros outside the euro zone. The exemption was granted on the grounds that the CLS system contributes to financial stability, as settlement on a PvP basis in central bank money helps to significantly minimise settlement risk on foreign exchange transactions. The exemption, however, is subject to the Eurosystem's close involvement in the cooperative oversight arrangement for CLS implemented by the Federal Reserve Bank of New York. Only transactions settled in CLS on a PvP basis are exempt from the thresholds applicable under the location policy. Transactions not settled on a PvP basis, such as those involved in CLS's latest initiatives (see section 4), are subject to these thresholds.

3.2. Cooperative oversight of the CLS system

Given its international scale and role in handling many currencies, the CLS system is subject to cooperative oversight governed by an agreement ("the Protocol").³⁵ between a number of central banks, including those of the G10 countries, together with other central banks whose currencies are processed by CLS.³⁶ The Federal Reserve, as the lead overseer, coordinates this oversight. The purpose of the cooperation arrangement is to enable the central banks involved to participate in the system's oversight so as to ensure its safety and efficiency. Under this arrangement, the central banks ensure that CLS complies with standards applicable to payment systems and market infrastructures, as well as examining changes proposed by the operator to assess their potential impact on the system's rules, operating conditions, and, in particular, its risk profile. The Oversight Committee, under the aegis of the Federal Reserve Bank of New York (FRBNY), which includes the signatory central banks, oversees this cooperation.

4. Settlement in today's foreign exchange market: CLS's position and areas of development

4.1. Overview of settlement methods for foreign exchange transactions

Following its launch in 2002, CLS swiftly became crucial to the foreign exchange market as a tool for mitigating settlement risk. However, it experienced teething problems: its financial viability was a source of concern. Later, CLS benefited to a certain extent from the positive effects of the 2007-2008 financial crisis, as market players became more risk-averse and hence more in favour of settlement on a PvP basis. In March 2008, the value of foreign exchange transactions settled daily in CLS passed the USD 10,000 billion mark. In September and October 2008, despite

31 Federal Reserve Board's Policy Statement on Payment Systems.

32 Dodd-Frank Wall Street Reform and Consumer Protection Act.

33 The FSOC was set up under the DFA and its role is to identify risks to financial stability in the United States, to respond to situations of imminent risk and to promote market discipline. It can put a national or foreign financial company under the direct supervision of the Federal Reserve. It can also order an institution into "orderly" bankruptcy. It is chaired by the Secretary of the Treasury and includes representatives of the various regulatory authorities (Federal Reserve, SEC, CTFC, OCC, FDIC, etc.).

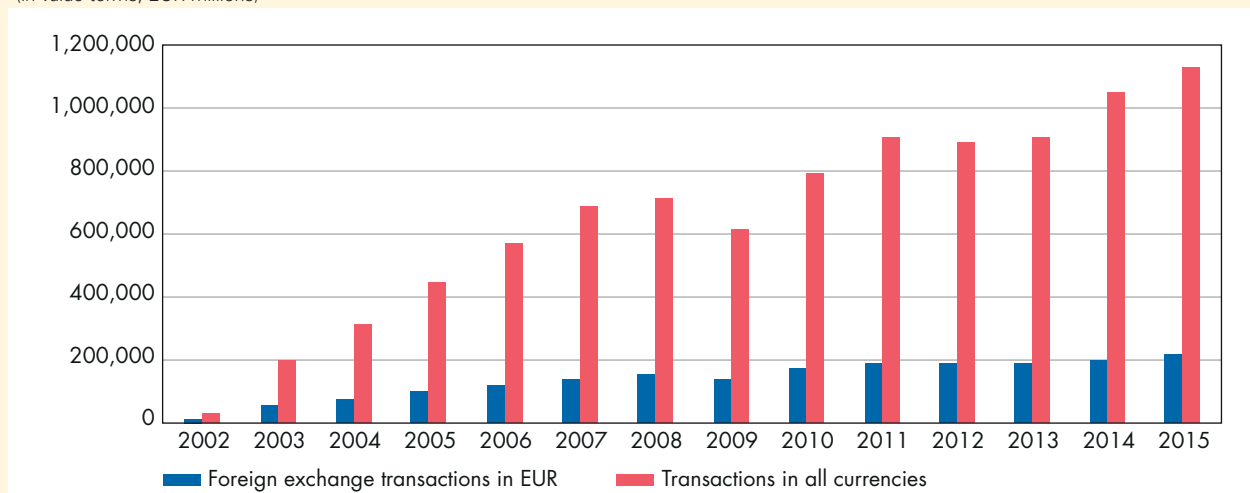
34 <https://www.ecb.europa.eu/pub/pdf>

35 <http://www.federalreserve.gov/paymentsystems/cls>

36 The central banks of the G10 countries (Germany, Belgium, Canada, the United States, France, Italy, Japan, the Netherlands, the United Kingdom, Sweden and Switzerland) and other central banks whose currencies are processed in the system (European Central Bank, the central bank of Norway, Reserve Bank of Australia, Reserve Bank of South Africa, the Bank of Israel, the Bank of Korea, the Hong Kong Monetary Authority (HKMA), the Monetary Authority of Singapore (MAS), and the central bank of Mexico).

Box 6: Foreign exchange transactions settled by CLS

(in value terms, EUR millions)



Sources: CLS, ECB.

the market coming under severe strain due to the failure of US bank Lehman Brothers, CLS remained continuously operational. The latest record in volume terms dates back to January 2015, with more than 2.2 million trades settled.

Even though CLS has become more widely used in recent years, settlement risk has not been completely eradicated in the foreign exchange market. Kos and Levich (2016) provide figures on the various settlement methods in use in the foreign exchange market, based among others on a study carried out by CLS in April 2013. In 2013, CLS processed (in value terms) almost 51% of all foreign exchange

transactions in the market and almost 55% of all transactions in currencies eligible for the CLS system. Other PvP payment systems exist,³⁷ but their weight in the foreign exchange market as a whole remained very small. The share of foreign exchange transactions using other payment methods remained fairly significant, even in currencies eligible for the CLS system. The table below shows that non-PvP gross settlement methods, i.e. payments exposed to settlement risk using the traditional channel of correspondent banks, still represented almost 11% of settlements in currencies eligible for CLS and nearly 40% of those in non-eligible currencies.

³⁷ Such as that of Hong Kong, see Box 8.

Box 7: Market share (in terms of transaction value) by settlement method (2013)

(%)

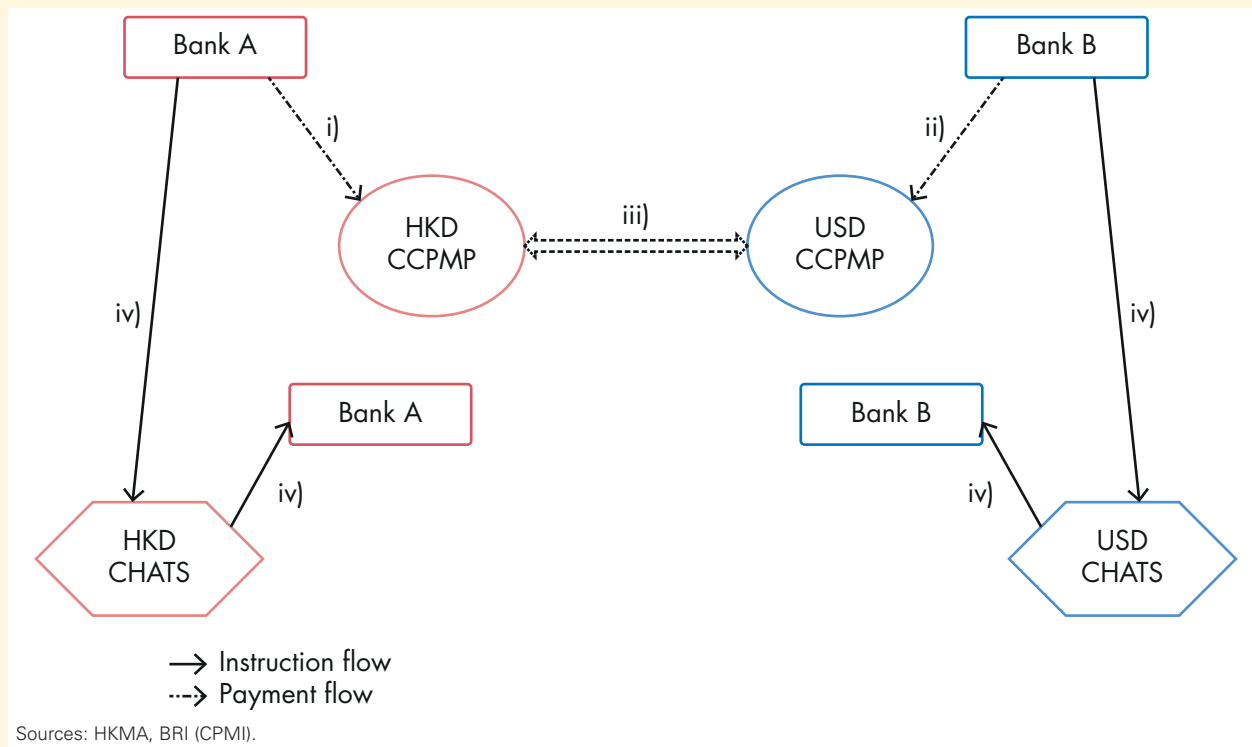
	Total foreign exchange market	Currencies eligible for CLS	Currencies not eligible for CLS
CLS system	50.8	54.6	–
Other PvP systems ¹	0.1	0.0	1.2
On-Us settlement*	9.2	9.0	12.2
Bilateral clearing	27.3	25.8	48.3
Gross settlement/Non-PvP	12.5	10.6	38.3

Source: Kos and Levich (2016)

¹ See Box below on settlement infrastructures for foreign exchange transactions in Hong Kong.

Box 8: Settlement infrastructure for foreign exchange transactions in Hong Kong

Hong Kong has four RTGS payment systems (CHATS¹): the HKD CHATS system for the settlement of transactions in Hong Kong dollars and the USD CHATS, EUR CHATS and RMB CHATS for the settlement of foreign exchange transactions in the US dollar, euro and Chinese renminbi, respectively. These four systems are linked by a PvP system called the “Cross-Currency Payment Matching Processor” (CCPMP), which enables payment instructions to be settled simultaneously, thus eliminating settlement risk. The common operator of these four systems is a private company, Hong Kong Interbank Clearing Ltd (HKICL), owned jointly by the local central bank (Hong Kong Monetary Authority, HKMA) and an association representing the Hong Kong banking industry, Hong Kong Association of Banks (HKAB). The USD CHATS system also set up a PvP link with Malaysia’s RTGS system (RENTAS)² in November 2006 and with Indonesia’s RTGS system (BI-RTGS) in January 2010.



The chart above presents the PvP mechanism, taking as an example the settlement of a USD/HKD trade. Bank A sells HKD to Bank B in exchange for USD. On the settlement day, (i) Bank A sends a payment instruction to Bank B via the HKD CHATS system, (ii) Bank B initiates a “mirror” instruction via the USD CHATS system; (iii) the HKD and USD CCPMP systems link the two instructions. The HKD and USD CHATS systems hold in their respective settlement accounts funds in HKD for Bank A and funds in USD for Bank B. If the two banks have sufficient liquidity in the currencies involved, (iv) the two payment systems transfer the funds to the respective counterparties simultaneously.

1 Clearing House Automated Transfer System.
 2 Real Time Electronic Transfer of Funds and Securities.

The HKMA has put risk management mechanisms in place to ensure the proper operation of the systems. Liquidity management is facilitated by mechanisms for liquidity optimisation,³ management of queued payments, and the monitoring and management of flows. The features of the HKD CHATS system are similar to those of the other CHATS systems, with a few exceptions:

- the HKD CHATS settlement agent is the HKMA whereas, for the other systems, commercial banks handle payments in the various currencies;
- the USD CHATS and EUR CHATS systems have a two-tier membership structure: banks can use the system as either direct members or indirect members after obtaining the approval of the HKMA and the settlement agents;
- unlike the USD CHATS and EUR CHATS systems, HKD CHATS does not offer intra-day credit facilities to its direct members.

Hong Kong’s multi-currency RTGS systems

RTGS system	Launch date	Settlement bank	Number of members* (directs/indirect)	Average daily transactions (in value)*	Average daily number of transactions*
USD CHATS	Aug. 2000	HSBC Ltd	94/219	USD 18.1 billion	18,220
EUR CHATS	April 2003	Standard Chartered Bank (HK) Ltd	37/18	EUR 563.7 million	485
RMB CHATS	June 2007	Bank of China (HK) Ltd	184	RMB 395.4 billion	6,788

* data as of 2013.

Source: HKMA.

3 RTGS Liquidity Optimiser (http://www.hkma.gov.hk/gdbook/eng/r/rtps_liquidity_optimiser.shtml)

4.2. Integrating new currencies in the system

When it was first established, CLS processed seven currencies. At the end of 2017, it was settling foreign exchange transactions in 18 currencies. The table below shows the dates on which the various currencies were integrated in CLS since the system’s launch.

While admitting new currencies is a source of external growth for CLS, it also meets the demands of clients, central banks and banking regulators, who want PvP mechanisms to be used more widely in the foreign exchange market to reduce risk.³⁸ As stated above, half of transactions

in the foreign exchange market are still settled outside CLS. Certain currencies are developing rapidly in the foreign exchange market, in particular those of the BRIC countries,³⁹ whose weight in the global economy and international trade is increasing.

Against this backdrop, CLS continues to work on plans to integrate new currencies. Integration, however, is a long and complex process, subject to strict specifications and official approval by the central bank of the currency concerned, as well as CLS’s regulators and supervisory bodies (FRNY, Oversight Committee).⁴⁰ The integration of emerging countries’ currencies will inevitably change CLS’s risk profile. In view

38 “Supervisory guidance for managing risk associated with the settlement of foreign exchange transactions”; BIS (BCBS), February 2013.

39 Brazil, Russia, India and China.

40 See the CLS website, which provides a commercial brochure for its currency programme: <https://www.cls-group.com/news-insights/publications>

Box 9: Launch dates for the integration of currencies

Currency	Effective launch date
US dollar (USD), euro (EUR), Japanese yen (JPY), Pound sterling (GBP), Swiss franc (CHF), Canadian dollar (CAD) and Australian dollar (AUD)	September 2002
Danish krone (DKK), Norwegian krone (NOK), Singapore dollar (SGD) and Swedish krone (SEK)	September 2003
Hong Kong dollar (HKD), South Korean won (KRW), New Zealand dollar (NZD), and South African rand (ZAR)	December 2004
Israeli shekel (ILS) and Mexican peso (MXN)	May 2008
Hungarian forint (HUF)	November 2015

Source: CLS.

Box 10: Amount* of foreign exchange transactions settled by currency and growth rate

Currency	Daily average (USD billion)					Growth rate			
	2004	2007	2010	2013	2016	04/07	07/10	10+/13	13/16
USD	1,114	2,845	3,371	4,662	4,438	155.4	18.5	38.3	-4.8
EUR	470	1,231	1,551	1,790	1,591	161.9	26.0	15.4	-11.1
JPY	292	573	754	1,235	1,096	96.2	31.6	63.8	-11.3
GBP	162	494	512	633	649	204.9	3.6	23.6	2.5
AUD	54	220	301	463	348	307.4	36.8	53.8	-24.8
CAD	56	143	210	244	260	155.4	46.9	16.2	6.6
CHF	74	227	250	276	243	206.8	10.1	10.4	-12.0
CNY	0	15	34	120	202	–	126.7	252.9	68.3
SEK	31	90	87	94	112	190.3	-3.3	8.0	19.1
MXN	10	44	50	135	97	340.0	13.6	170.0	-28.1
NZD	7	63	63	105	104	800.0	0.0	66.7	-1.0
SGD	13	39	56	75	91	200.0	43.6	33.9	21.3
HKD	28	90	94	77	88	221.4	4.4	-18.1	14.3
NOK	18	70	52	77	85	288.9	-25.7	48.1	10.4
KRW	10	38	60	64	84	280.0	57.9	6.7	31.3
TRY	0	6	29	71	73	–	383.3	144.8	2.8
INR	3	24	38	53	58	700.0	58.3	39.5	9.4
RUB	4	25	36	86	58	525.0	44.0	138.9	-32.6
BRL	6	13	27	59	51	116.7	107.7	118.5	-13.6
ZAR	12	30	29	60	49	150.0	-3.3	106.9	-18.3
DKK	15	28	23	42	42	86.7	-17.9	82.6	0.0
PLN	6	25	32	38	35	316.7	28.0	18.8	-7.9
TWD	3	12	19	24	32	300.0	58.3	26.3	33.3
THB	2	6	8	17	18	200.0	33.3	112.5	5.9
MYR	1	4	11	21	18	300.0	175.0	90.9	-14.3
HUF	0	9	17	23	15	–	88.9	35.3	-34.8
CZK	2	7	8	19	14	250.0	14.3	137.5	-26.3
ILS	1	5	6	10	14	400.0	20.0	66.7	40.0
SAR	1	2	3	5	15	100.0	50.0	66.7	200.0

* On a net basis.

Source: BRI.

of this, without neglecting its integration programme for new currencies, in 2017 CLS decided to offer a new service, CLSNet, to calculate bilateral net balances, in particular for currencies not eligible for the CLS system.⁴¹ This service, set for launch in 2018, is not a payment system: CLS does not make payments or transfer payment instructions. It is a vehicle that standardises players' processing operations and by so doing mitigates operational risk, improves intra-day liquidity management and cuts transaction costs.

4.3. Same day settlement sessions

In September 2013, CLS introduced a second settlement session in its system for same day settlement (SDS) of USD/CAD foreign exchange transactions. This second session is geared towards covering settlement risk on transactions with same day settlement⁴² which are not settled during the main session of the CLS system.⁴³ The SDS session for USD/CAD trades serves as a testing ground to assess the project's feasibility for other currencies. However, it faces severe liquidity constraints, notably for European members, which have to block part of the liquidity needed for the second session when it could be used to settle payments in other systems. Finally, the USD/CAD session has not been as successful as anticipated. In view of this, CLS is considering alternative solutions to reduce settlement risk, such as a gross PvP mechanism, which would make currency-for-currency payments simultaneously, to reduce settlement risk. Settlement would not be based on multilateral net positions but on the gross amount owed in each currency.

4.4. Other services in use or planned by CLS in the foreign exchange market

Since November 2015, CLS has expanded its range of foreign exchange instruments settled using the PvP system to include

cross-currency swaps (CCS), which have become much more prevalent in the market since 2010. A CCS combines a foreign exchange swap and an interest rate swap. CLS only settles the contract's principal value,⁴⁴ with payment instructions being supplied and confirmed previously by Markit.⁴⁵

At the same time, CLS now provides a compression service⁴⁶ for forex forward instructions⁴⁷ (see Chapter 5) in collaboration with TriOptima.⁴⁸ Provided in response to strong market demand, this service enables Settlement Members to significantly reduce the number of transactions they submit to the system and to limit their gross exposures, thus reducing their capital requirements for counterparty risk and leverage ratio requirements under the new regulations (EMIR, Basel III, DFA).

At present, central counterparty clearing houses (CCP) are indirect members ("third parties") of CLS. In connection with the introduction of mandatory clearing for standardised OTC derivatives, CLS is currently setting up a dedicated PvP settlement service⁴⁹ for CCPs for the clearing of certain foreign exchange products⁵⁰ that are not exempt⁵¹ (i.e. OTC foreign exchange options). This would enable CCPs to benefit from the CLS system's netting effect, thus reducing their exposures to liquidity risk in the event of a default by one of their clearing members. Their transactions would also be settled in central bank money, as CLS has access to the local RTGS for each currency concerned. The service would operate on an "all or nothing" settlement basis so as to limit the risks associated with partial or unfinished settlement.

The project is being developed in collaboration with the British CCP, LCH Ltd and the German CCP, Eurex Clearing AG. The effective launch of the new service is scheduled for 2018, once it has been approved by the relevant authorities.

41 Non-eligible currencies are those which cannot be settled on a PvP basis during CLS's main session.

42 "Outright Same-Day trades"; "Near-leg of Same-Day/Next-day Swaps"; "Near-leg of Same-Day/Forward Swaps"; "Far-leg of CLS In/Out Swaps" or "Far-leg of Informal Liquidity Swaps".

43 CLS's main session does not cover an ordinary payment day due to time differences and the different operating hours of the RTGS systems of the central banks involved.

44 Interest payments would be excluded from CLS's service.

45 Markit (acquired in 2016 by IHS) is a financial information company based in the UK.

46 Compression is a risk mitigation technique whereby two or more counterparties terminate transactions contained in a portfolio and replace them with one or more other transactions with a combined nominal value below that of the original transactions.

47 13% of the value of transactions settled in the foreign exchange market, with an increase of 43% between 2010 and 2013 (BIS).

48 TriOptima AB is a Swedish company specialising in risk management and post-market infrastructure. It is a subsidiary of the ICAP group.

49 The service will be completely separate from the "mainstream" service used by banks.

50 Exchange-traded or OTC foreign exchange options, FX futures, cross-currency swaps, etc.

51 Several jurisdictions (e.g. United States, Australia, Singapore and Japan) have decided to exempt derivatives such as FX swaps and FX forwards from mandatory clearing by a central counterparty, considering that the settlement risk on these products is greater than the corresponding credit risk and replacement risk. These instruments generally have fairly short maturities (under one year) and represent nearly 50% of the value of transactions settled on the foreign exchange market.

CHAPTER 10

Retail payment systems

Updated on 17 December 2018

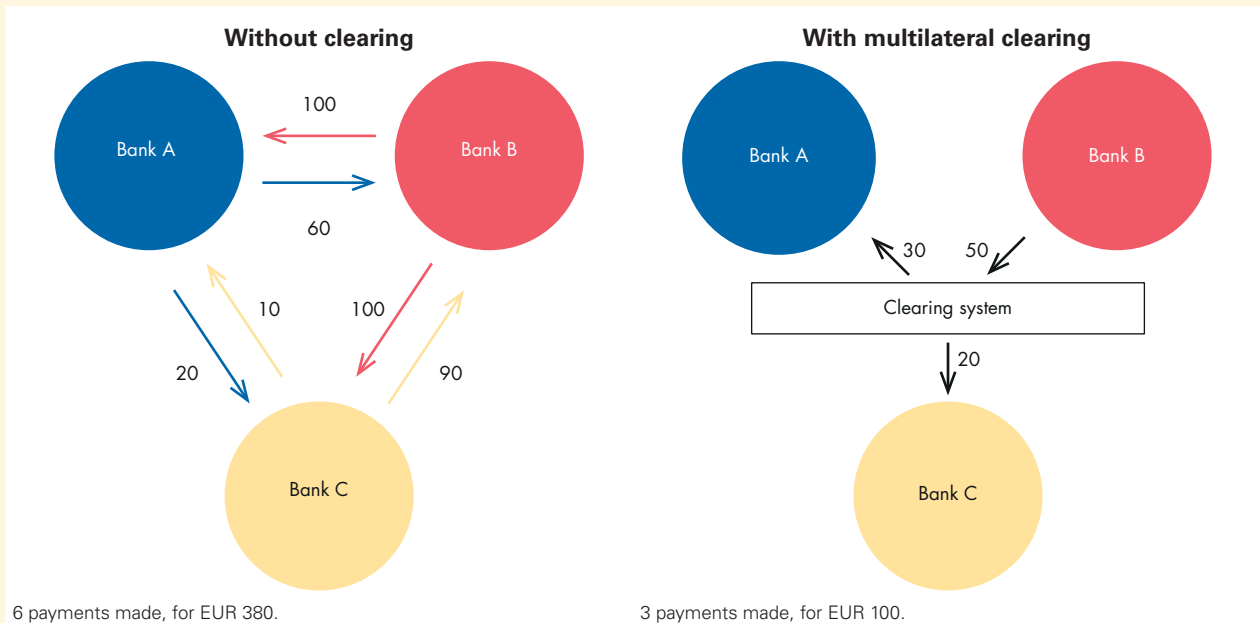
Retail payment systems play a key role in the economic sphere, handling payment transactions for retail customers and corporates. They typically process large volumes of low-value payments. The landscape in which these systems operate in Europe has evolved significantly over the last decade with the introduction of the European format (SEPA) for credit transfers and direct debits, but it remains relatively fragmented. New developments are now underway with the arrival of instant payments. The first section of this chapter presents the challenges, background and functioning of retail payment systems, together with their development, both to the present day and underway. The second section focuses on the payment system landscape in Europe, the third on financial risks in retail payment systems and the fourth on the oversight framework established by the Eurosystem for retail payment systems.

1. Retail payment systems and the challenges they face

Retail payment systems process “retail” payment orders (credit transfers, direct debits, cheques, cards, etc.). In contrast with large-value payment systems, they typically handle non-urgent payments that are relatively low in value but high in volume between retail customers and businesses in the broad sense. These systems often provide clearing services to reduce the number of interbank payments required. Clearing is usually performed on a multilateral basis: the system calculates the net balance payable or receivable by each participant based on all the transactions processed during the period considered (usually one day).

Payment clearing is an old technique (see Box 2). Originally, payment orders were exchanged and cleared manually in “clearing houses”. Physical clearing was practised at the time when paper-based

Box 1: An example of payment order clearing



Box 2: The history of France's retail payment system

In France, the first clearing house for the exchange of means of payment dated back to 1872 and was used for cheques. It was the Paris bankers' clearing house, developed with the support of the Banque de France to reduce the large number of transactions involved in settling payments with the payment instruments in use at the time, namely bills of exchange and cheques. This clearing house enabled bankers to physically exchange the paper instruments with a view to paying only the net balances resulting from their transactions.

A hundred years later, with the emergence of electronic and automated payments, manual clearing remained in use alongside automated clearing processes performed in dedicated systems. Gradually, automated systems began to take over. In the 1980s retail payments were processed by:

- 104 "traditional" clearing houses for exchanges of paper-based payment instruments, most of which took place on the Banque de France's premises;
- 9 clearing computers for the exchange of transactions using magnetic media;
- 9 regional centres for the exchange of cheque images, enabling low-value cheques to be collected in the form of cheque images.

In 1983, French banks decided to streamline this structure by launching a project to create a single automated exchange system known as SIT (*Système Interbancaire de Télécompensation* – interbank remote clearing system). SIT entered into operation in 1992 and progressively took over from the clearing computers, replacing them completely in 1994.

SIT was operated by GSIT (*Groupement pour un Système Interbancaire de Télécompensation*), an economic interest group (GIE) comprising the major French banks and the Banque de France. It relied on a network of processing centres connected bilaterally via a private network. At the time, SIT was a highly sophisticated system, being the first in the world to provide end-to-end processing of payments (acquisition, clearing, settlement and the forwarding of accounting information).

Following on from the initial migration to SIT of paperless means of payment (credit transfers, direct debits, etc.), payments by bank card (1995-1996) then cheques (2001-2002) gradually migrated to the system. Before cheques could benefit from automated clearing, a processing method had to be put in place to speed up the clearing process without inflating management costs. The shift to cheque images¹ made this possible. Legislation on cheque images comprises several texts, including the Law of 13 March 2000, which gave legal recognition to electronic-based writing.

In July 2002, all interbank exchanges were processed electronically in SIT. In September 2002, the system processed more than 45 million transactions a day on average, with an average daily value of EUR 18 billion.

In 2004, in anticipation of SEPA,² six French banks (BNP, Caisses d'Épargne, Crédit Agricole, Crédit Mutuel, Banques Populaires and Société Générale) decided to set up a private company tasked with developing and operating a reference clearing platform for retail payments in Europe. As a result,

¹ Cheque images are created from cheques physically submitted by customers to their banks, which are then digitised. The beneficiary's bank sends the cheque image electronically, including the MICR line and amount, to be cleared in the payment system.

² See Section 1.2.

.../...

the company STET (*Systèmes Technologiques d'Échanges et de Traitement*) was founded and became the operator of the retail payments system CORE(FR). Progressively, CORE(FR) replaced SIT, which ceased operations in October 2008.

As technology continued to advance and payment platforms were modernised, centralised multilateral clearing remained the system of choice. At the same time, the French operator STET SA adapted its services so that it could process SEPA instruments and instant payments.

France currently has two payment systems operated by STET SA: CORE(FR) and SEPA.EU. Each of these systems meets distinct needs. The first is designed as a national payment system, while the objective for the second is to be used on a pan-European scale.

CORE(FR): a dedicated national payment system

The project came to fruition in 2008 with the migration of all transactions previously cleared in SIT to the CORE(FR) system. The new system provided a single multilateral clearing process for all means of payment. Transactions are processed on a continuous basis with a single clearing cycle. A financial security mechanism, comprising a common guarantee fund and individual guarantees, increases the certainty that the system will settle. Settlement takes place once a day in TARGET2. Direct participants are connected to the system via a private secured network. The system's operational resilience is ensured by the use of two production sites. STET operates the technical platform and the secure messaging network directly.

As of 31 December 2016, the CORE(FR) system had 10 direct participants – the shareholder banks, together with HSBC France, the Caisse des Dépôts et Consignations, Crédit Mutuel-Arkéa and the Banque de France – and 177 indirect participants.

With more than 50 million transactions processed each day, for a value of over EUR 20 billion, in 2017 CORE(FR) remains Europe's largest retail payment system based on volume (12.5 billion transactions) and second based on value (EUR 4,800 billion in transactions cleared) after EBA Clearing's STEP2-T system (see below).

SEPA.EU: the development of a pan-European service

As well as the French payment system CORE(FR), the technical platform developed by STET hosts the Belgian banking community's payment system, CEC (*Centre d'Échange et de Compensation*). The CORE platform was actually developed to meet the specific needs of other exchange communities, while benefiting from the economies of scale provided by a shared platform.

Alongside this development strategy, STET created a payment system targeting the pan-European market, so as to diversify its revenue sources and provide an alternative to the services offered by rival pan-European payment systems. SEPA.EU has been operational since 21 November 2016, with the French community's migration to SEPA direct debits. In 2020, the system will handle the SEPA transfers currently cleared in CORE(FR) and open its services up to non-French participants. STET is also developing a dedicated service for instant transfers in SEPA.EU, which should be operational in 2019. In 2017, SEPA.EU processed between 196 million and 229 million transactions a month, with overall monthly values ranging from EUR 74 billion to EUR 106 billion.

payment instruments were the norm. These physical systems were gradually replaced by automated systems in the 1970s, paving the way for electronic payment systems to develop, spurred by the shift to paperless means of payment, advances in IT and technological innovation.

The payment system landscape continues to evolve as new technologies and means of payment emerge. Taking a broader perspective, the creation of the single euro payments area (SEPA) disrupted the ecosystem of payment systems built around their national banking communities, with the emergence of pan-European players and the development of interoperability links.

1.1. Operation of retail payment systems

Unlike real-time gross settlement systems (RTGS), which are designed to process large-value and/or urgent payments, retail payment systems generally process transactions submitted by participants during the payment cycle on a deferred net settlement (DNS) basis.

Interbank retail payment systems are the preferred channels for the exchange and clearing of payments. In France,

in 2015, these channels handled 74% of payments based on volume, versus 16% for intra-bank channels (within the same institution), 9% for intra-group channels (within the same banking group) and 1% for interbank transactions executed outside payment systems (correspondent banking, see Chapter 6). The distribution of payments processed based on value – with and without multilateral clearing – is shown in the Chart 1:¹

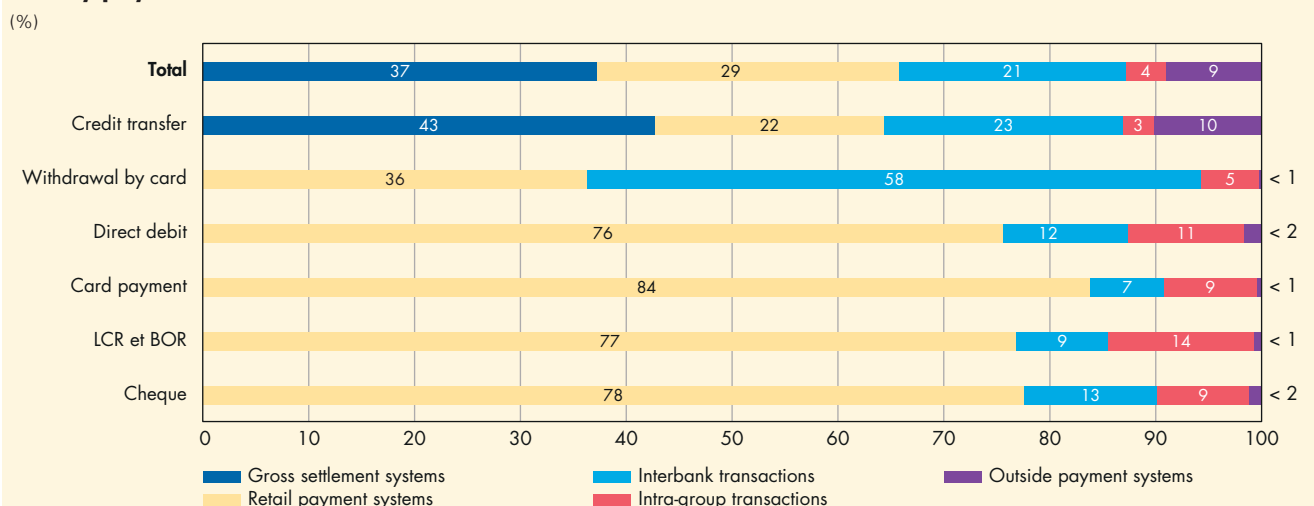
A retail payment system has both direct and indirect participants:

- direct participants execute transactions directly with other participants;
- indirect participants channel their transactions through a direct participant.

In the European Union, direct participants in a system are accountable to the settlement agent (or all other participants) for the execution of their own payments, the payments of their clients and those of their indirect participants. When a new payment system is established, it must be notified to the European Commission as a system subject to Directive 98/26/EC on Settlement Finality. Under this Directive,

¹ https://www.banque-france.fr/sites/default/files/media/2017/04/05/bilan-cartographie-des-moyens-de-paiement-2016-donnees_2015.pdf

C1 : Breakdown of 2016 payment transactions executed within and outside payment systems by payment instrument in value terms



Source: Banque de France.

settlement systems are defined as formal arrangements between three or more participants (essentially credit institutions and investment service providers), without counting a possible settlement agent (for the final accounting of such settlements), a possible central counterparty or a possible clearing house, with common rules and standardised arrangements for the execution of settlement orders between the participants. This “Finality” directive was amended on 6 May 2009 by Directive 2009/44/EC in order to extend its scope of application and increase the protection provided in a context where links are developing between payment and settlement systems. The new directive also extended the protection provided in the event of a participant’s failure to cover not only settlement orders exchanged between participants in the same system, but also those exchanged between different systems.

Settlement cycles are defined on the basis of each system’s specific rules. Therefore, during its daily operating hours a system can include a single settlement cycle or several such cycles. A settlement cycle generally involves several stages. For example, France’s CORE(FR) retail payment system operates in the following stages:

- (i) it begins with an **opening period**, during which participants submit their transactions to the system. At the end of this period (the cut-off time), either the system is closed and no further transactions are accepted or further transactions are accepted but will only be eligible for processing during the following clearing cycle, which can be on the same day (D) or the following day (D+1);
- (ii) the system computes each participant’s multilateral net balance and informs participants thereof, allowing for a **validation period** during which participants can check their respective balances payable/receivable and dispute them if necessary;

- (iii) at the end of stage ii, participants with negative net balances are required to deposit funds in their settlement accounts so that the system can settle their transactions. This is known as the **information period**, during which instructions for settlement in TARGET2 are established;

- (iv) the **settlement period** then begins, with transactions being settled in TARGET2. On completion of this stage, the operator forwards the relevant accounting information to participants.

The Box 3 shows the settlement cycle of France’s national retail payment system CORE(FR), operated by STET SA, during a typical payment day.

In CORE(FR), after the cut-off time by which clearing balances must be validated by direct participants (14:30 CET), an information period begins at 14:45. Instructions for the settlement of participants’ clearing balances and the restitution of individual guarantees are sent to the settlement agent (TARGET2). The settlement period in TARGET2 runs from 15:05 to 15:15.

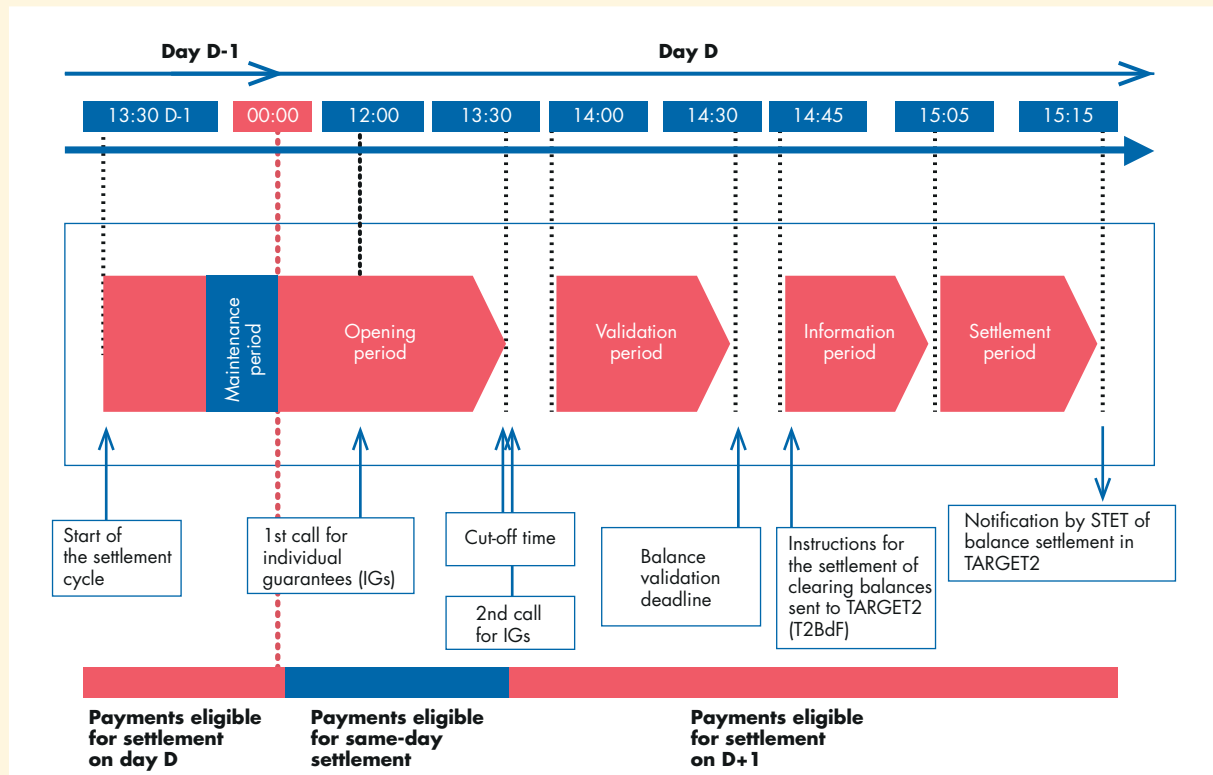
Payment systems must provide payment finality – rendering payments irrevocable and unconditional – no later than the time of settlement. Participants’ net positions are generally settled in central bank money,² i.e. on the books of the central bank, as is the case for France’s CORE(FR) system, which settles participants’ net balances in TARGET2. Settlement using central bank money is highly recommended as it eliminates the settlement risk associated with a default by the settlement bank (see Chapter 17). Therefore, within the euro area most retail payment systems, like the French systems CORE(FR) and SEPA EU, settle their participants’ net positions in TARGET2³ (see Chapter 7).

In this type of system it is also possible for transactions to be settled in commercial bank money (see Chapter 1, Section 3) on the books of a credit institution, in

² In the euro area, pursuant to amended Regulation (EU) 795/2014, PFMI 9 on settlement in central bank money is applicable to systemically important payment systems (SIPS) and prominently important retail payment systems (PIRPS). For other retail payment systems (ORPS), settlement in central bank money is not mandatory (for more details see section 4.2).

³ BIS, “Payment, clearing, and settlement system in the euro area”, CPSS, Red Book, 2012. <https://www.bis.org/cpmi/publ/d105.htm>

Box 3: A typical payment day in the CORE(FR) system with a single payment cycle



Source: STET SA, Banque de France.

accordance with strict conditions for the management and control of the risks inherent in this type of settlement.

1.2. The impact of SEPA on retail payment systems

The single euro payments area (SEPA) was established by a group of major banks comprising the European Payment Council (EPC), with support from the ECB and the European Commission. Initiated in 2002, the project aimed to harmonise means of payment in euro across the 34 countries in the SEPA area⁴ so that cross-border payments in euro could be handled as quickly and securely as domestic payments and under the same conditions. SEPA thus supplemented the introduction

of the euro currency in 18 European countries. The first SEPA implementation stage was the launch of the European credit transfer (SEPA Credit Transfer or SCT) on 28 January 2008. Following the adoption of the SEPA Regulation (EU) 260/2012⁵ – known as the “end-date” regulation because it set a deadline for discontinuing domestic credit transfers and direct debits – the migration to the SEPA credit transfer (SCT) and SEPA Direct Debit (SDD) became effective on 1 August 2014. The replacement of domestic by European means of payment changed the payment system landscape, creating the conditions for Europe-wide competition in the retail payment market. This shift logically involved the introduction of specific requirements for payment systems.

⁴ The SEPA area comprises the 28 Member States of the European Union, together with Iceland, Norway, Switzerland, Liechtenstein, Monaco and San Marino.

⁵ <http://eur-lex.europa.eu>

1.2.1. SEPA requirements applicable to payment systems

The requirements applicable to payment systems in connection with SEPA are set out in the abovementioned Regulation (EU) 260/2012. It stipulates that operators must ensure that their payment system is technically interoperable⁶ with the other systems operating in the European Union and must not adopt business rules that restrict interoperability if they are not justified on the grounds of security. The Banque de France is the competent authority responsible for ensuring that this requirement is met by the operators of payment systems established in France, namely STET SA for the CORE(FR)⁷ and SEPA.EU systems and EBA Clearing SAS for the STEP2-T system.

Acting in its capacity as a catalyst, in 2013 the Eurosystem published the SEPA terms of reference for retail payment systems. They include and supplement the requirements laid down by Regulation 260/2012, which establishes four criteria to define the Eurosystem's long-term vision for the clearing and settlement of SEPA payments. Each of these criteria refers to a series of questions that payment system operators are invited to answer in order to assess their level of compliance. They include requirements for systems to:

- have the technical and operational capacity to process payments in compliance with the standards set by the EPC;
- be fully interoperable with the other systems by means of direct or indirect links;
- give participants access to all SEPA-compliant counterparties;
- ensure freedom of choice among payment service providers, based on the quality and cost of the clearing and settlement solutions they provide.

1.2.2. The European payment system landscape following migration to SEPA

Almost four years after the migration to SEPA credit transfers and direct debits, the European payment system landscape allows greater integration of SEPA transaction processing. This is because banks and other payment service providers are increasingly using the pan-European system STEP2-T operated by EBA Clearing. Alongside the migration of credit transfers and direct debits to the SEPA standard, STEP2-T, created in 2003, has become the leading retail payment system in the euro area based on value. As well as increasing its share in the market for cross-border payments, STEP2-T has also gained market share from national systems used for domestic SEPA payments.

However, few changes have been made and the market remains fragmented, with a multitude of national systems operating alongside their pan-European counterparts. This means that banks usually have to participate in several systems to ensure that they are reachable⁸ by any other counterparty involved in SEPA payment transfers.

While regulators have looked closely at interoperability links between systems, in terms of concrete action, little has been achieved. Low volumes of cross-border transactions, coupled with technical and legal obstacles to inter-system links, have put the brakes on initiatives in this area. At present, only 25 interoperability links are in place among the 37 retail payment systems in operation in the euro area (see Box 5 below).

1.3. The launch of instant payments in the euro area

Following migration to SEPA, the Eurosystem wanted the market for retail payment systems in euro to advance towards greater integration. In view of this, the Euro Retail Payments Board (ERP),

6 Two payment systems are interoperable if the payment instruments processed in one system can be used in the other. Interoperability requires not only technical compatibility but also a commercial agreement between the systems concerned.

7 As long as the CORE(FR) system processes SEPA transactions (see Box in Section 1).

8 A bank is said to be reachable if it has the operational capacity to receive SEPA payments via one or more payment systems, i.e. if the bank is a direct or indirect participant in these payment systems.

set up in December 2013 to replace the SEPA Council and chaired by the ECB, set out to identify factors conducive to a more integrated market. In view of the changes underway in technology and consumer expectations, especially with the rise of e-commerce, instant payments have been identified as a powerful vehicle for integration.

In 2014, the ERPB provided an initial definition of “instant payments” as *“electronic retail payment solutions available 24/7/365⁹ and resulting in the immediate or close-to-immediate interbank clearing of the transaction and crediting of the payee’s account with confirmation to the payer”*. In contrast, payments made via “classic” SEPA credit transfers and direct debits (SCTs and SDDs) or by card are only settled (i.e. credited to the payee’s account) on the day after the payment order is submitted (D+1). With instant payments, the payee’s account is credited within a few seconds of the issuer informing its bank of its intention to pay. Instant payments, which allow the funds credited to be reused immediately, are already operational at the national level in several countries, particularly in Europe.¹⁰ The first cross-border solution is the RT1 system operated by EBA Clearing, launched in November 2017. At the end of June 2018, RT1 had 22 participants and was processing more than 10,000 transactions a day on average.

After the ERPB tasked the EPC with rapidly developing a scheme (defined as a set of rules and standards of use) for European instant payments, the EPC built on the existing SCT to develop an instant payment scheme in the form of a credit transfer: SCTInst. The EPC submitted a draft scheme to the ERPB in November 2015, describing the SCTInst transaction process and setting out the requirements to be satisfied by participants and payment service providers (PSPs) in terms of controls and reporting. The scheme can be adopted on a voluntary basis. Several operators have used SCTInst to develop instant payment solutions. Notable examples include EBA

Clearing with its RT1 system and STET, the CORE(FR) system operator, with its new system SEPA.EU, which is open to Europe’s banking communities and will be available to process instant payments from the end of 2018.

The arrival of instant payments will force payment system operators to review their technical infrastructures, in some cases very thoroughly, especially as the Eurosystem has expressed specific expectations, notably in terms of admission policies, interoperability and risk reduction.¹¹

Instant payments thus represent a pan-European challenge and the Eurosystem wants to take the opportunity to spur further integration of the euro area payment market. In view of this, the ECB has also decided to launch an instant payment solution, TIPS (TARGET Instant Payment Settlement). TIPS will process instant payments between two of its participants directly, using the ASI6 RT (real-time) procedure to settle them in TARGET2 (see Chapter 7, Section 6 for details), thus removing barriers between retail payment systems and large-value payment systems.

With this solution, working closely with the banking industry, the Eurosystem wants to ensure that demand for instant payments will be satisfied at the European level. The TIPS service is expected to go live in November 2018.

2. The principal retail payment systems in Europe

A wide range of retail payment systems are in operation across the euro area. As of end-2016,¹² there were 37 payment systems overall, including four SIPS – two of which are retail payment systems – one large-value payment system (“non-SIPS LVPS”), nine PIRPS and 23 ORPS.¹³ All the PIRPS and ORPS are retail payment systems (for the definition of SIPS, PIRPS and ORPS, see Section 4.2. below). The list of payment systems in the Eurosystem

9 24 hours a day, 7 days a week, 365 days a year.

10 For example, Swish in Sweden, MobilePay in Denmark, and Faster Payments Service (FPS) in the UK.

11 <https://www.ecb.europa.eu>

12 SDW report, payment statistics, September 2016, ECB.

13 SIPS (Systemically Important Payment System), PIRPS (Prominently Important Retail Payment System) and ORPS (Other Retail Payment System): <https://www.ecb.europa.eu/paym/pol/activ/systems/html/index.en.html>

is updated annually and published on the ECB's website.

Payment traffic is nevertheless concentrated in a limited number of retail payment systems. In Europe, for instance,

the three largest systems in value terms, namely STEP2-T, Bacs (UK) and CORE(FR), process almost 72% of the total value of payments cleared. The percentage climbs to 83% if the five largest systems are considered.

Box 4: List of payment systems in use as of end-2016

Country	SIPS (4)	Non-SIPS LVPS (1)	PIRPS (9)	ORPS (23)
Pan-European	TARGET2			
Pan-European	EURO1			
Pan-European	STEP2-T			
Germany				RPS (EMZ)
Germany				STEP2-CC
Austria			Clearing Service Austria	Clearing Service International
Belgium			CEC	
Cyprus				Cyprus Clearing House
Cyprus			JCC Payment Card System	JCC SDD
Spain			SNCE	
Estonia			Local clearing system for card payments	
Finland		POPS		
France	CORE(FR)			SEPA.EU
Greece			Dias	ACO
Ireland				IPCC
Italy				CSM Banca d'Italia
Italy				ICBPI-BICOMP
Italy				ICCREA-BICOMP
Italy				SIA-BICOMP
Latvia				Electronic Clearing System EKS
Latvia				Local clearing system for card payments
Lithuania				SEPA-MMS
Malta				Malta Clearing House
The Netherlands				Equens CSM
Portugal			SICOI	
Slovak Republic			SIPS (Slovak Interbank Payment Systems)	First Data Slovakia
Slovenia			SIMP-PS	Multilateralni kliring Activa
Slovenia				Plačilni sistem Moneta
Slovenia				Poravnava bankomatov
Slovenia				Poravnava kartic
Slovenia				Poravnava Multilateralnega kliringa MasterCard

Box 5: Retail payment systems: examples from European countries other than France

Pan-European systems in the euro area: EBA Clearing, domiciled in France, operates the STEP2-T retail payment system for SEPA transactions. The system was launched in 2003 and its traffic increased sharply with the migration to SEPA.¹ Since 2013, it has been the leading retail payment system in Europe based on value, having cleared EUR 13,169 billion in transactions in 2016, well ahead of the French national system, CORE(FR), with EUR 5,513 billion.

Change in the value of transactions processed by STEP2-T and CORE(FR)

(annual values, in EUR billion)

	2010	2011	2012	2013	2014	2015	2016
STEP2-T	2,385	2,984	3,511	4,748	11,072	12,217	13,169
CORE(FR)	5,119	5,373	5,405	5,376	5,373	5,540	5,513

Source: ECB (2017 Oversight Report, Appendix: https://www.ecb.europa.eu/pub/pdf/other/eurosystemoversightreport2016_en.pdf?2ae0c243b5cab226b6d21c0115dbf609)

The system provides various settlement services, depending on the SEPA payment instrument used: STEP2-T SCT for SEPA credit transfers, STEP2 SDD for SEPA direct debits and SDD B2B for SEPA direct debits between businesses. At the end of December 2015, these services had 131, 98 and 85 direct participants, respectively. STEP2-T has multiple payment cycles. The SCT service operates in five daytime cycles and two optional night-time cycles. Participants can submit their payments for settlement during any of these five cycles but must be ready to settle the payments due for each cycle. The SDD service operates two separate settlement cycles (between 12:00 and 12:45 for Core SDD and between 13:00 and 13:45 for B2B SDD). Like most retail payment systems, STEP2-T operates on a deferred net settlement basis, whereby participating banks settle their transactions by paying their multilateral net balance in TARGET2. The operator notifies participants of their bilateral gross obligations and calculates their multilateral net balances, which are transmitted to TARGET2 via a dedicated interface (ASI).² In STEP2-T, payment orders are transmitted to the beneficiary banks after settlement (“delivery after settlement”) and are only accepted for settlement if they have been funded (i.e. if the issuing or debtor banks have sufficient funds in their accounts). Payments are considered final once settlement has taken place. In 2016, STEP2-T processed around 10.2 billion transactions representing an overall value of EUR 13,169 billion.

In Belgium, the *Centre d’Échange et de Compensation* (CEC) is the interbank payment system used for retail transactions. It centralises and coordinates the bulk of domestic low-value cashless payment traffic between individuals, companies and public authorities. Since March 2013, all domestic payments (Belgian formats) and SEPA credit transfers (SCT) have been processed on the CORE technical platform operated by STET, the operator of the French retail payment system CORE(FR). Alongside the migration to SEPA, the Belgian banking community launched a request for proposals to provide instant payment processing. STET was chosen as the supplier of the technical platform. In 2016, the CEC processed 1.385 billion transactions, representing an overall value of around EUR 919 billion.

¹ Several European banking communities, notably those of Germany and Italy, decided to process their SEPA payment flows in STEP2-T.

² Ancillary System Interface. TARGET2 has several interfaces with different operational modes to settle the net balances of ancillary systems.

.../...

In Germany, most retail payments are cleared under bilateral settlement agreements between banks within the “Giro” network³ populated by the German banking system’s three key institutions (commercial banks, savings banks and cooperative banks). Alongside this system, the Bundesbank operates a payment system for retail transactions (EMZ),⁴ especially those in the SEPA format (SCT, SDD) and cheques.⁵ For this purpose, it is connected bilaterally with other European SEPA-compliant automated clearing houses (ACH). At present, more than 220 banks domiciled in Germany use the EMZ system, including 156 direct participants in the SEPA service. In 2016, EMZ processed around 4.3 billion transactions, with a total value of around EUR 3,100 billion. The value processed in the system is low compared with the EUR 5,542 billion handled by CORE(FR) in 2016. This reflects German banks’ extensive use of bilateral settlement agreements, as well as the fact that they are much heavier users of the pan-European STEP2-T system than their French counterparts.

In the Netherlands, Equens is the company that operates the two Dutch retail payment systems. Domestic non-SEPA payments are processed in the clearing and settlement system (CSS)⁶ and SEPA payments are handled by Equens CSM.⁷ Equens was set up in 2006 by a merger between Interpay Nederland BV and the German institute for payment service transactions (*Deutsches Transaktionsinstitut für Zahlungsverkehrsdienstleistungen*). Since 2008, Equens has had European Company status (Equens SE). All Dutch retail banks participate in Equens for domestic transactions (CSS). They can, like all institutions holding banking licenses in other European countries (EU and EEA), participate in the clearing of SEPA instruments. In 2016, Equens processed 1.8 billion transactions with an overall value of EUR 1,764 billion.

In Italy, BI-COMP is the clearing system used for retail payments in euro (cheques and credit transfers), as well as SEPA transactions (SDD, SCT). The system is operated by the Banca d’Italia and its transactions are settled in TARGET2. The central bank provides participants with an interoperable service that allows their payment instructions to be executed in other connected systems. BI-COMP is interoperable with Equens, STEP2-T and CS.I.⁸ In 2016, BI-COMP processed around 847 million transactions with an overall value of EUR 1,154 billion.

In the UK there are three retail payment systems: Bacs, Faster Payment Service (FPS) and Cheque and Credit Clearing (C&CC). Bacs is the largest domestic retail payment system based on volume. It handles low-value and/or non-urgent electronic debit/credit transactions (direct debits and bank transfers) for payments in pounds sterling and domestic euro payments.

Bacs Ltd is the system’s operator but it outsources processing operations to VocaLink Ltd. Bacs counts 70 financial institutions as members. In 2005, the system introduced affiliate status for members. Affiliates participate in the system’s various governance bodies but do not assume operational responsibilities for settlement. In 2016, Bacs processed 6.2 billion transactions with a total value of GBP 4,800 billion.

FSP is an automated clearing and settlement system used to process instant transfers, forward-dated transfers and standing orders for UK retail customers and companies. The system is administered

3 The Giro is a bank transfer in which the recipient is not actively involved. The beneficiary provides their banking details to the order originator, who can then transfer the required amount to the account of the beneficiary, who need not take any action. The order originator is then notified that the payment has been successfully completed. This type of transfer is very common in Germany, where cheques are rarely used.

4 *Elektronischer Massenzahlungsverkehr*.

5 Cheques and SDD make up almost 60% of EMZ’s traffic (based on volume).

6 Clearing and Settlement System.

7 Clearing and Settlement Mechanism.

8 Clearing Service International, a system operated by the Oesterreichische Nationalbank (OeNB, the central bank of Austria).

.../...

by FPS Ltd and operates 24/7/365. Its processing operations have also been outsourced to VocaLink Ltd. FPS is a deferred net settlement system with three interbank settlement cycles each day. The Bank of England acts as the settlement agent. A limit of GBP 100,000 applies to individual transactions and all FPS members have a debit limit (“Net Sender Cap”) and are subject to a loss-sharing agreement if a participant defaults.

C&CC is the system used to process cheques and bank giro transfers. It settles transactions in a number of currencies (GBP, EUR and USD) and has 10 direct participants (all of which handle euro and 5 of which handle dollars) and around 400 indirect participants, most of which are banks and building societies. Under the supervision of the Financial Conduct Authority (FCA), in 2015 the UK Payment Systems Regulator⁹ (PSR) created the Payment Strategy Forum (PSF) bringing together payment professionals, banks, consumer representatives and the government to discuss market-related issues and promote new initiatives. The latest discussions raised the need to review the UK’s payment architecture, focusing on the potential consolidation of the Bacs, FPS and C&CC operators.

⁹ The PSR has significant regulatory authority.

Box 6: Types of settlement used in instant payment systems

Two types of settlement are used in instant payment systems:

- **Deferred net settlement (DNS)** mechanisms are the same as that described above. In this type of settlement, transactions are transmitted, executed and notified in real time to the payment service providers (PSPs) concerned. The beneficiary’s PSP credits the funds to the beneficiary immediately. The positions are settled between the PSPs after the funds have been credited to the beneficiary’s account. The clearing system used for instant payments calculates the net positions of all the PSPs involved, which are subsequently settled in an RTGS system (usually in several daily settlement cycles).

Examples of instant payment systems using a DNS model include the following:

Korea	United Kingdom	China	India	Italy	Singapore
EBS	Faster Payments	IBPS	IMPS	Jiffy	FAST

- **Real-time settlement:** transactions are settled in high-speed sequences. Instructions are transmitted, executed and notified in real time to the PSP concerned, but, in contrast with the DNS model, funds are transferred between PSPs before being credited to the beneficiary. Funds can be transferred on a gross basis (whereby transactions are settled one by one in real time) or a net basis (whereby the system triggers high-frequency settlement cycles to enable near real-time settlement). Funds are transferred between PSPs’ RTGS accounts.

Examples of instant payment systems using a real-time model include the following:

Sweden	Mexico
Bir/Swish	SPEI

TIPS (Target Instant Payment Settlement), the instant payment settlement service put in place by the Eurosystem at end-November 2018 (see Chapter 7, Section 6.2), is using a real-time settlement mechanism. Funds are transferred between dedicated cash accounts (DCA for deposit cash accounts) legally opened in TARGET2. Liquidity can be provided to these DCAs from participants’ TARGET2 accounts.

For details on risk management in instant payment systems, see Section 3.2 below.

3. Financial risks associated with retail payment systems

3.1. Deferred net settlement (DNS) mechanisms: liquidity risk and credit risk

Retail payment systems generally rely on deferred net settlement (DNS) mechanisms, whereas most large-value payment systems use gross settlement mechanisms.¹⁴ While DNS systems provide greater liquidity efficiency, they also carry greater settlement risk: as settlement is deferred, there is a risk that participants' net balances may not be paid if one or more participants default.

The concept of settlement risk encompasses both credit risk and liquidity risk. These two types of risk materialise in different ways in a DNS retail payment system (see Chapter 17):

- liquidity risk arises if a participant is unable to honour a payment when it falls due, but may potentially be able to pay at a later date. In DNS mechanisms that do not incorporate a settlement guarantee, the system or its participants are exposed to liquidity risk if one or more participants default on their payments. In such cases, if there is no guarantee mechanism, the transactions affected by the default(s) are partly or wholly cancelled. The net balances are then recalculated for settlement by the non-defaulting participants. Such cancellations can squeeze the liquidity of non-defaulting participants, creating the risk that further defaults could occur;
- credit risk arises when the defaulting participant cannot make their payment on the due date and is unlikely to be able to pay at a subsequent date. In such cases, the participant becomes insolvent and cannot take part in the transaction. This creates a risk of loss for the system or its participants relating to the exposures involved, if the clearing system for the payment instrument concerned¹⁵ provides for the immediate provision of funds (instant payments, cash withdrawals, etc.) or includes a settlement guarantee

(bank card transactions). These exposures can sometimes be outside the system.¹⁶

Liquidity risk and credit risk are not strictly independent of each other: liquidity risk always arises before credit risk. If a participant defaults, in the first instance this creates liquidity risk. Credit risk follows if the participant is permanently unable to fulfil its payment obligation.

3.2. Management of financial risk and existing protection mechanisms

At present, most retail payment systems in Europe operate without a risk coverage mechanism. In the Eurosystem, only systemically important payment systems (SIPS)¹⁷ are required to cover their risk. For SIPS or systems incorporating risk protection mechanisms, the level of protection provided can vary from coverage of the highest net debit balance shown by a system participant to a full guarantee ensuring that all transactions will settle.

The main models used to cover financial risk are risk pooling, individual guarantees and prefunding:

- risk pooling arrangements can take the form of a common guarantee fund constituted by direct participants covering net debit positions up to a cap set by the system's operator and/or participants. Such funds are generally set to protect the system against the failure of the direct participant holding the highest net debit position, an arrangement known as "Cover 1";
- in models based on individual guarantees, the operator can require a participant holding a net debit position in the system to provide or top up a liquidity deposit to guarantee the settlement of their net balances;
- with prefunding, financial institutions are required to deposit funds in their accounts at the settlement institution before these accounts can be used to settle their payment obligations.

¹⁴ Except for EURO1, which is a large-value payment system operating on a deferred net settlement basis. The vast majority of large-value payment systems operated by central banks for monetary policy-related operations and interbank payments are RTGS systems.

¹⁵ In retail payment systems, the automated processing of payment orders is generally structured by type of payment instrument.

¹⁶ For example, in the French retail payment system, CORE(FR), credit risk exposures, notably relating to payments and withdrawals by card, arise outside the system, at the level of the participants. The exposures depend on participants' practices for the crediting/debiting of customers' accounts, which takes place before the interbank settlement of the balances calculated in CORE(FR).

¹⁷ A payment system is qualified as "systemically important" if, in the absence of sufficient protection against risk, an internal disruption resulting, for example, from a participant's insolvency can have knock-on effects for other participants or systemic effects across the broader financial sphere. The key criterion that determines an institution's potential systemic importance is the size/type of its payment orders and their overall value. This justifies the requirement for the associated financial risks to be covered. For prominently important retail payment systems (PIRPS) and other retail payment systems (ORPS) the level of financial risk is lower. This is why the Eurosystem concluded that compliance with the fundamental principles for financial risk management need not be mandatory for these systems.

Box 7: Examples of protection mechanisms used in payment systems

System	Protection mechanism	Description
STEP2-T (and the other retail payment systems in the euro area, except for CORE(FR))	None	If a participant goes bankrupt, net balances are recalculated and the system attempts to settle them again among the non-defaulting participants.
CORE(FR)	A Common Guarantee Fund covering at least 80% of the highest net debit positions, supplemented with individual guarantees.	The financial security mechanism (FSM) comprises a Common Guarantee Fund (CGF) and individual guarantees (IGs). The CGF protects the system against a participant's default, provided that the participant's net debit position is under EUR 650.5 million. If the net debit position is higher than the CGF amount, IGs are called in after the cut-off to cover the default. If the calls for guarantee fail, the default is not covered. The defaulting participant is excluded from the clearing process and a "partial" clearing process is executed.
Bacs (UK) and euro area payment systems that process instant payments using the ASI6-RT procedure to settle them in the Eurosystem (TARGET2, ¹ see Chapter 7).	A "cover all" arrangement, whereby all positions are covered by full pre-funding.	Participants are required to post collateral at the start of the day (or, for instant payments (IP), when the system is launched). The amount of collateral posted (generally cash) determines the maximum debit cap. Payments not covered are queued (or rejected in the case of IP). Participants can increase their debit cap during the day by providing additional liquidity.

¹ The launch of IP in the euro area began with the RT1 system operated by EBA Clearing in November 2017.

Source: ECB, Banque de France, Bank of England.

Box 8: Risk management in instant payment systems

Liquidity risk and credit risk are covered differently depending on the type of settlement used by the system concerned.

- **Deferred net settlement:** participants' commitments can be covered by a prefunding arrangement (see above), whereby participants must deposit funds in their accounts at the settlement institution to set their maximum authorised payment capacity in the system.

This type of protection mechanism is used notably for European instant payment systems such as RT1 operated by EBA Clearing. The system interacts with TARGET2 via a specific procedure (ASI6 Real Time), so that collateral can be constituted in central bank money on a technical account opened in TARGET2 before transactions are processed in the system. Each participant can allocate liquidity to this account from their TARGET2 account. The amount allocated determines the participant's maximum payment capacity for instant payments. If this maximum capacity is reached, the participant must deposit additional funds in their prefunding account. If they fail to do so, the participant will no longer be able to settle payment instructions on their account.

- **Real-time settlement,** transactions need not be covered by collateral or prefunding amounts because payments are settled on a gross basis in real time: funds are first transferred between participants' RTGS accounts. If a participant has insufficient funds in their account to settle a payment order, the order is rejected. The beneficiary's account is credited only after funds have effectively been transferred in central bank money between the originator's PSP and the beneficiary's PSP. This type of system prevents the accumulation of a net debit position that can pose a financial risk in a deferred settlement system.

4. The Eurosystem's oversight framework for retail payment systems

4.1. Reasons for the oversight of retail payment systems

The oversight of payment systems is one of the major roles assumed by a central bank, as these systems are essential for the smooth functioning of the capital markets and the economy (see Chapter 18). Retail payment systems remain crucial for the functioning of most economic activities, being widely used for payment transactions between economic agents, individuals, companies and public administrations. Effective oversight promotes safe, efficient systems that facilitate the circulation of money and sustain confidence in the economy.

In their oversight capacity, central banks pay close attention to the financial and operational risks associated with retail payment systems. The deferred net settlement processes generally used by retail payment systems create liquidity risk and credit risk, which must be monitored and mitigated by the system's operator and/or participants. While advances in information technology have enabled operators to process increasingly large volumes of transactions with ever diminishing unit costs, they also require systems to have greater operational resilience. If an operating incident is not resolved speedily, it can prevent a great many transactions from being processed. In view of this, operational risk management and a system's ability to resume normal operations swiftly after an incident are crucial.

In the Eurosystem, the oversight of payment systems is arranged in accordance with the subsidiarity principle. As a rule, operators of euro area payment systems are overseen by the national central bank of the jurisdiction in which their system operates (the national anchor). For systems operating in several jurisdictions, however,

oversight responsibility falls to the authority of the country in which the operator is domiciled. In addition, by a decision of the Council of Governors of the ECB, the Eurosystem can assign oversight of a pan-European payment system directly to the ECB. Therefore, under the national laws of European countries, most payment systems (including those which process retail transactions) are overseen by their national central banks. One exception is the STEP2-T system (operated by EBA Clearing, domiciled in France), which, in view of its pan-European dimension, is overseen by the ECB.

As means of payment become increasingly integrated, there is a growing trend towards cross-border transactions in the euro area and the Eurosystem must adapt its oversight framework accordingly. Although its oversight is decentralised, by implementing this harmonised framework it ensures that common requirements are enforced consistently across the euro area.

4.2. Common principles

By a decision of 3 June 2013, the Council of Governors of the ECB adopted the "Principles for Financial Market Infrastructures" (PFMI, see Chapter 18) as the Eurosystem's oversight standards for all types of financial infrastructure operating in the euro area. The key features of the PFMI are geared towards strengthening requirements for the management of credit risk and liquidity risk, and recognising non-financial risks such as general business risk and the risk associated with tiered participation arrangements.

The PFMI apply to euro area payment systems in varying degrees, depending on the importance of the system concerned. In the Eurosystem's oversight framework, payment systems are categorised according to three levels of importance: SIPS, PIRPS and ORPS. In practice, all the PIRPS and ORPS in the euro area are retail payment systems. There are four SIPS: two retail

Box 9: Principles applicable in the euro area, based on the payment system's importance

Principles	SIPS	PIRPS	ORPS
Total number of applicable principles	18	12	9
Principle 1: Legal basis	X	X	X
Principle 2: Governance	X	X	X
Principle 3: Framework for the comprehensive management of risks	X	X	X
Principle 4: Credit risk	X		
Principle 5: Collateral	X		
Principle 6: Margin			
Principle 7: Liquidity risk	X		
Principle 8: Settlement finality	X	X	X
Principle 9: Money settlements	X	X	
Principle 10: Physical deliveries			
Principle 11: Central securities depositories			
Principle 12: Exchange-of-value settlement systems	X		
Principle 13: Participant-default rules and procedures	X	X	X
Principle 14: Segregation and portability			
Principle 15: General business risk	X	X	
Principle 16: Custody and investment risks	X		
Principle 17: Operational risk	X	X	X
Principle 18: Access and participation requirements	X	X	X
Principle 19: Tiered participation arrangements	X		
Principle 20: FMI links			
Principle 21: Efficiency and effectiveness	X	X	X
Principle 22: Communication procedures and standards	X	X	
Principle 23: Disclosure of rules, key procedures and market data	X	X	X
Principle 24: Disclosure of market data by trade repositories			

Source: ECB.

payment systems – STEP2-T and CORE(FR) – together with TARGET2 and EURO1.

This classification is based on four criteria: (i) the volume and value of transactions processed by the system, (ii) the system's share of the national and European market, (iii) the amount of cross-border traffic and (iv) use of the system to settle other systems' transactions, where appropriate. On this basis, the Eurosystem adapted its requirements to the importance of each system. As a result, SIPS must comply with all the principles set out

in the PFMI and transposed in the SIPS Regulation, while PIRPS and ORPS need only comply with a sub-set of principles (12 of the 18 principles applicable to payment systems for PIRPS and 9 of the 18 principles for ORPS).

For SIPS, the Eurosystem transposed all the PFMI in ECB regulation 795/2014, which came into force on 12 August 2014 and was revised on 16 November 2017. This regulation makes compliance with the PFMI requirements mandatory and gives the overseer powers of enforcement

over the operator. The ECB therefore has the power to sanction payment system operators that breach the regulation's requirements (see Chapter 18).

4.2.1. Cooperation between Eurosystem central banks in their oversight of payment systems

To improve the implementation of the principles and ensure that all systems are treated equally, the Eurosystem took measures to ensure cooperation between the national oversight authorities. In practice, assessment schedules are aligned and assessments follow a common methodology, which was revised in June 2018¹⁸ in line with the revised regulation on SIPS. The assessment reports prepared by the national overseers are based on a common framework and are subject to peer reviews. Issues that could potentially be interpreted differently by the various oversight bodies are discussed at the level of the Eurosystem to achieve a common interpretation. Given the particular importance of SIPS, the Eurosystem receives regular reports on their activities

(changes, incidents, assessment and monitoring of action plans, etc.) from the national oversight authority.

4.2.2. The role of the Banque de France and measures it has taken

Pursuant to the provisions of the French Monetary and Financial Code,¹⁹ the Banque de France ensures the oversight of payment systems in the Eurosystem's framework. In particular, the Banque de France is responsible for overseeing the French retail payment systems CORE(FR) and, more recently, SEPA.EU. Being qualified as a SIPS, the CORE(FR) system must regularly report on its activities to the Eurosystem's authorities.

As the company STET operates the French payment system and provides critical services to the Belgian retail payment system (CEC), with the two user communities sharing the same technical platform, the Banque de France and the Banque Nationale de Belgique have signed an agreement to facilitate information exchanges and the coordinated implementation of oversight requirements.

18 <https://www.ecb.europa.eu/pub/pdf>

19 Article L.141-4.

CHAPTER 11

Central counterparties

Updated on 30 September 2020

Central counterparties (CCP) have become a cornerstone of the financial market infrastructure landscape, mainly since the development of the derivatives market on the one hand and the 2008 financial crisis on the other. A central counterparty plays a very important role by interposing itself between the counterparties to a transaction.

Conceptually, the notion of a central counterparty must be clearly distinguished from that of a clearing house, whose main function is to calculate a net balance from a set of individual (or “gross”) transactions. The existence of these clearing houses, which originally were limited to clearing payment flows, goes back more than two centuries.

However, these infrastructures have evolved and nowadays, in the field of financial instruments, the vast majority of clearing houses also fulfil the role of central counterparty, and vice versa. The current practice is therefore to use either term to designate an infrastructure that offers both services. In this chapter, the term “CCP”¹ refers to a clearing house that acts as a central counterparty.

CCPs play a very specific role in the processing chain of securities and other financial instruments (including derivatives): they replace the seller and the buyer and are thus a counterparty to each of them. They are therefore at the heart of the transaction processing system for financial instruments. During the financial crisis of 2008, CCPs demonstrated strong resilience and effectively implemented their default management mechanisms, thus preventing contagion to the other financial players.

The increased role that regulators have assigned to CCPs since the crisis, especially with respect to derivatives, has been accompanied by transparency requirements and the establishment of an even more stringent international risk management

framework, which has been transposed at European Union level into Regulation (EU) No 648/2012 of 4 July 2012 on OTC derivatives, central counterparties and trade repositories,² called “EMIR” for “European Market Infrastructure Regulation”.

The standards and the regulatory framework for CCPs are still evolving. The EMIR framework was amended twice in 2019, first with regard to the requirements applicable to CCPs (EMIR “Refit”) and second with regard to the supervisory architecture for EU and third-country CCPs (EMIR 2), which was complemented by the drafting of the “Level 2”³ texts published in September 2020. Furthermore, the forthcoming European Regulation on CCP recovery and resolution,⁴ aiming at ensuring the continuity of the CCPs’ critical services after exhaustion of pre-funded resources, was agreed upon by the EU co-legislators in July 2020, and should be published in the EU official Journal by end-2020.

1. The history of clearing

As a preliminary point, the clearing of payment orders should be clearly distinguished from the clearing of financial instruments and derivatives. The clearing of payment orders is dealt with in detail in the chapters of this book dedicated to payment systems.⁵ It consists of the netting of flows (and thus represents clearing in its narrowest meaning as defined above), whereas the “clearing” of financial instruments (as defined above) also includes the interposition of a central counterparty, which becomes the counterparty for all transactions recorded in its books: the central counterparty replaces each buyer in the contract with the seller and replaces each seller in the contract with the buyer.

The history of clearing thus falls into two stages; clearing initially emerged in its simplest form, which was then accompanied by the interposition mechanism of the central counterparty.

1 As is the case for the acronym “CSD” (see Chapter 12), the acronym CCP has become the term used most commonly by professionals, even in French.

2 <https://eur-lex.europa.eu/legal-content/EN> (English version). <https://eur-lex.europa.eu/legal-content/FR> (French translation).

3 Commission delegated regulations, adopted following technical advice from the European Securities and Markets Authority (ESMA) as provided for under the European market infrastructure regulation (EMIR) (referred to as “Level 1” as they are set down in European legal documentation).

4 Resolution occurs when the infrastructure is defaulting or close to failure and is then managed by a resolution authority with broad powers to mobilise financial resources and restructure such infrastructure.

5 See Chapters 6 and 10.

1.1. Initially a simple flow clearing function

Clearing of bank debts managed by a central body appeared in 1587, in Venice, with the first public Venetian bank, Il Banco de la Piazza del Rialto, replaced in the 17th century by Il Banco del Giro, which was a true clearing house.

The practice gradually spread to England and Scotland; London became the main European clearing centre for national payments at a very early stage. In 1773, a clearing house opened in London, and of the City's 36 banks at the time, 31 became members. Earlier, in Scotland, seven Scottish banks had arranged to set up a clearing house in Edinburgh to clear each other's claims and debts. Net balances were calculated on a daily basis (netting).

As early as 1826, the banks of the North of England met every week to exchange sight drafts with each other to settle their net balances with the Bank of England.

In the United States, a clearing house for clearing contracts, but with no interposition, was only created in 1883 by the Chicago Board of Trade (CBOT), whose objective was then to reduce transaction costs related to financial instruments; the clearing house issued margin calls and settled cleared contracts. The CBOT played a leading role in the management of default risk, but the clearing house did not replace the parties to the transaction.

1.2. Nowadays the clearing of flows and the interposition of the clearing house are central features

The interposition mechanism of the clearing house as a central counterparty emerged with the growth of the derivatives markets. According to Moser,⁶ full and complete systems including flow clearing and clearing house interposition

in over-the-counter derivatives markets appeared in Europe in the 19th century. This was the case in France with the *Caisse de Liquidation*, and in Germany with the *Liquidationkasse*.

In France the *Caisse de Liquidation* interposed itself on the conclusion of a transaction between the buyer and the seller of a sugar futures contract, by replacing the first contract with two new contracts (with each of the counterparties to the transaction). The two counterparties to the transaction then no longer had any direct relationship with each other, but with the *Caisse de Liquidation*.

These central counterparty systems were replicated in the United States as early as 1891. In 1924, the Board of Trade Clearing Corporation kept as collateral all the securities of its members, who were then accountable to each other, introducing the concept of risk mutualisation. It guaranteed the contracts and imposed rules on the liquidity, capital and activity of said members.

1.3. The implementation of the clearing obligation for derivatives and the incentives for centralised clearing

Nowadays, CCPs clear all kinds of financial transactions (see Chapter 5): in cash equities, debt securities, repurchase agreements (repos), spot foreign exchange transactions and derivatives transactions (swaps, options, commodity derivatives, etc.). However, in most jurisdictions the central counterparty clearing is limited to derivatives.

This clearing obligation was born out of lessons learned from the 2008 financial crisis (in particular the bankruptcy of the US bank Lehman Brothers), which highlighted the lack of transparency and regulation of OTC derivatives markets.

⁶ Moser JT: "Origins of the Modern Exchange Clearing House: A history of early Clearing and Settlement Methods at Futures Exchanges" Research department, Federal Reserve Bank of Chicago. April 1994.

In response to the financial crisis, the G20 adopted a Roadmap at its Pittsburgh Summit in September 2009, which included a commitment to submit standardised financial derivative instruments to centralised clearing because it was considered safer than bilateral clearing.⁷ In response to this commitment, most jurisdictions have implemented a regulatory clearing obligation for derivatives, provided they are sufficiently standardised and liquid.

The Progress Report of the Financial Stability Board (FSB), revised in October 2019,⁸ states that of the 24 jurisdictions of the Financial Stability Board, 21 have implemented a clearing obligation.

In the European Union, Article 4 of EMIR introduces, for specific categories of OTC derivatives, a clearing obligation via central counterparties that have been authorised to clear these categories of OTC derivatives.

The EMIR delegated regulation of 6 August 2015⁹ covers the clearing obligation for interest rate derivatives (Interest Rate Swaps – IRS). The obligation applies to standardised interest rate swaps with high volumes and liquidity and good pricing information. These are simple interest rate swaps (fixed-to-float), basis swaps, forward rate agreements (FRA) and overnight index swaps (OIS), denominated in the four most commonly cleared currencies (USD, EUR, GBP, JPY). The delegated regulation of 10 June 2016¹⁰ adds fixed-to-float interest rate swaps and forward rate agreements denominated in NOK, PLN and SEK.

Contracts subject to the clearing obligation share the following characteristics:

- (i) they are single-currency;
- (ii) they include no optionality clause;
- (iii) they have a constant or variable notional (predictable), but not a conditional notional (unpredictable).

The Dodd–Frank Act (DFA) in the United States, signed into law on 21 July 2010, introduces a clearing obligation for all instruments defined as “swaps” or

“security-based swaps” under the rules published by the CFTC¹¹ and the SEC.¹²

All of the DFA’s implementing rules for clearing have been published and are in force. They apply to foreign clearing houses registered with these two entities (which is a requirement for authorisation to provide services to US clients). Accordingly, the CFTC¹³ launched a draft reform programme in 2019 of the derivatives clearing organisation status as part of its broader KISS (“Keep It Simple, Stupid”) project. According to data from the Bank for International Settlements, at 31 December 2018, 76% (in volume) of single-currency interest rate swaps entered into bilaterally were centrally cleared; the proportion was 54% for OTC credit derivatives.

This clearing obligation in accordance with EMIR also applies to credit default swaps (CDS). In this respect, several types of index contracts are subject to the clearing obligation under the CFTC’s rules since they came into force in February 2013. In the European Union, the delegated regulation of 1 March 2016¹⁴ covers the clearing obligation for credit derivatives. The instruments covered are certain European CDS indices.¹⁵

Since the entry into force of Regulation (EU) 2019/834 of 20 May 2019 amending EMIR (“EMIR Refit”), the clearing obligation has been slightly alleviated. A financial counterparty is now subject to the clearing obligation only if its OTC derivative positions exceed, at its Group level, one of the two following thresholds: EUR 1 billion for credit or equity derivative contracts and EUR 3 billion for other categories (foreign exchange, interest rate and commodity derivatives).

Furthermore, regulators have been very careful to create the right incentives to encourage centralised clearing of derivatives, in line with G20 commitments to make OTC derivatives transactions (that are entered into and cleared bilaterally i.e. without going through a CCP) safer and

7 “Improving over-the-counter derivatives markets: All standardised OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate, and cleared through central counterparties by end-2012 at the latest”

8 <http://www.fsb.org/wp-content>

9 Commission Delegated Regulation (EU) 2015/2205.

10 Commission Delegated Regulation (EU) 2016/1178.

11 Commodities and Futures Trading Commission.

12 Securities and Exchange Commission.

13 Reference: 12th Progress Report of the Financial Stability Board.

14 Commission Delegated Regulation (EU) 2016/592.

15 iTraxx Europe Main 5Y and iTraxx Europe Crossover 5Y.

to increase the transparency of financial markets. To this end, in September 2013 the Basel Committee and IOSCO published standards for margin exchanges for bilateral transactions that are not centrally cleared. These standards were updated in 2015 and later in July 2019.¹⁶ In the European Union, the corresponding technical standards came into effect in January 2017 for initial margins, and in March 2017 for variation margins. Depending on the nature of the counterparties and the size of the outstanding amounts, the timetable for implementing this obligation is staggered.

1.4. The desirability of setting up a CCP

In the light of the growth of derivatives markets, and in particular over-the-counter derivatives, and beyond the instruments that are subject to a clearing obligation, the question of the desirability of establishing a CCP has become critical.

The Principles for Financial Market Infrastructures (PFMI, see Chapter 18) recommend assessing the desirability of setting up a CCP. In particular, given the costs incurred, the establishment of a CCP is not appropriate in all markets: establishing the kind of robust risk-management system that a CCP must have generally requires a significant initial investment and not insubstantial ongoing expenses.

Annex C of the PFMI contains a number of recommendations, one of which (Recommendation 4) on CCPs¹⁷ states that each market should assess carefully the balance of the benefits and costs of a CCP. This balance will depend on factors such as the volume and value of transactions, trading patterns among counterparties, and the opportunity costs associated with settlement liquidity. A growing number of markets have determined that the benefits of implementing a CCP outweigh the costs. In addition, in some cases, creating a CCP may attract international investors who would be reluctant to be the counterparts of little-known local players.

2. The role and characteristics of central counterparties

The processing of transactions by a CCP typically includes the receipt and recording of individual transactions from the trading system or a matching platform, the calculation of participants' net positions vis-à-vis the CCP, the management of the risk management systems and, lastly, the transfer of instructions to the settlement system when the financial instruments are deliverable. In the case of derivatives, there is no settlement of instruments: there is only an exchange of collateral in the form of securities or cash between the counterparties to the transaction and the CCP.

A CCP plays a fundamental role as a risk management mechanism and reduces the liquidity needs of the participants (also known as clearing members), thereby benefiting the financial markets as a whole. The CCP has clearing member default management procedures and a default loss allocation mechanism, including dedicated pre-funded financial resources. These are discussed in detail later in this chapter.

The CCP therefore calculates a net position per participant, by netting all transactions (for a given type of underlying), all counterparties combined: the primary effect of this netting is to reduce liquidity requirements for collateral deposited as a financial guarantee (securities and cash).

The diagrams below illustrate the mechanism for reducing the flow of payments and delivery of assets (securities or commodities depending on the CCP cleared market segment).

2.1. The interposition of the CCP: the legal mechanisms of novation and the open offer

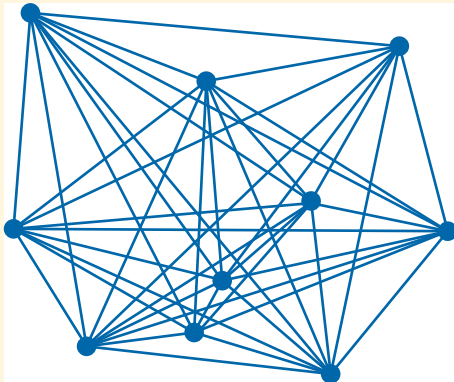
The mechanisms described below apply to both conventional financial instruments (securities, repos, etc.) and derivatives (interest rate swaps, foreign exchange

¹⁶ <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD635.pdf>

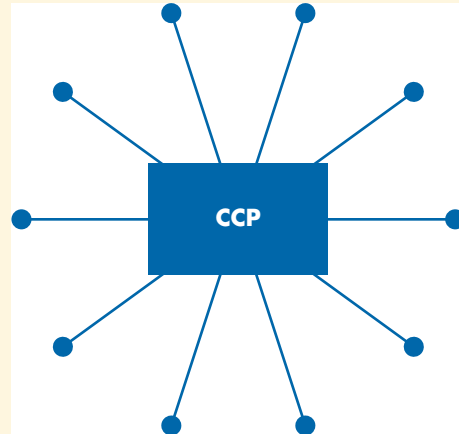
¹⁷ This recommendation was itself taken from the "Recommendations for Central Counterparties" published in November 2004 by the CPSS (now CPMI) and IOSCO committees (see Chapter 18, Section 1.1.3).

Cleared transactions vs uncleared transactions

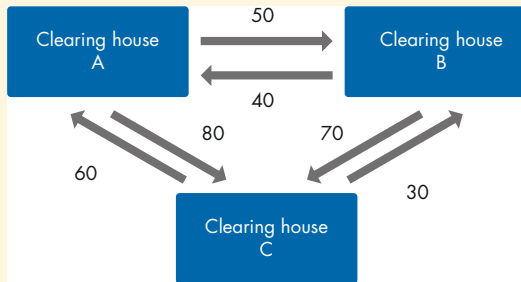
Uncleared transactions



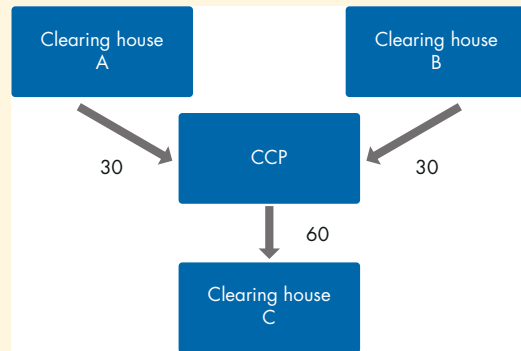
Cleared transactions



Pre-clearing situation



Post-clearing situation



swaps, equity derivatives, commodity derivatives, etc.).

As mentioned in the introduction to this chapter, “central counterparty clearing (CCP)” refers to mechanisms in which the clearing house, in addition to its technical function of calculating the net balances of the participating members, legally replaces the initial seller and buyer and guarantees the successful completion of transactions. It is said that the central counterparty becomes the buyer to every seller and the seller to every buyer. The purpose of this substitution is to prevent the default of a member from directly affecting the clients of the defaulting member and other members. The central counterparty takes over the obligations (payment, delivery, etc.) of the

defaulting party vis-à-vis its other members. Some CCPs may not perform the technical function of calculating net balances: in this case, they simply guarantee the successful completion of transactions and manage the associated risk management systems.

The CCP’s interposition plays a fundamental role for both market participants and overall financial stability. With respect to market participants, (i) the CCP simplifies the management of their risks by becoming the sole counterparty to financial transactions, instead of multiple counterparties, and (ii) it mitigates operational risk. The CCP must therefore meet very strict security requirements, e.g. collateralisation of all transactions, margin calls, pre-funded and calibrated resources,

default management procedures, highly regulated investment policy, etc. and be supervised by the competent authorities. Such strict requirements give the CCP the necessary robustness. The role of CCPs is, lastly, crucial from a financial stability perspective because, by centralising all transactions, they allow a clear overview of the positions of the counterparties to all transactions, and because they are designed and equipped to manage extreme but plausible market events, including the failure of a clearing member. “Circuit breakers” (see below) prevent contagion to other market participants.

The interposition of the CCP can be based on various legal mechanisms, mainly novation, used mainly in France (LCH SA) and in the United Kingdom, and the “open offer” used for example in the Netherlands (Ice Clear Netherlands), Germany (Eurex Clearing AG) and Italy (Cassa di Compensazione & Garanzia).

Through the legal mechanism of novation, the CCP takes over the rights and obligations of the clearing members. In France novation is defined in article 1271 of the Civil Code. In the case of a CCP, the CCP replaces the parties to the initial transaction in their rights and obligations. The CCP then becomes the seller to the initial buyer and the buyer to the initial seller.

The legal mechanism of the “open offer” is slightly different: the CCP interposes itself between the buyer and the seller immediately after they have agreed on the terms of the contract. In other words, under the open offer, the buyer and the seller are deemed never to have had a contractual relationship.

In both the novation and the open offer mechanism, the CCP finds itself as a counterparty to the original buyer and seller. The difference between the two regimes lies in the exact moment when the guarantee is taken over by the CCP – at the time of execution for the “open offer” and at the time of receipt of the transaction

by the CCP for the novation. This may be of importance in the case of technical transmission problems between the trading platform and the CCP.

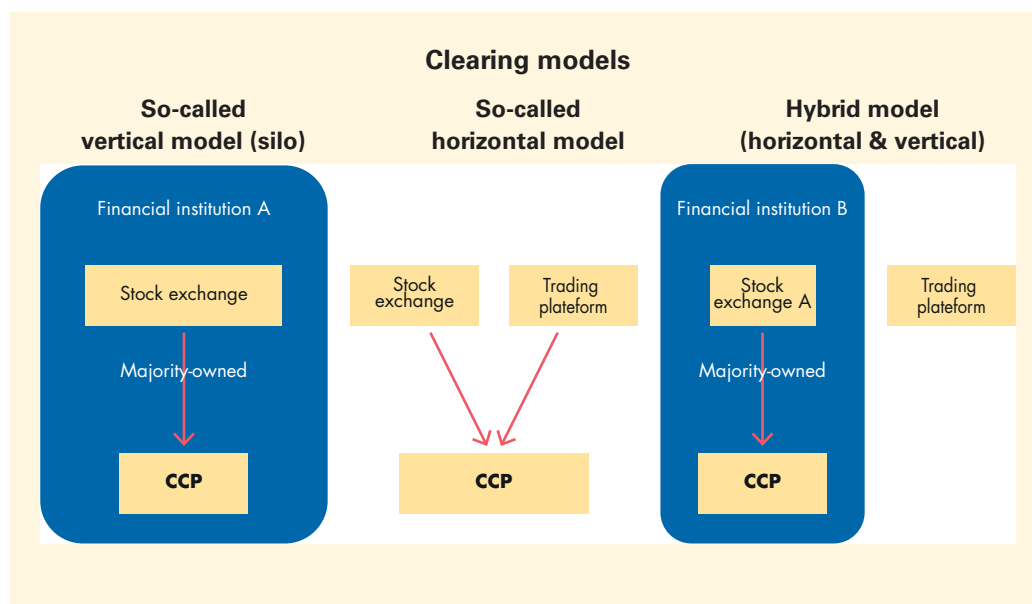
2.2. The different organisation models of the clearing market

CCPs are required to clear both transactions from regulated markets (exchanges) and trading venues as well as over-the-counter transactions. In the first case, we are dealing with what it is commonly referred to as “listed” products, while in the second case we have bilateral transactions between two counterparties – for example on repos, interest rate swaps or credit.

2.2.1. Mono-product clearing versus multi-product clearing

Some CCPs only offer a clearing service for one type of financial instrument. This is the case, for example, of the Dutch CCP EuroCCP, which only clears cash equity transactions. This is called a mono-product clearing service. In general, mono-product central clearing is provided by smaller CCPs. The main limitation of this model is that it does not allow participants active in more than one market to benefit from a one-stop clearing of their transactions.

The larger CCPs offer clearing services for various financial instruments, e.g. listed derivatives, OTC derivatives, sovereign debts, equities: this is the case in Europe, with notably Cassa di Compensazione & Garanzia, Eurex Clearing AG, ICE Clear Europe, LCH SA, LCH Ltd and Nasdaq OMX. The advantage of being able to offer clearing for several products is to be able to clear positions of products or currencies that benefit from a stable and significant correlation (see Section 3.1.4 developments on portfolio margining), which translates into lower margins and consequently savings in collateral for clearing members. Another economic advantage lies in the pooling and sharing of infrastructures, services and applications with fixed costs between the various market segments cleared by the CCP.



2.2.2. Relationship between the CCP and the trading venues

In the context of clearing instruments traded on trading platforms, there are different models for the relationships between the CCP and the trading venues. These different organisational models are described below.

The so-called vertical model (or silo) is a model in which clearing services are provided by an infrastructure belonging to a group that includes the trading platform, the clearing infrastructure and, where applicable, the settlement infrastructure. The vertical model entails an exclusive relationship between the market and the CCP, which is in general the economic complement of other functions, in particular trading. This is how the German group Deutsche Börse is organised.

The so-called horizontal model is a model in which trading platforms do not have a majority capitalistic link with the infrastructure that clears trades. The CCP bases its business model exclusively on clearing revenues and seeks to clear trades entered into across multiple trading venues. This is the case for example of the Dutch CCP

EuroCCP, held in 2020 by the Chicago Board Options Exchange (CBOE) and which, at the beginning of 2019, cleared transactions originating from nearly thirty trading platforms, including multilateral trading platforms such as those of Nasdaq OMX, Alternext, Euronext, Traiana, Turquoise, Cboe Europe Equities, Equiduct, etc.

The so-called hybrid model (both horizontal and vertical) is a model in which there is a capital link between the trading platform and the clearing infrastructure, but which nevertheless allows other trading infrastructures to benefit from the clearing services of the clearing infrastructure. The French CCP LCH SA is one example.

2.2.3. Interoperability

A CCP may participate in another CCP through the interoperability mechanism. Interoperability is an organisational model for linking market infrastructures: applied to CCPs, this arrangement allows the orders of a member active in one of the two CCPs to be matched anonymously with those of a member active in the other CCP without either of them needing to be a member of both CCPs. Interoperability

Box 1: The case of LCH SA

The French CCP LCH SA (trading name of Banque Centrale de Compensation) is the French subsidiary of the UK group LCH Group Limited. From May 2013, the London Stock Exchange Group (hereinafter “LSEG”) held the majority of the shares of LCH Group Limited. In October 2018, it increased its stake in LCH Group Limited by 15.1% to nearly 82%. As LSEG does not constitute a financial group, it is not supervised by the French authorities.

LCH SA is headquartered in Paris and has branches in Amsterdam and Brussels, as well as a representative office in Portugal.

The clearing services provided by LCH SA mainly concern euro-denominated products.

- Securities traded on Euronext regulated markets: cash equities and convertible bonds;
- Derivatives traded on Euronext regulated markets: equity derivatives (indices and single stocks) and commodities;
- Transactions in government debt (France, Italy, Spain, Germany and Belgium): cash purchases and sales and repurchase agreements.
- Derivatives traded on OTC markets: CDS on indices of referenced names and single name issuer CDS.

The CCP thus clears the products traded on the Equiduct, Turquoise Luxembourg Stock Exchange, and repo trading platforms (MTS, Brokertec, Tullett Prebon).

LCH SA has the status of clearing house pursuant to Article L. 440-1 of the French Monetary and Financial Code and, as such, acts as a central counterparty for its clearing members.

LCH SA is also authorised as a credit institution by the French Prudential Supervision and Resolution Authority (ACPR). Due to its status as a credit institution, LCH SA is subject to prudential banking requirements and has access to the Eurosystem refinancing operations.

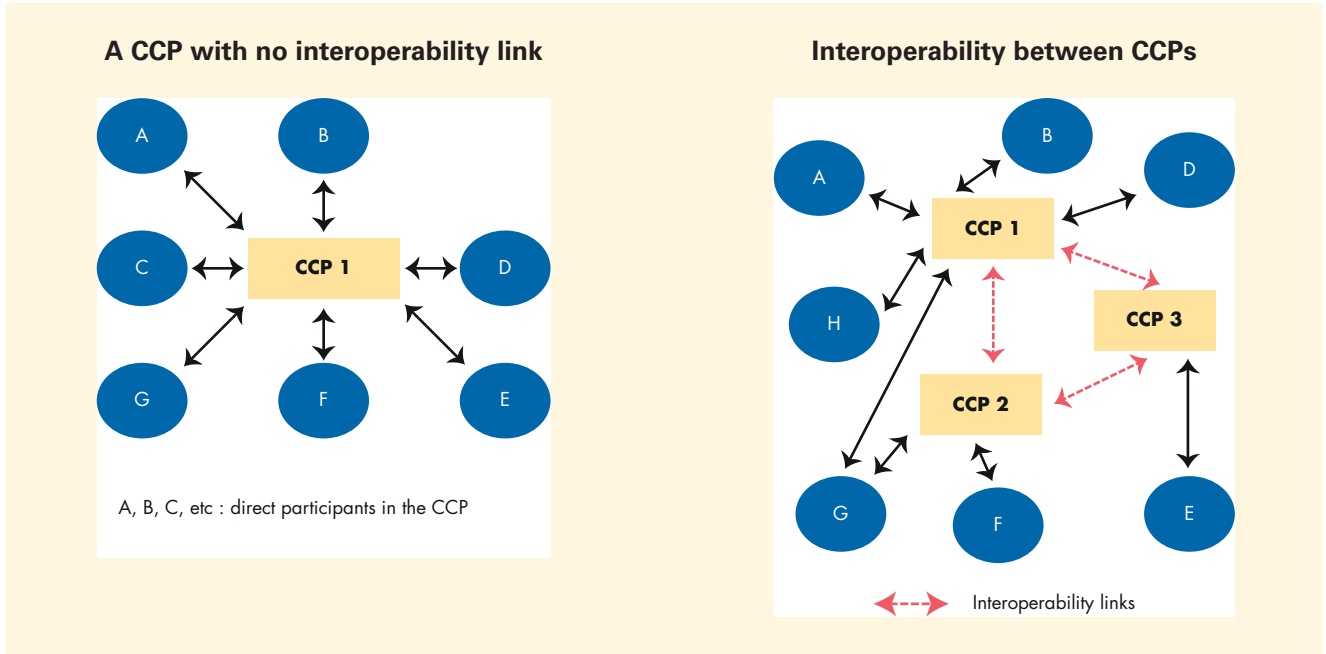
Within the framework of the European Directive 98/26/EC on settlement finality (hereinafter referred to as the “Finality Directive”), LCH SA has been designated by the French Ministry of Finance as a system notified to ESMA.¹ This status allows it to benefit from the provisions of the “Finality Directive”² by making irrevocable and binding on all participants in said system the clearing of bank or financial claims in the event of collective insolvency proceedings against one of the participants. This directive also guarantees the transfer of ownership of the financial instruments, i.e. the collateral delivered to the CCP by the participants as protection for their positions.

The French CCP, as a financial market infrastructure, is supervised by the ACPR, the Autorité des marchés financiers (Financial Markets Authority – AMF), and the Banque de France. The three authorities have been designated as competent national authorities by the French State pursuant to EMIR.

The authorisation of the French CCP under the provisions of EMIR was the subject of an evaluation conducted in April 2014 by the three competent national authorities, which found that LCH SA complies with the requirements of EMIR. In this context, the ACPR authorised LCH SA under EMIR on 22 May 2014.

¹ ESMA, European Securities and Markets Authority.

² Directive 98/26/EC of the European Parliament and of the Council of 19 May 1998 on settlement finality in payment and securities settlement systems.



is defined in PFMI Principle 20 (see Chapter 18) as a set of operational and contractual agreements between two or more infrastructures, directly or through an intermediary. A financial market infrastructure can therefore link with (i) a similar infrastructure to extend its services to additional financial instruments or to new markets – this is interoperability – or (ii) a different market infrastructure, e.g. a CCP for securities markets may establish and use a link with a central depository to receive and deliver securities.

Interoperability is only possible when the two CCPs in question have entered into agreement, thus becoming counterparts to each other. Interoperability involves controlling the systemic risk that would be triggered by a failure of the CCP with which the link has been established. Determining the additional resources needed to cover this risk therefore requires the consideration of instability hypotheses of inter-CCP positions.

In Europe the links between CCPs are as follows:

- CC & G and LCH SA: Italian sovereign debt;
- Euro CCP and LCH Ltd: equity securities;

- Euro CCP and Six x-Clear: equity securities;
- LCH Ltd and Six x-Clear: equity securities;
- LCH Ltd – Six x Clear (Norwegian subsidiary): equity securities and equity derivatives.

In this context, each CCP must establish a general framework to detect, monitor and manage the risks that may result from interoperability.

EMIR strictly regulates interoperability arrangements, which should only relate to transferable securities and money-market instruments – OTC derivatives are excluded, since the European regulator considers that they can not be cleared in the context of interoperability¹⁸ given the complexities involved in interoperability arrangements. It should be noted that interoperability introduces a risk of counterparty default between CCPs, as opposed to a simpler structure in which a trading platform is linked separately to each CCP. Linking CCPs with interoperability arrangements means expanding the interdependencies between them, in this case to the clearing members of the other CCP.¹⁹ This can increase the systemic risk.

18 EMIR Recital 73: “[...] addition, given the additional complexities involved in an interoperability arrangement between CCPs clearing OTC derivative contracts, it is appropriate at this stage to restrict the scope of interoperability arrangements to transferable securities and money-market instruments.”

19 OTC derivatives: new rules, new actors, new risks, Banque de France, Financial Stability Review No. 17, April 2013 <https://publications.banque-france.fr/en/april-2013>. “CCPs as instruments of stability and risk mitigation” by J. Aigrain.

The principle of segregation of positions and assets (see Section 3 of this chapter) is also applicable to interoperability arrangements.

EMIR contains special provisions relating to the risk management of two CCPs bound by an interoperability agreement. In the context of an interoperability arrangement, the two CCPs do not contribute to their respective default funds (see Section 3.1.5 below): this effectively limits the risk of contagion between the two infrastructures, insofar as the resources of the surviving CCP are not affected by the losses of the defaulting CCP. Risk coverage is therefore done only through an exchange of margins between the two CCPs (including the possibility for each CCP to call additional margins).

Beyond interoperability, the analysis of the interdependencies between CCPs is an important point of attention for regulators, particularly within the framework of counterparty default risk stress tests coordinated by ESMA,²⁰ but also through default simulation exercises conducted by European CCPs and their respective regulators to evaluate the interconnections of their common direct participants (February 2016) and international and European other streams of work (BIS, ESRB).²¹

In 2017 the Bank for International Settlements (BIS) also published a study dedicated to the analysis of interdependencies related to central clearing;²² the roll-over of the survey in 2018 to include data up to October 2017 showed that the study's findings remained valid.²³ Using a sample of 26 CCPs worldwide, the study highlighted the high level of interconnections due to common participants (see Chapter 17). It also revealed strong interdependencies among CCPs (without these necessarily being interoperable) and between CCPs and other market participants – including custodians, settlement agents, liquidity providers and investment services providers – some of which are also clearing members. Work

in this area, which highlights the highly systemic nature of CCPs, is ongoing.

3. Mechanisms to protect CCPs against the risks to which they are exposed

Access to CCPs must be fair and open: the membership criteria for joining a CCP must therefore be non-discriminatory and objective. The CCP must strike a balance between this principle and the access criteria that constitute its first line of defence. A CCP is indeed very much exposed to credit risk if one of its participants defaults. By becoming the buyer to the seller and the seller to the buyer, the CCP effectively assumes credit risk on each counterparty.

3.1. The CCP's protection mechanisms

The CCP's protection mechanisms against credit risk apply as soon as the membership criteria are laid down. The other tools available to the CCP include individual pre-funded resources (initial margin and variation margin) and pooled funds (default funds).

3.1.1. The criteria for direct membership

The criteria for direct membership of clearing members or CCP participants is the first line of defence in a CCP's risk management. The criteria must be objective and sound. The criteria mainly relate to the scope of the participant's business, its status, solvency, ratings, etc.

To date, there are no regulatory requirements at EU level regarding the quality of clearing members, as EMIR does not include any provisions in this respect; these criteria are therefore the responsibility of each Member State.

In France, participants' access to a CCP is governed by article L. 440-2 of the Monetary and Financial Code: the CCP participant

20 European Securities Markets Authority or ESMA.

21 European Systemic Risk Board.

22 "Analysis of central clearing interdependencies" <http://www.fsb.org/wp-content> (July 2017).

23 <https://www.bis.org/press/p180809.htm>

must be a legal person and must belong to one of the following categories: (i) credit institution, (ii) investment firm, (iii) supra national entities (international financial institutions or government agencies and controlled enterprises operating under a State guarantee). The PACTE Law, before Parliament at the time of writing, provides for the conditional possibility of direct participation in a CCP to be extended to funds and insurers. These strict access conditions related to the status of the participants ensure the high quality of direct participants in the CCP and thus to strengthen the system for pooling losses in the event of default.

In addition to the national regulatory or legislative provisions with which they must comply, counterparties to a transaction must subscribe to a membership contract with the CCP and meet the membership criteria defined by the latter. These counterparties then become participants (or “Clearing Members”) of the CCP. Participants then benefit from clearing services in exchange for the payment of fees and of margins as well as a contribution to a default fund to protect against a possible default. Each member can carry out transactions on their own account, but also transactions on behalf of clients. These clients are usually smaller institutions or do not meet the requirements for direct membership of the CCP.

In accordance with the principle of segregation of positions and assets (see Section 4 of this chapter), CCPs must distinguish the positions and assets of a clearing participant from those of another clearing participant, and also from their own assets. Likewise, the clearing participant’s positions and assets must be distinguished from those of its clients.

Institutions that do not meet the eligibility criteria required by the CCP to become direct participants and clear their orders directly with the CCP are obliged to go through direct participants. These players are known as “indirect participants” or “clients.”

3.1.2. Indirect participation models

There are two models for indirect participation:

- the agency clearing model, which is predominant in the United States. Under this model, the direct participant in the CCP (referred to in the United States in the field of derivatives trading as a “Futures Commission Merchant” or FCM) is mandated by the client to guarantee and make its payments and/or deliveries. The client and the CCP have a direct link, with the client benefiting directly from the CCP’s performance guarantee through its FCM. The latter is responsible vis-à-vis the CCP for the client’s commitments;
- the so-called “principal” model is predominant in Europe. It is based on two separate legal relationships: this model implies that the clearing member has a contractual relationship with the CCP, it acts on its behalf and it sets up a “mirror” contract with the client. In the “principal” model, the client has exposure to the direct participant in the CCP and not to the CCP.

In both models, the CCP puts in place procedures to protect the assets of clients by distinguishing them from those of the direct participant to limit the risk of contagion of a default of the direct participant to its clients: this is called segregation (see Section 3.1.6 of this chapter). In addition, in the event of the default of a clearing member, the CCP must provide for the transfer of the client positions of this clearing member to another “non-defaulting” clearing member: this is called portability.

A hybrid model is currently being considered by several European CCPs, and is already in place in countries such as Germany. This direct access model is called “sponsored”. The model allows the client to become a direct counterparty to the CCP. The client has an agent who pays contributions to the default fund on its behalf, and who,

if necessary, is involved on behalf of its client in the management procedures of a default by a clearing member. Depending on the model envisaged, the agent can also act as paying agent for the client's transactions e.g. margin calls, collateral management, etc.). This model allows the client to have direct access to the CCP, without having to meet the strict requirements and access criteria as a clearing member, while enjoying lower margin requirements than if it were an indirect participant. From the point of view of the prudential requirements, this model allows the agent not to take into account the exposures related to the transactions and the margins of its client, for example for the calculation of its capital requirements.

3.1.3. Margins (or deposits)

The initial margin deposit, or initial margin, is deposited within the CCP (in the form of cash or highly liquid and safe assets). This initial margin corresponds to the estimated loss related to the drop in the market value of the defaulting member's position, in the event of a liquidation of the defaulting member's portfolio over a few days, assuming (i) adverse market conditions, and (ii) the absence of variation margins during this time span. It must cover any losses – with a probability of at least 99% under EMIR, and 99.5% for OTC derivatives – related to market changes on exposures during a liquidation period based on the cleared financial instruments and their liquidity. For example, initial margins assume a five-day liquidation period (pursuant to EMIR) for over-the-counter derivatives, which are deemed to be less liquid than listed derivatives, for which a liquidation period of two days has been assumed.

Variation margins are used to hedge the CCP's market risk related to changes in the value and risk of the positions of clearing members, based on market prices. The calculation of the variation margin is based on the difference between the market value of portfolio transactions at the time of the last valuation and their initial value, to cover the possible replacement

cost of transactions at their market value. Participants whose positions depreciate are called upon to pay variation margins. These are adjusted at least daily. Margin calls are made at least once a day, or even during the day if market volatility is high.

The CCP controls – at least several times a day – the adequacy of the margins it holds in the face of its exposure to risks. These controls typically focus on back-testing margin levels relative to members' portfolios. The objective of back-testing is to check ex-post that the level of pre-funded resources held by the CCP is sufficient to cover its exposure, based on the positions of the clearing members and the prices actually observed in the market. Back-testing allows the CCP to learn from any errors, and adjust the risk management model if needed. It is necessary to assess the method used and to validate the CCP's risk management model.

3.1.4. Portfolio margining

For a CCP, portfolio margining involves calculating an initial margin amount based on an estimate of the losses of a clearing member's portfolio by taking into account instruments that belong to one or more specific business segment(s) e.g. equity derivatives, CDS or repos.

Portfolio margining allows a CCP that concentrates the same type of instruments in multiple currencies, or different instruments with a significant correlation, to call lower initial margins, in the aggregate, from its clearing members than if the margins had been calculated instrument by instrument and/or currency by currency. This practice allows clearing members to deposit margin amounts that are significantly lower than would be required if the CCP estimated potential losses instrument-by-instrument or currency-by-currency.

In the European Union, the practice of portfolio margining is governed by Article 27 of EMIR Technical Standard 153/2013. For the record, according to article 27 of

Box 2: The special case of cross-margining

In a cross-margining agreement, two CCPs calculate a margin corresponding to the consolidated positions in each CCP of a common clearing member, thereby giving said clearing member a reduction in the margins called in the event of a negative correlation between the two portfolios. In a cross-margining agreement, the two CCPs agree on a common risk model and calculate the required initial margin based on the combined portfolios. The clearing member is therefore only called for a reduced amount reflecting the correlation between these two portfolios.

In practice there are two models for cross-margining agreements:

- The first model is integrated, which means that the cross-margining arrangement is managed by a single CCP.¹ The transactions for which margins are calculated under a cross-margining agreement are segregated on the same positions account (whatever the CCP with which they have been entered into). These positions are covered by margins that are calculated on the basis of the portfolio as a whole and held in a dedicated margin account. Margin and position accounts are managed by one of the two CCPs, who is the “administrator”. In the event of a participant’s default, both CCPs coordinate the default management processes (a margin calculation under a portfolio margining agreement assumes simultaneous liquidation of all relevant positions). Any losses are absorbed first by the dedicated margin account, then by the two CCPs (either in proportion to the positions of each CCP or equally) by first using the rest of the defaulting participant’s collateral (margins of the other accounts and contribution to the default funds), and lastly the default funds of the two CCPs. For the calculation of the “stress test loss” of each participant (which can determine the size of the default fund under the “Cover 2”² principle), the CCP’s exposures to the positions of the cross-margined account are taken into account by each CCP;
- The second model maintains the segregation of accounts between the two CCPs but takes into account the positions of the other CCP.³ Accordingly, each CCP calculates the margins corresponding to its participant’s portfolio separately, and then deducts on a prorated basis from the calculated amount the portion corresponding to the gains that portfolio margining procures to the participant’s combined portfolio. In theory, if the losses of a CCP exceed the collateral remaining on this margin account, this means that gains have been made by the liquidation of the positions held by the other CCP: each CCP therefore has a claim on the other, equal to the difference between the margins calculated separately and the margins it actually holds.

In the event of a default, the two CCPs should closely coordinate their default management processes, from the declaration of default to the simultaneous liquidation of the defaulting participant’s positions (essential to preserve the benefit of portfolio margining). In practice, this would imply that the coordination is such that management of the default is carried out at a central point to be perfectly synchronous. It would therefore be operationally cogent to entrust default management to one of the entities for the cross-margined portfolios.

In these two cross-margining models, the CCPs are obliged to set up close coordination to manage a default, which implies that one of the two CCPs acts on behalf of both. Otherwise, both are exposed to greater losses than those covered by the called margins. In essence, this implies outsourcing by one CCP to the other, or at least a very strong dependence.

¹ This model is used for example by the US CCPs CME and OCC.

² The “Cover 2” principle refers to the need to cover the default of the two participants with the largest exposures. For more details see Section 3.1.5 below.

³ This model is used by the US CCPs FICC and CME.

.../...

Cross-margining is relatively developed in some jurisdictions, including the United States, where cross-margining solutions have been implemented between multiple CCPs, and across different business segments (e.g. between CME/OCC and CME/FICC, respectively). By contrast, the European regulation prohibits cross-margining insofar as it does not allow a CCP to have full control of its pre-funded resources, as required by EMIR. There are two reasons for this:

- First, from the point of view of financial stability, cross-margining creates cross-exposures between CCPs (at least some of the margins of one serving to cover the risk of the other) that increase interdependencies and the risk of contagion between CCPs. The losses incurred by each CCP and their coverage by the available collateral depend not only on the situation in the markets but also on the quality of each CCP's default management, in terms of the liquidation of the portfolio and the collateral of the defaulting clearing member. The allocation of some of the losses to the collateral of the other CCP creates a moral hazard that may in some cases reduce the incentive for good default management. In addition, in particular in a cross-border context, the supervisor of the CCP which must cover the losses of the other CCP could refuse to authorize the transfer of the collateral, especially if it considers that this collateral must cover the losses of the CCP itself or that the management of the default by the other CCP is deficient;
- Secondly, the coordination of default managements can be problematic. Portfolio margining requires the simultaneous liquidation of portfolios throughout the relevant scope. Although the procedures theoretically assume rapid liquidation based on a pre-established timetable, experience shows that CCPs sometimes prefer to keep the portfolios for longer for operational reasons or to wait for a return to better fortune. Moreover, given the market volatility in this type of context, it is important that the operational coordination be such that the actions are virtually simultaneous. In practice, this requires single-location coordination for the two CCPs, which is tantamount to entrusting the default management process to one of the two entities.

EMIR, a CCP can calculate its margins at the level of a portfolio of financial instruments under the following conditions:

- if the prices of these instruments feature a reliable and significant correlation;
- if this correlation is reliable over historical periods, shows "resilience during periods of stress" and corresponds to an economic rationale between the instruments;
- the CCP can then take into account up to 80% of the gains realised, unless it can demonstrate that taking into account 100% of the gains does not change its risk profile.

Portfolio margining relates to a clearing mechanism between financial instruments or currencies within a single CCP. In some jurisdictions, in particular the United States,

there is also a clearing arrangement between instruments or currencies for the same clearing member in more than one CCP; this is called cross-margining.

3.1.5. The pooled default fund

Participants (i.e., clearing members or indirect participants in the agency model) contribute to the pooled default fund established within the CCP to cover their exposures that are not covered by margin calls. This fund must be funded in advance by the clearing members, with a contribution that is either proportional to the central counterparty's exposure to these members (which is the usual case) or fixed. The methods for calculating the contributions of clearing members to the default fund are determined by the CCP.

Following the serious defaults observed since 2008 (Lehman Brothers, MF Global),

the international standards (Principles for Financial Market Infrastructures or PFMI, see Chapter 18) provide that pre-funded resources (i.e. the combination of initial margins and contributions to the default fund) must at least cover the default of the participant with the largest exposures (Cover 1). This coverage requirement is more stringent for systemically important CCPs or those which clear complex products: they need to cover the default of the two participants with the largest exposures (Cover 2).

EMIR has chosen the most demanding coverage (Cover 2) for all CCPs in the European Union. In accordance with EMIR (Article 43), the calibration of the default fund must thus allow the CCP to withstand extreme but plausible market events and to cover the two largest exposures to its participants. In practice, the default fund is usually sized to reflect the results of the CCP's internal stress tests: from these extreme but plausible scenarios, the CCP determines for each clearing member the maximum loss that would exceed the initial margins (called the 'stress test loss over initial margin', or STLOIM): the default fund is then calculated as the sum of the two highest STLOIMs, which guarantees that the CCP meets the "Cover 2" requirement.

The CCP conducts daily tests (stress-testing), to measure the adequacy of its resources (the margins and the contribution to the default fund) in case of an extreme, but plausible, change in market conditions. These stress tests are based on historical and/or hypothetical scenarios. In addition, CCPs have set up "reverse stress tests": These should allow a CCP to assess the limits of its coverage levels, by identifying the conditions under which it would no longer be able to absorb losses.

3.1.6. Segregation and portability

The pre-funded resources (margins and contributions to default funds) called by the CCP to cover participants' exposures

are deposited by the latter in the CCP's books, in the form of either a transfer of ownership or a pledge. EMIR sets strict requirements regarding the quality of the collateral, which must be deposited either in the form of cash or in the form of highly liquid financial instruments with minimal market and liquidity risk. Depending on the instruments delivered, haircuts are also applied to allow for a potential drop in the value of the delivered collateral between the last valuation of said collateral and the probable time of its liquidation. Additional security is brought by an EMIR regulatory requirement to deposit collateral securities with operators of securities settlement systems which guarantee the full protection of these financial instruments (see Chapter 12 on CSDs).

European regulations require transparent collateral management. This means that the positions and collateral must be segregated in the accounts of the CCP to preserve the positions of clients from a defaulting clearing member and thus avoid the risk of contagion. The main advantage of segregation is to avoid sharing losses, by clearly distinguishing the assets of each clearing member and those of the CCP, as well as the assets of each client of the same clearing member, provided said client has opted for individual segregation. Furthermore, in the event of a clearing member's default, segregation allows the portability of the positions of its clients to another "healthy" clearing member. This mechanism ensures continuity of contracts by transferring client positions, and allows CCPs to track and monitor the risks associated with the concentration in a few large participants of the exposures generated by indirect participants.

When managing a default, CCPs seek to minimize the losses in the portfolio of the defaulting member. To do this, they have a number of tools, such as:

- the inventory of the defaulting member's portfolio;

- where possible, the transfer of the positions and guarantees of the defaulting member's clients to another member;
- the use of the initial margins deposited by the defaulting member;
- the application of a liquidation strategy for non-transferred positions (type of asset/portfolio);
- neutralisation of the defaulting member's portfolio risk by taking reverse positions in the market, and/or by selling the portfolio through an intermediary.

In the event that the liquidation of the clearing member's portfolio has generated a profit, it is paid to the defaulting member's

administrator. In contrast, if the liquidation results in a loss, the non-defaulting members contributions to the default fund are used.

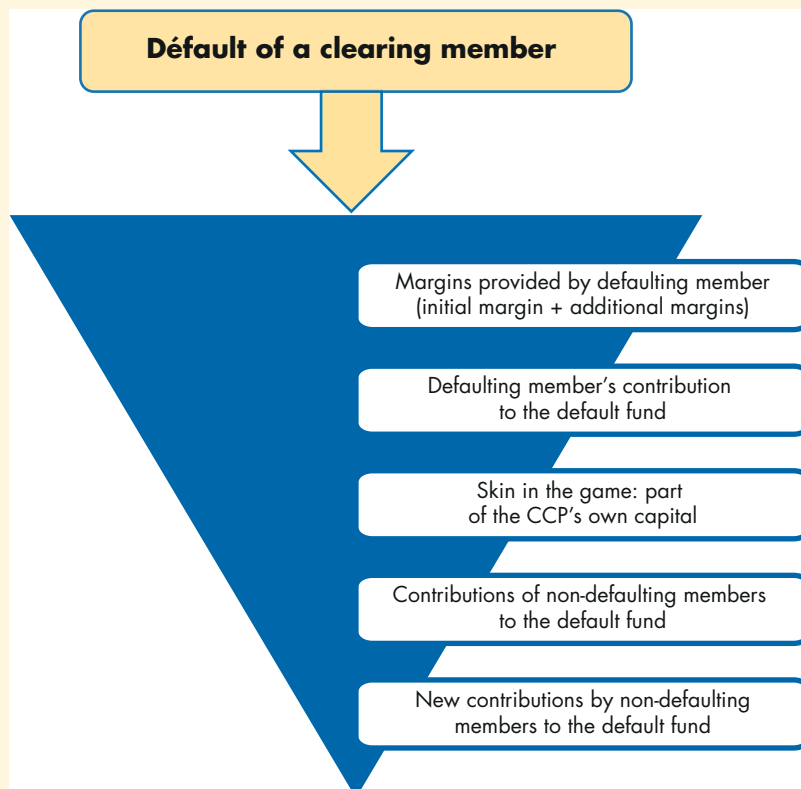
3.1.7. Tiered allocation of losses

In the case of the management of a member's default, EMIR prescribes an order for the use of resources, or a tiered allocation of losses ("waterfall process").

If a default occurs, the CCP settles the defaulting member's positions as follows:

- **First level:** the margins provided by the defaulting member (initial margins and additional margins laid down by the CCP). The use in first position of the defaulting member's margins is aimed at prompting participants to manage their

Box 3: Loss allocation order ("waterfall") under EMIR



risks prudently and CCPs to properly calibrate these margins;

- **Second level:** the defaulting member's contribution to the CCP's default fund. If the CCP is organised in several business segments – as is the case for LCH SA for example, which has fixed income, cash and derivatives, CDS, etc. segments –, it can define for each business segment a separate and waterproof default fund: this means that closing a business segment will not result in contagion to other segments;
- **Third level:** part of the CCP's own resources ("skin in the game"). The CCP's own resources must be used before those of the non-defaulting members. This incentive scheme for good risk management by the CCP is specific to the European framework and EMIR; other jurisdictions, such as the United States, do not provide for a regulatory obligation in this area, even though this good practice is fairly widespread. In Europe, the "skin in the game" is determined by regulation and must correspond to at least 25% of the CCP's capital requirements (set by EMIR). This 25% is then distributed among the various business segments, in proportion to the size of the segment (and in particular the size of the default fund retained by the CCP for each segment);
- **Fourth level:** contributions to the default fund from non-defaulting members. It is through the use of these resources that the losses are mutualised. The initial margins of non-defaulting members are excluded from the mutual loss coverage. Where the default fund has been fully used, it may be replenished at CCP's request.

If all of the pre-funded resources described above are insufficient to absorb the losses of the defaulting clearing member's portfolio, a recovery phase may be initiated requiring the surviving clearing members to provide additional resources:

- The CCP may apply a variation margin gains haircut (VMGH), on a pro rata basis between the clearing members, to those owed to the defaulting clearing member.
- The positions of clearing members with a reverse position to that of the defaulting clearing member can be cancelled in exchange for the payment of an indemnity.
- If the preceding steps do not cover the losses generated by the liquidation of the defaulting clearing member's portfolio, then the surviving clearing members will have to contribute so that the clearing service can continue via a new contribution to the default fund within the limit provided for by the CCP's operating rules.
- **As a last resort**, and to avoid contagion to other business segments for which the CCP offers clearing services, the CCP could decide to close the relevant clearing segment.

In addition, if justified in terms of financial stability, the resolution authority may trigger at any moment the resolution of a failing CCP. The resolution authority would then decide to recourse to certain tools in order to preserve the critical services provided by the CCP, while avoiding at all possible extent the recourse to public funds.

The forthcoming EU regulation on the recovery and resolution of central counterparties, the negotiation of which came to an end in the course of summer 2020 and which should be published by end 2020, will standardise the tools that CCPs and their resolution authorities have at their disposal, as well as how they may use them. Regarding recovery, depending on whether financial losses incurred by a CCP are linked to the default of one or several clearing members or not (e.g. operational issues of which the CCP can be held responsible; financial loss due to a CCP's investment policy), different tools will be made available.

The regulation also details how CCPs can be handled in resolution, with a limited list of tools at resolution authorities' disposal, which they may use in order to preserve financial stability and a fair allocation of losses between stakeholders, with the overall aim to avoid public funding to all possible extent.

4. Standards and regulations applicable to CCPs

4.1. Standards applicable to CCPs at the international level

Market infrastructures, and in particular CCPs, worked well during the financial crisis, in particular by limiting the risk of contagion. Nevertheless, it has become necessary to strengthen their robustness and thereby improve their contribution to financial stability and the mitigation of systemic risk.

This is the focus of the Principles for Financial Market Infrastructures (PFMI) published in April 2012 (see Chapter 18). Compared to the set of standards²⁴ they replace, the PFMI are now unified in a single document, updated, harmonised and strengthened. Their objective is to strengthen the infrastructures and enable them to better withstand financial crises and in particular a potential default by one or more participants.

The PFMI include a chapter on the responsibilities of central banks, market regulators and other competent authorities in the field of regulation, control and supervision of these infrastructures.

In view of the growing importance of CCPs, particularly as a result of the implementation of the G20 commitments related to the clearing obligation of standardised derivatives, in 2015 the Financial Stability Board, the Basel Committee, the Committee on Payments and Market Infrastructures (CPMI) and the International Organization of Securities Commissions (IOSCO) initiated the CCP Workplan to strengthen

the resilience, recovery and resolution of these infrastructures. This workstream first led to recommendations clarifying the PFMI,²⁵ giving guidance on the main aspects of CCP risk management, including governance, stress tests relating to credit and liquidity risk, risk coverage, margins and contributions to absorb CCP losses. Another report supplemented the 2014 CPMI-IOSCO guidelines for CCP recovery²⁶ – including making recovery plans operational, dealing with non-default losses, providing for replenishment of resources, and providing details on the use of recovery tools. Peer reviews conducted by CPMI-IOSCO on the implementation of the PFMI by infrastructures (see Chapter 18, Section 1.3) also examined the financial risk management and recovery practices of 10 CCPs clearing derivatives in two reports (August 2016²⁷ and May 2018²⁸).

Regarding resolution, a complementary guidance of the Financial Stability Board was published in 2017²⁹ on the powers of the resolution authorities to maintain the critical functions of CCPs, loss allocation tools, the establishment of crisis management groups and the development of resolution plans, in addition to the work already published by the Financial Stability Board.³⁰

4.2. The European principle of open access

The European regulatory provisions aim to open to competition the processing of the trading and also the clearing of financial instruments to prevent the establishment of de facto monopolies, which would be facilitated in particular by the silo organisation of certain markets. The principle is that there must be a choice as to the place of execution of orders (trading venue) and also the place of clearing of financial instruments: this is the "open model". The main purpose of MiFID 2³¹ and MiFIR³² of May 2014 (see Chapter 5) is to place order execution venues³³ in competition with each other and allow (i) non-discriminatory access for investors to execution venues and (ii) non-discriminatory access for execution venues to CCPs and payment systems

24 CPSS, "Core principles for Systemically important Payment Systems", January 2001. http://www.bis.org/cpmi/CPS-IO-SCO_Recommendations_for_Securities_Settlement_Systems_November_2001. http://www.bis.org/cpmi/CPS-IO-SCO_Recommendations_for_Central_Counterparties_March_2004. <http://www.bis.org/cpmi>

25 "Resilience of central counterparties (CCPs): Further guidance on the PFMI" <http://www.bis.org/cpmi> (5 July 2017).

26 "Recovery of financial market infrastructures – revised report" <http://www.bis.org/cpmi> (5 July 2017).

27 <https://www.bis.org/cpmi>

28 <https://www.bis.org/cpmi>

29 "Guidance on central counterparty resolution and resolution planning" <http://www.fsb.org/wp-content> (5 July 2017).

30 "Key attributes for effective resolution regimes for financial institutions" <http://www.fsb.org/wp-content> (October 2014).

31 <http://eur-lex.europa.eu/legal-content>

32 <http://eur-lex.europa.eu/legal-content>

33 Order execution venues include regulated markets, multilateral trading facilities (MTFs), and a new category of order execution venues introduced by the Directive and called organised trading facilities (OTFs). The Directive provides a very broad definition of OTFs, which includes all other organised forms of execution or trading that cannot be included in other categories.

“access right”). The “access right” under MiFIR means that CCPs must agree to clear trades executed on different trading platforms, as long as the latter meet the technical and operational requirements, including risk management requirements, laid down by the CCPs.

This principle was first set out in Article 7 of EMIR on over-the-counter derivatives subject to the clearing obligation. It has been reaffirmed and extended by this new European framework, and especially by MiFIR, to all financial instruments traded on trading venues.³⁴

A CCP must allow access to trading venues if certain access criteria specified in the regulatory technical standards are met.³⁵ The European legislator considered that for there to be genuine competition between platforms for trading derivatives, it was essential that these platforms should be able to access CCPs under transparent and non-discriminatory conditions. Non-discriminatory access to a CCP should mean that a trading venue has the right to non-discriminatory treatment in terms of how contracts traded on its platform are treated in terms of collateral requirements and netting of economically equivalent contracts and cross-margining with correlated contracts cleared by the same CCP, and non-discriminatory clearing fees.

4.3. Requirements under EMIR

4.3.1. The main requirements

In Europe, this concerns in particular, regarding CCPs, the European Market Infrastructure Regulation (EMIR), which entered into force in August 2012.

Given that the CCP becomes the sole counterparty of the clearing members, EMIR imposes very strict prudential requirements that the CCP must comply with.

With regard to financial risks first, which are the main risks for a CCP, EMIR has strengthened the risk management

requirements set out in the PFMI, which are only common minimum requirements:

- EMIR imposes a “Cover 2”³⁶ obligation (see above) for credit risk and liquidity risk for all EU CCPs. The PFMI only impose this requirement for the default of a single participant (“Cover 1”), except for CCPs that are systemically important in several jurisdictions or have a high-risk profile due to the complexity of the products they clear (e.g. CDS), for which “Cover 2” applies;
- the minimum confidence interval for the measurement of the exposures used to calculate the initial margins on over-the-counter derivative positions is raised to 99.5% in EMIR, compared to 99% for all products in the PFMI;
- EMIR sets quantitative minimum requirements for the liquidation period (two days for listed derivatives and repos, five days for over-the-counter derivatives) and the look-back period (12 months). The liquidation period is the period between the default and the end of the CCP’s default management process, which serves as a time frame for measuring the potential exposure, i.e. the potential decline in the value of the collateral between its last valuation and its liquidation and adverse changes in the portfolio to be liquidated. This potential exposure is one of the parameters needed to calculate the initial margin. The look-back period is the timeframe of the range of data that the CCP uses to calculate its margins.

Lastly, the rules for assessing banks’ exposures to CCPs in calculating capital requirements were reviewed by the Basel Committee in April 2014, with a new approach for determining these requirements when the CCPs are “qualified” (“Qualifying CCPs” or QCCPs). A QCCP is a PFMI-compliant CCP that is approved by the State in which the clearing member is established, and authorised by its supervisor to clear the products submitted

34 Article 35.1 of MiFIR: “Without prejudice to Article 7 of Regulation (EU) No 648/2012, a CCP shall accept to clear financial instruments on a non-discriminatory and transparent basis, including as regards collateral requirements and fees relating to access, regardless of the trading venue on which a transaction is executed.”

35 Recital 38 of said Regulation: “To avoid any discriminatory practices, CCPs should accept to clear transactions executed in different trading venues, to the extent that those venues comply with the operational and technical requirements established by the CCP, including the risk management requirements. Access should be granted by a CCP if certain access criteria specified in regulatory technical standards are met.”

36 See Annex II of Technical Standard 153/2013. <http://eur-lex.europa.eu/legal-content>

for clearing. The Basel Committee reviewed the conditions for applying the leverage ratio to exposures of CCPs and of clearing members that provide indirect clearing services (client clearing). The initial margins received from clients can now be deducted from the leverage ratio denominator, as they are intended to reduce the risks borne by the clearing member.

Regarding the other main risks facing a CCP, namely the investment and custody risks:

- the investment risk is governed by strict rules: for example, under EMIR, CCPs are allowed to invest their financial resources only in cash or in instruments with a minimum market and credit risk, meeting the very specific regulatory conditions laid down in the technical standards;³⁷
- the custody risk is highly mitigated by the obligation, where possible, to deposit the financial instruments given as margin or contributions to the default fund with a CSD or a central bank responsible for ensuring the full protection of these instruments and their rapid availability for the CCP, or failing that, a credit institution with a low credit risk.

A CCP can outsource some of its functions. However, a CCP cannot outsource risk management unless such outsourcing is approved by the competent authority.

With regard to their organisation, EMIR requires CCPs to have governance arrangements that are documented in a comprehensive and detailed manner. In addition, the CCP must ensure a clear separation between the hierarchical organisation of risk management and that of other activities. Each CCP must have a board of directors, of which at least one third of the members are independent. The role of the board of directors must be clearly defined and its activities and meeting minutes made available to the regulators. In addition, a risk committee that is independent from the governing

bodies must be set up. In order to mitigate the risk of conflict of interest, shareholders and members with qualifying holdings in the CCP must be clearly identified and written organisational and administrative rules must be established.

A central counterparty must also have participation requirements, transparent activity reporting, and separate records and accounts per clearing member.

With regard to the recovery and resolution of CCPs, a European Regulation is currently being drafted, based on and consistent with international workstreams and the international principles³⁸ established in this area.

4.3.2. Accreditation and supervision of central counterparties

Under EMIR, each Member State designates the competent authority or the authorities responsible for carrying out the tasks laid down in the Regulation (Article 22) and notifies ESMA accordingly. If more than one authority is designated, the Member State should clearly indicate the respective roles of each of the designated authorities.

However, only one of the designated authorities will be delegated responsibility for coordinating cooperation and information exchange with the Commission, ESMA, the competent authorities of other Member States, EBA³⁹ and central banks. In France, the Banque de France fulfils this role.

EMIR has established the processes for authorising and supervising CCPs with the establishment of colleges⁴⁰ made up of ESMA, a non-voting member, the regulator(s) notified as competent authority to ESMA, the competent authorities responsible for the supervision of (i) clearing members established in the three Member States making the largest overall contribution to the CCP default fund, (ii) trading platforms with which the CCP has established links, (iii) central counterparties with which the CCP has interoperability agreements,

³⁷ The PFMI stipulate that pre-funded financial resources (i.e. the combination of initial margins and default fund contributions) must at least cover the default of the participant with the largest exposures (Cover 1). This requirement is stricter for systematically important CCPs or CCPs that clear complex products: pre-funded financial resources must cover the largest aggregate exposure caused by the default of any two participants (Cover 2).

³⁸ "Guidance on central counterparty resolution and resolution planning", <http://www.fsb.org/wp-content> (5 July 2017).

³⁹ European Banking Authority.

⁴⁰ Article 18 of EMIR EU Regulation No 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories.

(iv) central securities depositories with which the CCP has ties, and (vi) central banks of issue of the currencies most relevant to the cleared instruments for each CCP.

The creation by EMIR of colleges (see Chapter 18 for details) echoes the requirement of cooperation between authorities in the oversight and supervision of CCPs recommended by the PFMI (see Responsibility “E”). Many authorities with different mandates, reflecting different facets of financial stability (central banks, market authorities, prudential authorities), have an interest in the proper functioning of CCPs. This is why the functioning of the colleges as envisaged by EMIR provides for coordination between the national authorities, whose main task is to ensure that the CCPs comply with all regulatory requirements, and the “relevant authorities”, which are also members of the college, can be consulted if necessary and ask the national authorities for additional information. ESMA, a non-voting member of the EMIR colleges, is in charge of the convergence of supervision, in particular through the peer reviews it conducts on the functioning of the colleges.

As part of the re-authorisation of a CCP under EMIR’s provisions, an assessment is performed; this assessment is in addition subject to an annual review by the competent national authorities.

Regulatory changes to the CCP supervision framework came into force on 1 January 2020 (EMIR2). This was the result of several observations:

- the concentration of clearing services in a limited number of CCPs with, at the same time, an increase in cross-border activity: the current system is essentially based on the authority of the country of origin;
- diverging practices in the oversight of CCPs in the European Union, which could create a risk of regulatory and prudential arbitrage for both CCPs and their participants;

- the role of central banks as issuers of money, which is not sufficiently reflected in the current colleges of EU CCPs.

The revised version of EMIR addresses these findings, firstly by affirming ESMA’s coordinating role in the supervision of EU CCPs.⁴¹ By 1st January 2021, ESMA must prepare a technical regulation to standardise interpretations of Articles 15 (extension of activities and services) and 49 (changes to the models). It may be invited to participate in on-site inspections by national authorities and will provide guidance on reviews and evaluation processes to national authorities (Article 21 6). In terms of powers, under Article 23a an ex-ante ESMA opinion is mandatory with regard to 12 EMIR articles before a national authority⁴² can finalise its decisions. Any other decision may be submitted on a voluntary basis. ESMA may issue guidelines and recommendations if it finds a lack of convergence or consistency in the practices of the competent national authorities.

Within ESMA, a new permanent body dealing with EU and third-country CCP issues is established: the CCP Supervisory Committee. For CCPs established in the European Union, the Supervisory Committee is empowered to conduct European stress tests and promote exchanges between authorities in particular. For third-country CCPs (see below), the committee draws up all ESMA supervisory decisions. In general, it prepares draft decisions (taken by simple majority, with the casting vote going to the Chair in the event of a deadlock) and submits them to ESMA’s Board of Supervisors for approval.

4.3.3. Recognition of third country CCPs

Lastly, EMIR allows CCPs from third countries to provide clearing services in the European Union. A CCP established in a third country may provide clearing services to clearing members or trading venues established in the European Union only if it is recognised by ESMA, following a

41 ESMA will act “with a view to building a common supervisory culture and consistent supervisory practices, ensuring uniform procedures and consistent approaches, and strengthening consistency in supervisory outcomes, especially with regard to supervisory areas which have a cross-border dimension or a possible cross-border impact.”

42 Articles 7 (access to a CCP); 8 (access to a trading venue); 14 (authorisation of a CCP); 15 (extension of activities and services); 29 (record keeping); 30 (qualifying holdings); 31 (information to competent authorities in the event of a change in governance); 32 (assessment in the event of a change in governance); 33 (conflicts of interest); 35 (outsourcing); 36 (conduct of business rules); and 54 (approval of interoperability agreements).

procedure laid down in Article 25 of EMIR. Thus, a CCP wishing to be recognised must provide ESMA with a file containing all the required information (defined in the technical standards). ESMA has 30 days to review the completeness of the application and then 180 days to decide on its approval.

Four conditions must be met for ESMA to recognise a third country CCP:

- the European Commission must have adopted an implementing act stating that CCPs from the jurisdiction in question are subject to a supervisory regime and risk management requirements equivalent to those laid down by EMIR;
- the CCP must be authorised in its country of origin, and must fully meet the regulatory requirements applicable in that jurisdiction;
- ESMA must have signed a cooperation agreement with the competent authorities of the country of origin of the CCP establishing, inter alia, arrangements for the exchange of information and the coordination of oversight activities;
- the CCP must be established or authorised in a third country that is considered as having equivalent systems for anti-money laundering and combating the financing of terrorism to those in force in the European Union.

In addition, before deciding definitively on an application for approval, ESMA must formally consult European authorities to ascertain their position on the application (the opinions issued by these authorities are not, however, binding). This includes the following authorities: (i) the competent authorities of the Member States in which the CCP wishes to provide clearing services, (ii) the competent authorities of the three Member States whose financial institutions are, or are anticipated to be, the largest contributors to the CCP's default fund, (iii) the competent authorities responsible for

the supervision of trading venues located in the EU and which the CCP wishes to serve; (iv) the competent authorities responsible for monitoring CCPs the third country CCP has interoperability agreements with, (v) the central banks of the Member States in which the CCP intends to provide clearing services, or in which a CCP is established with which the third country CCP has entered into an interoperability agreement, (vi) the central banks of issue of the most relevant European Union currencies of the financial instruments cleared or to be cleared.

As at 20 September 2020, 34 third-country CCPs had been recognized by ESMA⁴³. With Brexit and the United Kingdom's withdrawal from the European Union on 31 January 2020, the United Kingdom will become a third country after the transition period provided for by the withdrawal agreement comes to an end on 31 December 2020. After that date, UK CCPs will be recognised in the European Union under the third-country regime, a decision that ESMA took by anticipation on 28 September 2020.

While the mechanism for recognising third country central counterparties developed by EMIR relies entirely on third country regulation and oversight, most of these countries consider third country central counterparties to be systemically important infrastructures and subject them to enhanced supervision. The initial approach of EMIR could be regarded as a model of mutual trust, but the EU would have been exposed to risks if it had remained the sole jurisdiction to rely so heavily on the regulation and authorities of third countries.

It is in this context, the revision of EMIR (EMIR2) allowed the adoption of a risk-based approach, since third country counterparties that are systemically important for the European Union will be subject to direct and reinforced oversight by the European authorities, while at the same time a requirement that CCPs of substantial systemic importance should be located in

43 <https://www.esma.europa.eu/press-news/esma-news/esma-updates-list-recognised-third-country-ccps>

the European Union is also foreseen (see Chapter 17).

The EMIR2 regulation provides for an overhaul of the authorisation architecture for third-country CCPs. Decisions on the equivalence of third-country regulations are retained in principle but this may be reviewed as ESMA is responsible for monitoring regulatory developments in jurisdictions that benefit from equivalence decisions.

In contrast to the situation since 2012, the decision to authorise a third-country CCP to provide services in the European Union will now be based on more or less demanding criteria, depending on the CCP's systemic importance for the European Union. The CCP recognition process will therefore differ depending on whether the CCP is considered non-systemic or of limited systemic importance (in which case, recognition will mainly be granted on the basis of the equivalence decision of the regulatory framework), or systemically important (in which case, in addition to the equivalence decision, the third-country CCP will have to demonstrate that it complies with EMIR provisions, unless otherwise justified by "comparable compliance").⁴⁴ Furthermore, once a CCP is recognised as being systemically important, it becomes subject to direct supervision by ESMA, which then has the power to request information and to carry out documentary and on-site inspections. ESMA will also have the power to impose penalties, ranging from administrative fines to a withdrawal of authorisation.

The classification of a third-country CCP shall be reviewed each time it extends its activities or services, and at least every five years. It shall be based on the nature, size and complexity of the business, the effect of a downturn in the European financial markets, the holding structure, substitutability and interdependencies with other market infrastructures. Third-country CCPs must pay fees to ESMA to enable them to carry out their duties. A third-country CCP college has also been established with the aim of

sharing information with the competent European national authorities. It can ask for an item to be added to the Supervisory Committees' agenda.

Lastly, ESMA may deny recognition of so-called "substantially systemically important CCPs". The fact that these types of entities may be located outside the European Union could threaten the European financial stability. The procedure is as follows: ESMA would recommend that the Commission decide to refuse recognition. This recommendation would have to be justified by (i) showing that direct EMIR-related supervision would be insufficient to adequately reduce risks (such as potential conflicts of interest between the home supervisor and ESMA, which could lead to the CCP taking decisions contrary to EU financial stability, particularly in a crisis situation), and (ii) a cost-benefit analysis.

Once the European Commission has decided to deny recognition to a CCP, this CCP will no longer be able to offer its services in the European Union, unless it will relocate its activities and request approval as an EU CCP. As called for by the European Commission, the ECB and the ESRB, ESMA should assess the substantially systemic nature of LCH Ltd and Ice Clear Europe in the course of 2021.

With Brexit, EMIR2 and the associated technical standards have taken on particular importance for European financial stability. Given that certain CCPs located in the United Kingdom are systemically important for the EU (see below), it is essential that post-Brexit, they continue to provide all relevant disclosures to the European authorities and, if necessary, submit to their direct supervision.

5. The main CCPs in Europe

The Box 4 below describes the clearing activity, by business segment, of the main CCPs in Europe.

⁴⁴ Under "comparable compliance", certain CCPs considered systemically important for the EU may be deemed compliant with EMIR requirements without strictly observing its provisions. The scheme's functioning is to be clarified by the European Commission through a delegated act to be published at the end of 2020.

Box 4: Statistical breakdown of the main central counterparties clearing instruments denominated in euros and of cleared assets ¹

T1: Credit derivatives segment: Open interest – EUR-denominated CDS, October 2019

(billions euros; share in percentage)

CCP	Open Interest, Euro-denominated CDS indices (iTraxx Europe, Crossover, HiVol, SenFin)	Market share
ICE Clear Europe	205	33
ICE Clear Credit	298	49
LCH SA CDSClear	110	18

Source: Public information, CCP websites.

T2: OTC interest rate derivatives segment: Open interest - OTC interest rate derivatives, October 2019

(billions euros; share in percentage)

CCP	Open interest OTC interest rate derivatives (all currencies, USD equivalent)	Market share	Open interest OTC interest rate derivatives (in euro)	Market share
LCH Ltd (Swapclear)	361.6	89	88.0	87.0
CME US	17.4	5	0.6	0.5
JSCC	14.4	4	12.7	12.5
EurexOTC	12.7	3	0	0

Source: CCP websites.

T3: Listed interest rate derivatives segment: annual cleared volume by CCP

(number of contracts in 2016; share in percentage)

CCP	STIR (all currencies)	Market share	LTIR (all currencies)	Market share
Eurex Clearing	72,319	0	628,386,613	90.6
ICE Clear Europe	533,336,315	98.8	65,514,464	9.40
LCH Ltd (CurveGlobal)	6,619,742	1.2	15,156	0

Source: public information, CCP websites.

¹ In February 2019, LCH Group migrated its euro-denominated repo clearing activity from the UK CCP, LCH Ltd, to the French CCP, LCH SA. Repo clearing statistics following these market movements are not currently available, but are expected in the course of 2020.

CHAPTER 12

Central securities depositories

Updated on 30 September 2020

Central securities depositories (CSDs)¹ are essential infrastructures for the proper functioning and security of financial instrument markets. They play a key role in maintaining the integrity of securities issues by ensuring that securities are not created or deleted accidentally or fraudulently. The provision of securities accounts at the highest level of the holding chain (i.e. for the benefit of financial intermediaries themselves) and the reconciliation, at least daily, of these securities accounts with issue securities accounts² allow them to discharge this responsibility. In jurisdictions where this “notarial” service is provided by registrars, the CSD reconciles its own data (on ownership) with those of the registrar (on issues).

While the Principles for Financial Market Infrastructures (PFMI, see Chapter 18) consider that CSDs do not necessarily operate a securities settlement system, the European regulation transposing the PFMI establishes a very close link between CSDs and securities settlement systems. As a result, since the entry into force of the European CSDR³ (see Section 2 of this chapter), an entity must operate a securities settlement system to qualify as a CSD (and also provide at least one of the other

two core services defined by CSDR: notary services and/or central securities accounts maintenance services at the top tier level). In addition, CSDR considers that CSDs are the only entities authorised to operate a securities settlement system.⁴ It should be noted here that TARGET2 Securities (T2S), which will be described in Chapter 14, is not considered as a CSD, nor indeed as a securities settlement system but as a technical platform for settlement and delivery developed and operated by the Eurosystem.

The CSDs are also active participants in the integration of financial markets, in particular by establishing links between CSDs: these links are one of the ways for participants in a given market to be able to access securities issued in other jurisdictions. The establishment of a link from a CSD (called the “investor CSD”) to another CSD (the “issuer CSD”) means that the investor CSD becomes a participant of the issuer CSD, i.e. in practice opens a securities account in its name with the issuer CSD (which is in fact nearly always established in another country, as there are very few countries nowadays with more than one CSD). The investor CSD thus enables its participants to access securities other than those for which it itself performs the notary function.

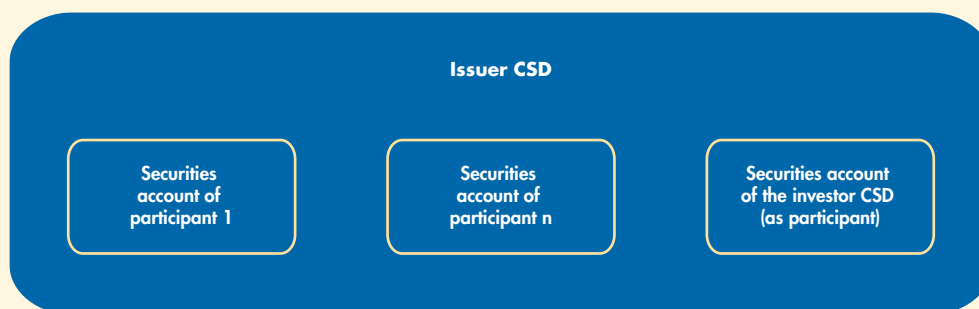
1 In the remainder of this chapter, the term “central depository” or the acronym “CSD” will be used interchangeably to designate central securities depositories.

2 The issue accounts correspond to the sum of the securities issued, for each ISIN code considered.

3 Central Securities Depositories Regulation (CSDR) is what the “Regulation (EU) No 909/2014 of 23 July 2014 on improving securities settlement in the European Union and on central securities depositories” is commonly called.

4 Note that some central banks still act as CSDs. For example, the National Bank of Belgium operates a settlement-delivery system (NBB-SSS) for the issuance and settlement of fixed income securities.

Diagram



1. The roles of a central securities depository

1.1. Management of securities issues: the notary service

1.1.1. History and trend towards paperless securities

Financial instruments were originally circulated in the form of paper certificates⁵ that were held physically by investors, either directly or a safe deposit box at their bank. The growth of financial markets and the surge in volumes of securities issued and traded showed the limits of this organisation: the physical transfer of large volumes of paper certificates required time and handling, which could not only create liquidity pressures, but also entail operational risks, such as the loss of securities or the circulation of fake securities. In addition, the issuance of securities in the form of paper certificates made transactions such as capital restructuring, e.g. stock splits, cumbersome. With the support of financial markets, national authorities therefore contributed to the creation of central depositories.⁶ These entities were initially responsible for centralising all the paper certificates in one place, so that the physical transfers could be eliminated: transactions were then settled by book entry in the books of the central depository. This step is known as “immobilisation.”⁷ Nowadays, securities that are still issued in the form of paper certificates⁸ are therefore usually immobilised at the CSDs or with a registrar, and then transferred electronically through a book entry.

Then an additional step was taken with “dematerialisation”, as securities issues became completely paperless.⁹ Paperless securities are not only held and exchanged but also issued electronically, through an accounting entry in the issue account, most often held by the CSD. As a result, operational processes usually have become safer and more efficient as advances in technology have made it possible to register and transfer securities electronically.

Legislation has been adapted in the various European countries to allow the representation of securities in the form of electronic records – or even make it mandatory. In France, the Law of 30 December 1981 made the dematerialisation of securities virtually systematic (implemented from November 1984). Dematerialisation did not however totally exclude the possibility of issuing physical securities: issuers can still issue part of an issue in the form of paper “representative certificates” in single or multiple denominations, for exclusive circulation outside France, even though in practice they no longer request to do so.

At the European level, a major step forward was made with CSDR, adopted in 2014, which imposes, from 1 January 2023 for transferable securities admitted to trading as of that date and from 1 January 2025 for all transferable securities admitted to trading irrespective of their issue date, that the initial registration be made by “book entry”. This means that these financial instruments will either have to be issued directly in paperless form – they will then exist only in the form of an accounting entry, with no underlying physical security – or issued physically in paper form and then “immobilised” (i.e. kept by a CSD so as to allow their subsequent transfer by book entry) or, for those securities initially issued in paper form that will still exist on 1 January 2025, dematerialised or immobilised on that date. One of the essential characteristics of immobilised or dematerialised securities is that they are fungible, i.e. the securities comprising the same issue are interchangeable.

1.1.2. The “notary service”, a core service under CSDR, but which can be provided by other entities

This so called “notary service” correspond to the initial recording of newly created securities at the level of the infrastructures or possibly specialised entities (see below). It is one of the three core services set out by

5 The possession of these certificates was proof of ownership. Several coupons were printed on each certificate, with each coupon corresponding to the maturity of an interest payment or a dividend. At the time of each payment, the holder of the security handed in a paper coupon against the payment of interest or dividends (hence the expression “coupon detachment”).

6 The French central depository SICOVAM – which became Euroclear France in 2001 – was for example created in 1949.

7 Immobilisation is defined by European legislation as “the act of concentrating the location of physical securities with a central securities depository so as to permit subsequent transfers by accounting entry”. This is particularly the case for international bonds or Eurobonds (see Section 4).

8 Another step was taken in this area, with respect to international issues for example, when the individual certificates to be immobilised were replaced by a global certificate representative of the entire issue.

9 Dematerialisation is defined in the Glossary of the Committee on Payments and Market Infrastructures (CPMI) as the “elimination of physical certificates or documents of title that represent ownership of securities so that securities exist only as accounting records”.

the European CSDR. In most cases, CSDs are directly involved in the process of issuing securities, by holding issue accounts opened in the name of the issuers and handling the initial registration of the securities. This is the case, for example, in France, where this notarial service is carried out by two national CSDs,¹⁰ Euroclear France and ID2S.

When an issuer submits an issuance project to Euroclear France or ID2S, the CSD concerned verifies the eligibility of the securities envisaged.¹¹ Each financial instrument is then assigned a unique identifier – an International Securities Identification Number (ISIN) – by a national numbering agency.¹² In many countries, this role is delegated to the financial centre’s historic (and most often unique) CSD. In France, Euroclear France directly assigns ISINs to issued securities. Issuers can be financial or non-financial companies, public institutions, governments, local authorities, etc.

In its role as issuer central securities depository (the “issuer CSD”), the CSD keeps an account of each issue to ensure its integrity, by reconciling – at least on a daily basis, in accordance with CSDR Article 37 – the number of securities registered in an issuing account with the number of outstanding securities, i.e. those held in the securities accounts of its participants. The issuer CSD has direct access to these data thanks to its role as the central account holder.

This essential function, conferred upon CSDs, thus allows them to ensure that there is no undue creation or destruction of securities for each issue. In the event of the undue creation of securities, investors might think that they have a right of ownership over securities, which, in reality, do not exist. Conversely, in the event of the undue deletion of securities, property rights in securities that have a real existence would be lost. In case of a discrepancy, a CSD is required to suspend settlement of the ISIN code concerned in accordance with the terms and deadlines set by CSDR.

Therefore CSDs play a key role in maintaining investor confidence.

This notary service is however not necessarily provided by a CSD: to make allowance for the practices of some jurisdictions, such as the United Kingdom, where specialised entities (the “registrars” in practice, but not necessarily banking institutions) perform this notary function, Article 31 of CSDR explicitly provides that an entity other than a CSD may be responsible for initial registrations, under certain conditions. In particular, the Member State must specify the applicable requirements in its national law, referring to the provisions of CSDR, and communicate to the ESMA (European Securities and Markets Authority, one of the European supervisory authorities set up in 2010) all relevant information on the provision of these services. In most EU Member States, however, the CSDs themselves provide the notary services.

Issuers may, in some cases, hold the securities accounts of the financial instruments they issue, which are then called pure registered shares (see below, the particular case of French registered securities as an example).¹³ The issue accounts, which are nevertheless still maintained by the CSD, reflect the sum of the assets held by the CSD’s participants.

Most issuers, however, do not directly manage the issuance of their securities by the CSD: they mandate an “agent” – in practice, usually a bank specialising in the securities business – to represent them in their relations with the CSD and proceed with the issue. Agents must already have a contractual relationship with the CSD, and thus have committed to comply with the latter’s contractual rules and operational processes.

When an entity other than the CSD is involved in carrying out this reconciliation (for example when the CSD is not directly involved in the issuance of securities and a separate entity such as a registrar provides the notary function), CSDR

¹⁰ See Section 3 of this Chapter: The French CSDs.

¹¹ In principle, all the financial securities referred to in the Monetary and Financial Code are eligible for Euroclear France operations: equity securities issued by joint-stock companies, debt securities, units or shares of undertakings for collective investment (see Article L. 211-1 of the French Monetary and Financial Code). ID2S currently only accepts NEU CPs (Negotiable European Commercial Paper – short-term commercial paper with a maturity of up to one year).

¹² For the French market, the Agence Française de Codification (AFC – the French national numbering agency), under the responsibility of Euroclear France, is responsible for assigning codes to shares, warrants and debt securities.

¹³ When the issuer holds the issue account itself, we use the term “registered securities” to refer to the securities. The rules nevertheless differ from one country to the next, both legally and operationally.

requires that the CSD and the other entity agree on “adequate measures of cooperation and information exchange” to maintain the integrity of the programmes. The “issuer” CSD of a financial instrument thus ensures that the securities accounts of the participants never show a debit balance, so that no securities are created outside the issuing process described above. When there is no local CSD (this may occur) and several “non-domestic” CSDs are directly connected to the registrar, the reconciliation relates to that provided by these CSDs with an account in the registrar’s books to ensure the circulation of eligible financial instruments in their own books. In this case, the CSDs entered in the registrar’s books reconcile the overall position for which they are registered with the registrar with the sum of the instruments held by their own participants in their books.

1.2. Central securities accounts maintenance

CSDs maintain securities accounts mostly on behalf of financial intermediaries, mainly custodians,¹⁴ who keep these securities in their books for their clients (investors).

1.2.1. General operating organisation

The “custody” of securities consists of booking the securities in the account

opened in the name of their holder; it is not strictly speaking an investment service, but a so-called “ancillary” service to investment services and which requires, in France, approval by the *Autorité de contrôle prudentiel et de résolution* (ACPR – French Prudential Supervision and Resolution Authority) for credit institutions and investment firms that wish to provide it. Custodians also provide a number of individualised services to their clients to enable them to exercise the rights attaching to the securities they hold, such as for example the receipt of payments to holders (e.g. coupons or dividends), or exercising voting rights in shareholder meetings.

In a so-called “indirect holding” model, as is the case in France and in most European countries, an investor who acquires securities does not hold them directly in an account with the CSD (this is even prohibited in France). Moreover, a unique feature of the French law is that the property right to the securities only applies to the securities accounts held by custodians: the securities accounts held by the CSD on behalf of custodians are only “technical accounts” or “mirror accounts” of the securities accounts held by these custodians on behalf of their own clients. The property rights of investors to their securities are booked by the entry of securities in an account opened in their name with a custodian, which can either be a direct participant of

¹⁴ In the remainder of this chapter, we use the terms “custodian bank” or “custodian” interchangeably to designate custodians.

Box 1: Models for direct holding or indirect holding of securities

In direct holding models, all the securities held by the end investors, i.e. the beneficial owners of the securities are recorded in the accounts opened in their name with the central depository. Each investor therefore typically has a custody account with the central depository, but the operational management of this account is usually performed by an agent (in practice, a financial intermediary). The fact that all investors’ accounts for a given security are managed in accounts at the CSD facilitates verification of the integrity of issues. Likewise, the central management of investor accounts facilitates the identification of shareholders (with however limits to the identification when securities are held by foreign investors via “non-domestic” financial institutions, which are then the only ones that the CSD knows) and the processing of securities transactions. Several European countries have adopted a direct holding model, including Sweden, Finland and Denmark. It should be noted that countries with a more recent “market” culture, such as India or China, have also adopted this model.

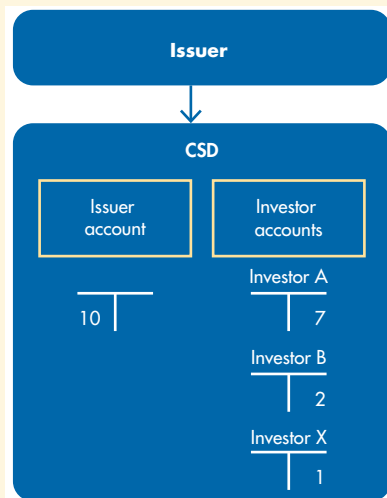
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Most European countries implement indirect holding models. These models are characterised by the existence of one or more levels of financial intermediaries, in particular custodian banks, which maintain in their systems and administer the securities belonging to the end investors. They handle the custody of securities for other financial intermediaries or for end investors themselves. Some of these intermediaries have chosen to be direct participants in the settlement system, and therefore have accounts in the books of the central depository. CSDs therefore only have a relationship with those financial intermediaries (via “omnibus” accounts), which participate directly in their securities settlement system.

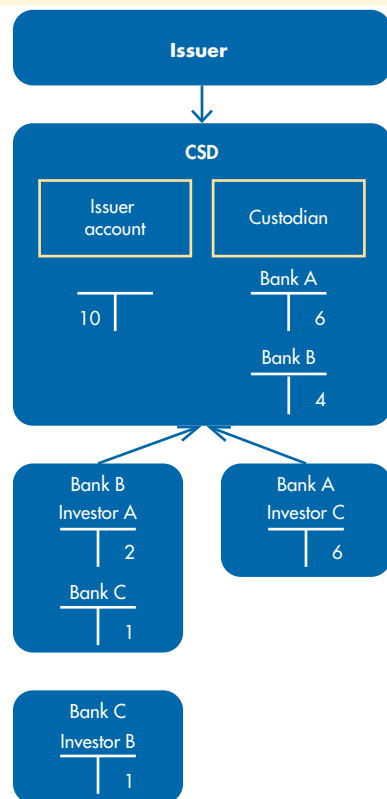
An “omnibus” account allows a financial intermediary to consolidate in this account securities held by several clients – or sometimes even all its clients. This practice is referred to as “collective segregation¹ of clients” under CSDR, as opposed to “individual segregation by client”. In France, the indirect securities holding model applies, and the use of omnibus accounts (i.e. collective segregation of clients) is widespread because it allows for more efficient operational management by custodians, while maintaining a high degree of security regarding clients’ legal ownership, due to the French legislative framework (see above) and the fact that the custodian’s own assets cannot be mixed with the assets of its clients. Individual segregation (or by category of holders) at the CSD level is also possible, in particular to isolate the securities held by UCITS.

¹ The term “collective segregation” is understood to mean that the clients’ holdings are grouped into a single omnibus account that is separate from the account holding the intermediary’s own assets.

Representation of account structures in direct holding model



Representation of account structures in indirect holding model



the CSD and thus have a securities account with the CSD, or have a securities account with another custodian who is a participant of the CSD. The number of intermediate layers in this chain of ownership is not subject to any theoretical limit.

Whether in an indirect holding or direct holding model, as each class of security is held by one or more end investors, possibly through one or more custodian banks along a holding chain of varying length, the sum of the securities held by the participants of an issuer CSD on behalf of investors must be equal to the number of securities issued, for each ISIN code. The securities

accounts held by the participants of a CSD reflect the degree of ultimate ownership within the chain (they are held by financial intermediaries who do not use another intermediary, so there is no additional tier in the custody of the assets present in these accounts). The same reasoning holds when the participant of a CSD (“issuer CSD”) happens to be another CSD (“investor CSD”). Here again, the issuer CSD is responsible for ensuring the integrity of the financial instruments issued, and hence the reconciliation between the issue accounts and the accounts of its participants, including the accounts of the “investor CSD”.

Box 2: The special case of registered securities in France and identifiable bearer securities

In France, securities may be held either in “bearer” or “registered” form, depending on the wishes of the investor and/or whether the issuer wishes permanently to know the names of its shareholders or the holders of its bonds. When a company stipulates in its articles of association that the registered form is mandatory, it is called a “mandatory registration security”; otherwise, when the investor can choose between the “bearer” and “registered” forms, the security is said to be “occasionally registered”. There are also statutory obligations that securities be in registered form (beyond a specific threshold of ownership, the holder must change the securities to either “pure registered” form or “administered registered” form: in either case, the security remains in the occasionally registered form.

Owners of registered securities may elect either to book them in their account with their usual custodian bank (“administered registered”), or to entrust their custody to the issuer (“pure registered”). In the latter case, the issuer must hold the accounts on internal registers and manage the related corporate actions; it may nevertheless delegate these functions to an agent. Shares issued in France are rarely registered shares.

Bearer securities are booked in a securities account with a custodian, in accordance with the conventional arrangements for the indirect holding of securities described above. In this case, their beneficial owner is not known to the issuer. However, to allow the issuers of bearer securities to know their shareholders or their bondholders, Euroclear France offers the identifiable bearer security (*Titre au porteur identifiable*, or TPI) service, whereby, at the request of the issuing company (and provided that the articles of that company explicitly provide for this regarding capital securities), it enquires among all financial intermediaries in whose books the securities of the issuer are deposited to identify the shareholders/bondholders. After consolidating the answers, the list is provided to the issuer. Bearer securities make up the majority of the securities issued in France.

1.2.2. The role of the other intermediaries along the security ownership chain

While CSDs play a central role in preserving the integrity of issues, each financial intermediary must also conduct similar reconciliations at its own level between on the one hand the assets booked in a securities account opened in its name with the tier above (most often an omnibus account, including when it is an account with the CSD), and on the other hand, the assets held for own account and the assets whose custody has been entrusted to it by its clients at the lower tier. This waterfall process along the chain ensures that the ownership rights of the end investors, at the other end of the chain, cannot be unduly challenged.

In an indirect holding model, the CSDs cannot play this role along the chain because they only have information on the securities accounts of their direct participants; similarly, each financial intermediary has visibility only on the assets held on behalf of its own clients, but not on the holding of these assets further downstream by the clients of its clients. Consequently, any failure of one financial intermediary can compromise the integrity of an issue and possibly entail the loss of securities for some end investors, even if the controls at the level of the issuer CSD are adequate. In France, as already mentioned, the property rights to financial instruments are attached to the securities accounts held by custodians, and not to the securities accounts maintained by CSDs, which are only “mirror accounts” reflecting the securities accounts of its participants.¹⁵

Daily reconciliations are therefore essential at the level of each participant of a CSD, including third-party CSDs that have opened a securities account with a CSD to allow their participants to access the securities that have been issued there (“investor CSDs”). If several investor CSDs hold securities with the same ISIN code with

a given issuer CSD, these investor CSDs are required to carry out periodic realignments, i.e. transfers of securities between their accounts opened with the same issuer CSD, to reflect the exchanges of securities between their own participants when the transaction occurs between the participants of two different CSDs. Note that automatic realignment is a function offered by the T2S system (see Chapter 14).

1.3. Settlement: circulation of securities and link with central securities accounts maintenance

Central depositories also play a crucial role in the circulation of financial instruments by operating one or more securities settlement systems (SSS) – see Chapter 13 – which allow the effective circulation of financial instruments by crediting or debiting the securities accounts of their participants (either within the framework of their own-account transactions or the transactions of their clients). They thus make it possible to “settle” transactions in financial instruments, i.e. via the actual delivery of these instruments (and the corresponding payment), under optimal security conditions.

Under CSDR, a CSD must provide at least two core services:

- the operation of a securities settlement system (or settlement-delivery system) is a core service that must be offered to qualify as a CSD (although a CSD must also offer at least one of the two other core services: notary services and/or central securities accounts maintenance services);
- only CSDs can operate a securities settlement system (as well as central banks acting as CSDs).

Because of their fundamental role in the functioning of financial markets, securities settlement systems are the subject of a dedicated chapter (see Chapter 13).

¹⁵ Other European countries have a different legal approach and consider that the ownership rights to securities are directly attached to the accounts held by the CSD. One advantage of the French provisions is that the securities cannot be attached/seized at the level of the CSD.

1.4. Ancillary services offered by CSDs

Beyond the three core services of CSDs mentioned so far (notary service, central account maintenance service and settlement service), CSDR provides a non-exhaustive list of so-called “ancillary” services that CSDs can offer, including services supporting the processing of corporate actions, tripartite collateral management, the organisation of a securities lending mechanism between its participants, services to issuers, etc.

1.4.1. The processing of corporate actions

Financial instruments usually give their holders a financial return, in the form either of a dividend payment for shares or an interest payment for bonds.¹⁶

In addition, many events can occur in the life of a security, such as transactions related to corporate reorganisations,¹⁷ some of which require the owners of the financial instruments to make a choice between various options (elective). These transactions, referred to as corporate actions, are a corollary of the initial registration of the securities and therefore closely involve CSDs. In this context the latter act as an intermediary between the issuer (or its agent) and the custodian banks and other financial intermediaries who hold the securities on behalf of other intermediaries and/or end investors. They receive announcements and notifications from the issuer, which they pass on in the form of announcements and notices of rights to the financial intermediaries where the securities are deposited. This role in the transmission of information and the control of positions played by CSDs and, at the lower levels of the securities ownership chain, by financial intermediaries, is essential because issuers do not always know who the end investors are (see bearer securities).

Beyond the transmission of information, CSDs also calculate the rights attaching to securities transactions (called

“entitlements”), if necessary register new securities, credit them on the accounts of the beneficiaries (financial intermediaries or end investors depending on the holding model) and, in the case of cash distributions, credit the cash accounts of beneficiaries after receiving the corresponding amounts from the issuer or its paying agent.

In addition, the management of corporate actions is one of the post-trade areas where the EU is making the greatest efforts to improve harmonisation. The Giovannini reports (2001 and 2003) identified the wide variety of rules and practices in the processing of corporate actions in the various European Member States as one of the main barriers to the financial integration of European markets. The harmonisation of practices was therefore seen as a priority for reducing processing costs and the operational risks of this type of transaction. This was the focus of a working group, the Corporate Actions Joint Working Group (CAJWG), bringing together all stakeholders (issuers, market infrastructures, intermediaries), which led in 2009 to the setting of standards applicable to the different categories of corporate actions.¹⁸

In terms of managing the flow of information relating to corporate actions, the Market Standards for Corporate Actions Processing recommend a “waterfall” principle under which it is up to the issuer to notify and provide the issuer CSD with the details of the corporate action. It is then up to the issuer CSD to send the information to the final investor via the chain of intermediaries (investor CSDs, financial intermediaries participating in the CSD and clients).

These standards were used and clarified within the framework of the T2S platform, to which all the euro area CSDs¹⁹ (as well as the CSDs of non-euro markets that wish to do so) have entrusted their securities settlement (see Chapter 14 on T2S). The significant expected growth in inter-CSD transactions and therefore in investor CSD activity has made it essential for the

¹⁶ The remuneration of certain securities may nonetheless be discounted, as is the case for fixed-rate discounted Treasury bills for example, in which case the investor receives no interest payments between the issue and the redemption of the security, since the remuneration lies in the difference between the amount paid by the investor to buy the security and the redemption price.

¹⁷ Categories of corporate actions that affect the number and/or nominal value of outstanding securities such as reverse stock splits, stock splits, etc.

¹⁸ Known as the *Market Standards for Corporate Actions Processing*. These standards were slightly revised in 2012.

¹⁹ At the time of writing this book, only the Finnish CSD has not yet switched its settlement-delivery to T2S, for technical reasons.

Box 3: Market Standards for Corporate Actions Processing

The Market Standards for Corporate Actions Processing cover both inventory-related corporate actions (i.e. based on the positions held on the “record date”, which is the date on which the positions are calculated) and flow-related corporate actions (i.e. applied to outstanding transactions), also called “Transaction Management”.

Inventory-related corporate actions include distributions of cash or securities, distributions with options, as well as mandatory and optional securities reorganisations. Examples include a stock split as part of a mandatory reorganisation or a public tender offer within the framework of a voluntary reorganisation.

European standards define standard timetables for each of these corporate actions and different stages are set depending on the nature of the corporate action. Of great importance is the “record date”, for instance, because it determines when the securities positions on the books of the issuer CSD are taken into account for the calculation of rights to the benefit provided by the corporate action (such as a coupon payment, a distribution or participation in shareholder meetings).

Flow-related corporate actions include market claims, e.g. when investors have not received the financial return attached to the securities held, or conversions (related to capital reorganisations leading to reverse-stock splits or stock splits, for example). Adjustments on distributions are made when the person who should have benefited from the corporate action did not receive the distribution because they did not hold the securities in their portfolio on the record date. This could be, for example, because of a delay in the settlement of a securities transaction, or the time lag between the trading date and the actual settlement date (in this respect, the transition from T+3 to T+2 on regulated markets has reduced the number of flow adjustments). In such a case the adjustment consists in an automatic transfer of the distribution to the legitimate beneficiary. At a more general level, the European standards on transaction management (flow-related corporate actions) aim to automate the securities reallocation process by limiting the intervention of the various parties and preserving the rights of the sellers and buyers of securities.

relevant markets to implement harmonised corporate actions standards. Although the T2S platform does not manage corporate actions directly, it does provide the CSDs with functionalities that make it easier for them to process such transactions. For example, the settlement instructions resulting from corporate actions are settled on T2S, from where the information on securities account balances is also extracted. However, central depositories remain the key player in the management of corporate actions; they maintain their platforms for the transmission of announcements, the calculation of entitlements, the generation of settlement instructions on T2S, etc.

CSDs also provide services relating to shareholder meetings and investment funds. CSDs may offer to forward notices

convening investors to shareholder meetings to financial intermediaries and/or end investors based on the positions held in their books, provide administrative support for the holding of meetings (printing of documents, certificates of participation, etc.), or offer a postal voting service (electronic vote collection, certificates of participation or proxies).

1.4.2. Tripartite management of collateral

As part of the offering developed for investors, participants who wish to can centralize all their available collateral at a single point to facilitate the mobilisation of the securities offered as collateral to the Eurosystem, a clearing house or another market participant. What makes

this centralisation of collateral even more relevant is that some CSDs now offer a tripartite collateral management service, which allows the automation of certain back-office functions and the settlement of repo transactions. Specifically, tripartite management consists, for the “collateral giver” and the “collateral taker”, in delegating the management of securities used as collateral for transactions to a third party, in this case the CSD, which then acts as a tripartite agent. In this role, the CSD automatically selects, based on the preferences expressed by the participant, securities held by the collateral giver and identified as eligible by the tripartite agent in this context and meeting the minimum quality criteria set by the collateral taker.

As part of the selection of securities that a collateral taker is willing to accept, the tripartite agent must therefore define with the latter the baskets of eligible securities. These baskets do not necessarily have standard features and can be individualised for each client. They can also be constructed to reflect diversification and risk mitigation requirements: a cash lender may for instance require to receive only baskets comprising at least 15 different individual issuers, or 70 different lines, or prohibiting certain sectors, types of issuers or types of securities (convertible bonds, for example). In principle, the number of potential baskets is therefore very high.

In practice, a form of standardisation has emerged. In descending order in terms of credit quality, top tier baskets usually include at least so-called investment grade sovereigns (that is, government debt with a rating of, for example, between AAA and BBB on the Standard & Poor’s scale, which corresponds to low risk) as well as supranational issues; second-tier baskets contain, in addition to the securities eligible for the first basket, other types of bonds, e.g. covered bonds²⁰ or bank bonds. The ability to shape baskets based on a wide variety of criteria nevertheless makes them very popular with counterparties.

The algorithms developed by tripartite agents allow them to optimize the investment of collateral givers’ available collateral to secure the highest return on the inventory of available securities. Some CSDs also offer the use of their triparty repo for the calculation and collection of margins associated with derivatives transactions, including for derivatives that escape the clearing obligation but are nonetheless subjected under the European EMIR regulation to mandatory margin calls between the counterparties (see Chapter 11).

1.4.3. Securities lending arrangements between CSD participants

Settlement and tripartite management services may include a securities lending arrangement to enable a counterparty that must deliver securities that it does not hold in its portfolio to borrow said securities to be able to subsequently deliver them – and, thus, to avoid a delivery fail – and to enable securities lenders to optimize the income from their portfolios. In this case, the CSD provides only the technical infrastructure enabling its participants to enter into securities lending transactions with each other, without being involved in these transactions and therefore without incurring any credit risk. However, some CSDs (and in particular international CSDs (ICSDs): see below, Section 4.1) have developed so-called “automatic securities lending” services: an algorithm integrates the prerequisites of both “potential securities lenders” and “potential securities borrowers” and based on this information, sets up the automatic securities lending (i.e. with no ad hoc intervention by market participants), if needed by a market participant who has previously declared itself and been accepted by the system operator as a potential securities borrower (e.g. to allow the release of a pending securities delivery instruction).

1.4.4. Banking-type ancillary services

Certain duly authorised CSDs with a banking license may offer bank-type services for settlement in a currency other than central

²⁰ Covered bonds are bonds whose interest payments and redeemed notional are secured by a set of assets, usually property loans. In France, banks often rely on specialised subsidiaries to issue covered bonds, such as mortgage credit companies or housing finance companies.

bank money: the settlement is then said to be in “commercial bank money”. In practice this is the provision to participants in the settlement system of cash accounts opened in the books of the CSD providing the service. The latter therefore also acts as a provider of cash accounts and can, if necessary, provide its participants with liquidity for the settlement of their transactions. This provision of liquidity is made – almost only – in the form of very short-term (intraday) credit and against the provision of collateral to the lender, i.e. the CSD that manages the system. Of course, the conduct of banking activities exposes CSDs that offer such services to additional credit and liquidity risk, and exposes their participants to counterparty risk, i.e. the risk that they will not have their assets in their CSD cash accounts in the event the CSD goes bankrupt. In practice, it is the ICSDs who offer this service, as the clear majority of CSDs do not have a banking license.

It should also be noted that some CSDs also offer settlement services in a currency other than the currency in which they settle in central-bank money (for example a euro area CSD which also offers settlement against US dollars). In this case it is usually a commercial bank that keeps the cash accounts in the currency concerned.

1.5. The role of CSDs in the implementation of monetary policy

The national central banks (NCBs) of the Eurosystem make direct use of euro area CSDs for the implementation of the Eurosystem’s monetary policy, which for NCBs consists in granting credit to their counterparties against the surrender of eligible collateral (see Chapter 15 on collateral). The surrender of securities as collateral to an NCB involves the book-entry of these securities in securities accounts opened by the NCB with a CSD, as a rule the CSD of its jurisdiction. For example, the Banque de France receives collateral securities in accounts opened in its name with

Euroclear France. The granting of credit to the institutions concerned will therefore only take place if they have transferred enough eligible collateral to the Banque de France’s securities account.²¹

CSDs are thus an important plank in the implementation of monetary policy in Europe, which has led the Eurosystem to develop a set of eligibility criteria for settlement systems and the CSDs that operate them, aimed at ensuring that they meet legal and operational security requirements (see Chapter 13).

As part of the implementation of the single monetary policy of the Eurosystem, a “single list” of securities eligible as collateral for all NCBs has been drawn up. To ensure that this harmonisation does not remain purely theoretical and can be effectively implemented through the delivery to the various NCBs of eligible securities that have been issued in CSDs other than those of their respective jurisdictions, the Eurosystem has actively sought solutions to allow the circulation of securities from one jurisdiction to another. Due to the lack of technical, legal and operational harmonisation of the euro area markets, which impeded the movement of securities between CSDs and resulted in high interoperability costs, the Eurosystem first set up an asset custody system between NCBs (correspondent central banking model).²² At a more structural level, to facilitate the effective circulation of securities between European markets and especially within the euro area (not only for the implementation of monetary policy but also for the functioning of European financial markets), the Eurosystem subsequently decided to launch the T2S project (see Chapter 14), to facilitate settlements between CSDs – and thereby increase the efficiency of the links between them – and, ultimately, to make the circulation of securities within the “T2S area” more fluid.

The Eurosystem Collateral Management System (ECMS), which is a harmonised collateral management project at the level of all Eurosystem national central

21 When a CSD operates in central bank money, i.e. when the funds leg of its transactions is settled in the books of a central bank, this allows the counterparties to also benefit from intraday credit with the local NCB, against the surrender of collateral securities which are the same as those used for monetary policy operations. Please refer to Chapters 1 and 15 for more information on these topics.

22 <https://www.ecb.europa>

banks, is currently being developed, with deployment planned for the end of 2022. For further details please refer to Chapters 7 (Section 6.4) and 15 (Sections 4.2 and 4.3).

2. Regulation and oversight of CSDs

Because of their systemic importance, central depositories have always been subject to special regulation and oversight.

2.1. Types of risks to which a CSD is exposed

Like other market infrastructures, CSDs conduct a critical activity and are systemically important to the smooth functioning of the financial markets they serve. The PFMI therefore recommend that they should equip themselves with systems and policies aimed at protecting them against any risks that could prevent them from performing their duties.

- **Legal risks**, which concern both CSDs and their participants. To mitigate the legal risks borne by the participants of a CSD, CSDR requires central securities depositories to have clear and understandable rules, procedures and contracts for all the securities settlement systems that they operate and all other services that they provide. Beyond these purely contractual aspects, the national legislative frameworks contribute directly to the legal certainty of the participants. In particular, each Member State of the European Union has transposed the “Finality” Directive,²³ which introduces a regime that derogates from the law of bankruptcy and thus provides greater protection to participants exposed to the default of another participant, up to notification of such default to the settlement system or until the end of the business day on which such notification occurs. Please refer to Chapter 5 for a more detailed description of the concept of settlement finality, and the moments that delineate it.

The CSD may itself be subject to legal risks, particularly when as an investor CSD it establishes a link to another CSD (“issuer CSD”). Indeed, the establishment of this link requires the investor CSD to become a participant of the issuer CSD, which is usually established in another jurisdiction with different legislation (therefore potentially conflicting laws) and which has adopted contractual documentation that could lead to risks for the participants. All these legal elements must be analysed precisely before the establishment of a link, to ensure, for example, that the investor CSD may, if necessary, recover the financial assets entered into its account if the issuer CSD were to be liquidated, i.e. that the assets registered in the securities accounts in the name of the investor CSD cannot be seized on behalf of the issuer CSD).

- **Operational risks**, as the activities of the CSDs rely on complex information systems and specialised human resources to carry out their activities. They must therefore have a framework for managing operational risks that meets the most demanding standards (risk mapping, identifying incidents, setting up action plans, governance, etc.) and business continuity plans (especially in the IT area) so that risks are properly monitored and addressed.
- **Credit and liquidity risks** concern central depositories operating in commercial bank money and providing banking-type ancillary services, such as intraday credit. When a CSD grants loans to its participants, this creates credit exposures on those participants, who are required to repay the loans quickly. The durations of these credit exposures are short, but they can be renewed every day depending on participants’ liquidity needs to settle their securities transactions and the amounts can be significant because of the high values of these securities transactions. Adequate identification,

23 See Chapter 15, Box 5.

monitoring and risk management systems must be in place and the custodians concerned must also make sure that they have enough liquidity to meet their obligations at all times and in all currencies required.

- **General business risk**, including losses from poor execution of business strategy and operating losses. The capital requirements of a CSD must allow for its possible liquidation (as a trading company and not of course as a central depository) or an orderly restructuring over a period of at least six months, consistent with the PFMI 15 recommendations (general business risk). In practical terms, this requires the CSD to be able to ensure, in all circumstances, the payment of all operating costs over a period of at least six months, hence the requirement that the capital of a CSD covers at least an equivalent amount.
- Lastly, if applicable, **the risks associated with the custody of securities** on behalf of participants, when a CSD has received authorisation from its authorities to offer custody of securities (“ancillary” service to investment services defined under MiFID 2/MiFIR²⁴ and where the national legal framework provides that ownership rights to the securities are attached to the securities accounts maintained by the CSD. The latter, even when offering securities custody, usually has a different market position from custodians, and is not intended to take over their intermediary role (especially in indirect holding models).

Effective governance should ensure a coherent strategy for the development of the CSD’s activities by constantly verifying that its exposure to risk does not exceed the maximum exposure that would trigger the implementation of the recovery plan²⁵ or, in a more serious situation, a resolution plan. The CSD must be able to identify, monitor and mitigate the risks to which it is exposed. Its own funds must be proportionate to its risk exposure, and it must invest them

either in cash or in highly liquid assets with minimal market and credit risk and which must be able to be liquidated in a timely manner, with a minimal negative effect on prices.

2.2. International oversight standards applicable to CSDs

International standards for CSDs and SSSs were published in 2001, revised in 2012 and incorporated into the Principles for Financial Market Infrastructures (PFMI – see Chapter 18).

However, the PFMI are not directly binding in the different countries; they serve above all as reference standards on which national (or European) legislation must be based to regulate the operations of market infrastructures. In the wake of the 2008 financial crisis which, despite the solidity of infrastructures and their good management of crisis situations, highlighted the need to better regulate their activities and the functioning of markets, the European Union published in September 2014 the CSDR, which is directly applicable and binding for European CSDs. Other European regulations were adopted at about the same time for other types of market infrastructures, e.g. EMIR in 2012, then revised in 2019, for CCPs and trade repositories and the ECB Regulation in 2014 for systemically important payment systems.

2.3. The European CSDR

Until recently, the operations of central depositories were governed mainly by national regulations.²⁶ In France, the activities of Euroclear France, the central securities depository and the manager of the ESES²⁷ securities settlement system, were thus governed by the provisions of the French Monetary and Financial Code and the Financial Markets Authority’s General Regulation (AMF).

CSDR, is largely inspired by the PFMI, which it aims to make binding while supplementing them with additional

24 Directive 2014/65/EC and Regulation 600/2014 “Financial Instruments Market”, published on 12 June 2014 in the Official Journal of the European Union. “MIF 2” came into effect on 3 January 2018 (see Chapter 5, Section 1.2.2).

25 Under CSDR, every European CSD is required to establish, implement and maintain operational an adequate business continuity policy and disaster recovery plan to ensure the preservation of its services, the timely recovery of operations and the fulfilment of the CSD’s obligations in the case of events that pose a significant risk of disrupting operations.

26 With the exception, however, of the so-called “Finality” Directive of 1998 (Directive 98/26/EC of the European Parliament and of the Council of 19 May 1998 on settlement finality in payment and securities settlement systems) which establishes a regime for settlement finality in payment and securities settlement systems, and the 2002 Financial Collateral Directive. These two directives introduced harmonisation in these areas at EU level.

27 ESES (Euroclear Settlement of Euronext-Zone Securities) is a securities settlement platform shared by three central securities depositories: Euroclear France, Euroclear Belgium and Euroclear Nederland. See Chapter 13.

regulatory requirements, and essentially aims at strengthening the safety and efficiency of these infrastructures. To this end, it introduces several harmonised requirements in the European Union, both for the functioning of markets and the operating conditions for CSDs.

Regarding the functioning of markets, the requirements include:

- the full deployment of the dematerialisation of securities (effective in France since 1984) or their immobilisation, from 1 January 2023 for transferable securities admitted to trading from that date and from 1 January 2025 for all transferable securities admitted to trading irrespective of their issue date. Immobilisation is related to the obligation to record in an account all transferable securities tradable on regulated markets, even when they have been issued in physical form;
- the harmonisation of the length of the settlement cycle, now no more than two business days between the trading date T and the settlement date T+2 for transactions traded and executed on trading platforms;
- the strengthening of the regulation discipline by mandatory preventative measures to avoid settlement fails, financial penalties in the event of late settlement, supplemented by a forced buy-in procedure²⁸ when the delay exceeds four days – or seven days for illiquid securities as well as securities listed on SME growth markets;
- the strengthening of risk control requirements when establishing and maintaining inter-CSD links;
- the decompartmentalisation of post-trade activities in Europe, which is still, despite the progress already made in terms of harmonisation, confined to “national silos.” Two important measures should contribute to achieving this goal:

- issuers must be able to register their securities in the European CSD of their choice, and no longer necessarily in their domestic CSD, subject to compliance with certain provisions of the applicable law of their country of origin. This was in theory possible before the adoption of CSDR but was rarely implemented in practice; by explicitly providing for this possibility, CSDR aims to further open the “issuer CSD” activity to competition between CSDs in the European Union. This should in principle allow issuers to select the CSD(s) that are the most efficient in the management of their securities;
- at a more general level, a CSD can provide its services throughout the territory of the European Union, provided that these services have been authorised. The CSD must nevertheless have obtained the required “passports” to handle securities governed by the law of an EU jurisdiction other than its own;
- CSDR also asserts the right for each CSD to have access to the transactions of clearing houses acting as central counterparties (CCP) and to trading platforms based in other European countries, so that they can process some of the transactions of these entities, which need a settlement service to materialize changes in the ownership of financial instruments (for example following purchases and sales of shares traded on a regulated market). This is a strong measure toward the liberalisation of the European post-trade market, which aims to “open up” national settlement markets and thus prevent national monopolies from perpetuating themselves, particularly in countries where “silo”²⁹ models currently preclude (or at least challenge) the possibility for a CSD other than the domestic CSD to process the transactions of a local

²⁸ Automatic buy-in procedure the execution of which may be entrusted to a CCP for cleared transactions or organised in the rules of trading venues.

²⁹ Vertical silo: integration of trading and clearing of financial instruments, and their clearing and/or settlement within the same group.

clearing house or trading platform. Any refusal of the CCP or the trading venue must therefore be duly justified by a thorough assessment of the additional risks that such access by a “third party” CSD would entail and may under no circumstances be motivated by commercial considerations. Similarly, a CSD must allow “non-local” CCPs and trading platforms to access its settlement system and can only deny such access if it would entail excessive risk.

CSDR also introduces several types of requirements applicable to CSDs:

- as far as possible, a CSD must carry out settlement transactions in central bank money, except in the (rare) cases where this is not possible;
- organisational requirements: CSDs are required to have robust governance arrangements. Their governing bodies must be composed of members with the requisite level of good repute and experience. For each settlement system that they manage, they must set up a committee of users representing issuers and participants in the system;
- CSDR also introduced conduct of business rules. Central depositories are required to publish the criteria for participation in their systems. These criteria must be transparent, objective and non-discriminatory. The rates that CSDs charge must also be transparent;
- several requirements, some of which reassert the PFMI, are laid down for the services provided by CSDs:
 - the first requirement is to verify the integrity of the issue. CSDs are therefore required to make accounting reconciliations at least daily to ascertain that the number of securities that make up an issue is equal to the sum of the securities held in the securities accounts of the participants in the securities settlement system that they operate (see Section 1.2.);
 - CSDs must segregate their own assets from those of their participants (if necessary) and open at least one securities account for each of their direct participants. They must also offer different levels of securities segregation by allowing any participant to distinguish its own securities from those of its clients (and any client to isolate its own assets from those of the direct participant of the CSD through which it accesses the CSD’s settlement system). The clients of a participant can elect to have their own securities account in the CSD’s books (this is called “individual segregation by client”) or not (“collective segregation of clients”) via “omnibus” accounts: see Section 1.2.1, Box 1 on holding models;
 - CSDs must settle transactions, either in real time or on an intra-day basis, and in any case no later than before the expiry of the agreed settlement date. The rules for determining the finality of funds and securities transfers must be made public and the moments of entry into the system and irrevocability of transfer orders must be clearly defined. All securities-for-funds transactions must be settled using the delivery-versus-payment (DvP) mechanism (see Chapter 13) and, as far as possible, in central bank money (see Chapter 1);
 - CSDs must have disclosed rules and default management procedures in place to contain liquidity issues and be able to continue to fulfil their obligations. These procedures are reviewed and tested regularly with participants;

- CSDs must remain responsible for the services they outsource and obtain the approval of their competent authorities before outsourcing a core service to a third party.³⁰
- lastly, a CSD cannot provide bank-type ancillary services or rely on a credit institution to provide these services unless it has been duly authorised to do so. To provide such services, it must be approved as a credit institution in the European Union and obtain a specific additional authorisation under CSDR. CSDs authorised to provide banking services are thus subject to additional capital requirements and must have an appropriate framework for monitoring and managing credit and liquidity risks, including on an intra-day basis. In particular, their exposures to credit risk must be fully covered by high-quality collateral;
- prudential requirements lay down that CSDs must be able to identify, monitor and manage the legal, general business and operational risks relating to their activities, as well as the risks arising from their investment policy. Capital requirements are thus introduced to ensure that CSDs can adequately cover the aforementioned risks, and the calculation of these capital requirements is inspired by banking regulations.³¹ Beyond these capital requirements, there are others, which are calculated to ensure the liquidation or orderly restructuring of their operations over an appropriate period of at least 6 months in a crisis scenario;
- inter-CSD links are also subjected to requirements (see Chapter 13): an “investor CSD” may establish a link to an “issuer CSD” by becoming its participant, so that its own participants may process financial instruments issued by the “issuer CSD”. The legal, operational and financial risks that may be caused by this participation in another CSD must be identified and, where appropriate, brought under control.

3. The French CSDs

3.1. Euroclear France

3.1.1. History

In the early 1990s, the French CSD (then called Sicovam before its acquisition by the Euroclear group) coexisted in France with a department in the Banque de France that acted as a CSD, and there was a segmentation by type of security between these two players: Sicovam (and its Relit system, launched in 1990) for exchange-traded securities, equities, corporate bonds and government bonds; the Banque de France (and its Saturn system launched in 1988) for treasury bills and, in a second stage, all money market securities.

As the Paris market expressed its desire to have a single securities settlement system, which would allow all securities issued in France to be centrally processed, an agreement was reached at the end of 1995 under which the Banque de France transferred to Sicovam SA its settlement operations relating to treasury bills and money market securities. Sicovam launched a capital increase restricted to the Banque de France in return for the contribution of the latter’s Saturn system, allowing it to raise its shareholding in Sicovam from 5% to 40%. At the same time, Sicovam announced the launch of a new securities settlement system called *Relit Grande Vitesse* (or RGV), which was launched in 1998 and enabled the Paris market to enjoy a state-of-the-art technical solution for all French securities. Furthermore, the centralisation of all Treasury issues in a single system (RGV) facilitated arbitrage between securities with longer maturities (OATs) and those with shorter maturities (treasury bills).

In 2000, Sicovam combined with Euroclear, which became the sole shareholder after the French banks exchanged all their Sicovam shares against Euroclear shares (the French banks had previously bought from the Bank of France all its Sicovam shares). The French CSD thus became Euroclear France SA in early 2001.

³⁰ Except when the CSD outsources certain services or operations to a public entity and this outsourcing is governed by a specific legal, regulatory and operational framework that has been agreed and formalised jointly by the public entity and the CSD and approved by the competent authorities on the basis of the requirements established by CSDR (in practice, this also covers the outsourcing to T2S of securities settlement by the CSDs participating in T2S, including Euroclear France since 12 September 2016).

³¹ CSDs not authorised to provide banking services must use the basic indicator approach (BIA) for calculating capital requirements; CSDs authorised to provide banking services may, if they have been authorised to do so, use the advanced measurement approach (AMA) or the standardised approach (SA).

It is one of the six central depositories of so-called “national” securities integrated into the Euroclear group,³² plus Euroclear Bank, which is an “international” central securities depository (ICSD; see below Section 4.1).

3.1.2. Euroclear France’s service offering

Core services

In the French market, Euroclear France provides the three core services of a CSD as defined by CSDR: 1) initial recording of securities in a book-entry system³³ (“notary service”); 2) providing and maintaining securities accounts at the top tier level (“central maintenance service”); and 3) operating a securities settlement system (“settlement service”), in this case ESES. The ESES system was developed for the three CSDs historically serving the Euronext markets in France, Belgium and the Netherlands.³⁴ While, legally, three ESES systems are operated by three different CSDs, each of which is governed by the law of the country in which it is established, technically it is a single platform, located in France.

Ancillary services

In addition to these three core services, Euroclear France offers nearly all the non-banking ancillary services listed by CSDR. They are services related to the notary service and to central accounts maintenance services, for example:

- the allocation and management of ISIN codes;
- the management of registered shares for updating shareholder registers;
- the management of shareholder registers, in particular thanks to the shareholder identification service in partnership with Capital Precision to look for non-resident shareholders and allow issuers to better know their investors and thus increase their participation in shareholder meetings or to organize events specifically targeting potential investors;
- establishing links with several markets, mainly European. These are either direct links to other CSDs or links relayed³⁵ via Euroclear Bank, which tend to be replaced by direct links when the issuer CSD to which a link is established also participates in T2S (the links relayed by Euroclear France to the German and Italian CSDs, Clearstream Banking Frankfurt and MonteTitoli, for example, were replaced by direct links in early 2017). Euroclear France in fact intends to set up new direct links in the medium term, mainly in the T2S environment, which will allow Euroclear France participants to enjoy inter-CSD transaction costs equivalent to those of domestic transactions. Around 40% of the debt securities currently held by Euroclear France are foreign securities. Conversely, several foreign CSDs have opened a securities account with Euroclear France to allow their participants to have access to securities issued in France, without having to become participants of the French CSD;
- the processing of corporate actions, at the issuer’s request:
 - notification of upcoming corporate actions;
 - management of these corporate actions with, where appropriate, the distribution of cash or securities to the appropriate accounts, and the provision of statements to the issuer;
 - notice of shareholder meetings and related voting services in partnership with Broadridge Financial Solutions. This optional service launched in 2013 covers shares listed on Euronext Paris and Alternext. The notification is done automatically, either by sending a message in ISO format, or by sending an e-mail. Other services provided include electronic voting, the collection of attendance certificates and proxies. In the context of the T2S platform, these postal voting services could be extended to pan-European securities.

32 Euroclear France, Euroclear UK & Ireland, Euroclear Nederland, Euroclear Belgium, Euroclear Finland and Euroclear Sweden.

33 Certain financial instruments such as negotiable debt securities may, however, at the option of the issuer, be recorded in an issue account held either by the central depository or by a custodian who then acts as the domiciliation agent.

34 The Portuguese CSD Interbolsa, which serves Euronext Portugal, does not use the ESES system.

35 Contractual and technical agreement that allows an investor CSD to hold (and offer settlement on) securities issued by an issuer CSD through a securities account held with a third party CSD (“middle CSD”).

Euroclear could also serve as a relay to allow foreign investors to use the secure electronic voting platform called Votaccess.³⁶

Securities settlement services

Through its SBI platform (brokerage firm – intermediaries), Euroclear France offers order execution confirmation services between financial intermediaries which receive/transmit orders and market members responsible for executing the orders;³⁷

Euroclear France also offers a tripartite collateral management service;³⁸ this service has been operational since November 2011 and is gradually being extended. It allows Euroclear France participants to entrust it with the day-to-day management of the assets deposited as collateral with the Eurosystem (see Section 1.4 above for a description of a tripartite repo). Since June 2013, intra-operability has been

in place between Euroclear France and Euroclear Bank, which allows a Euroclear France participant to receive collateral or send collateral to a counterparty whose securities account is open with Euroclear Bank, and vice versa. The scope of securities available for this service was expanded in 2013 and 2014, through the establishment of relayed links, via Euroclear Bank, between Euroclear France and the CSDs of the German, Italian, Belgian, Austrian and Greek markets. This scope is expected to continue expanding.

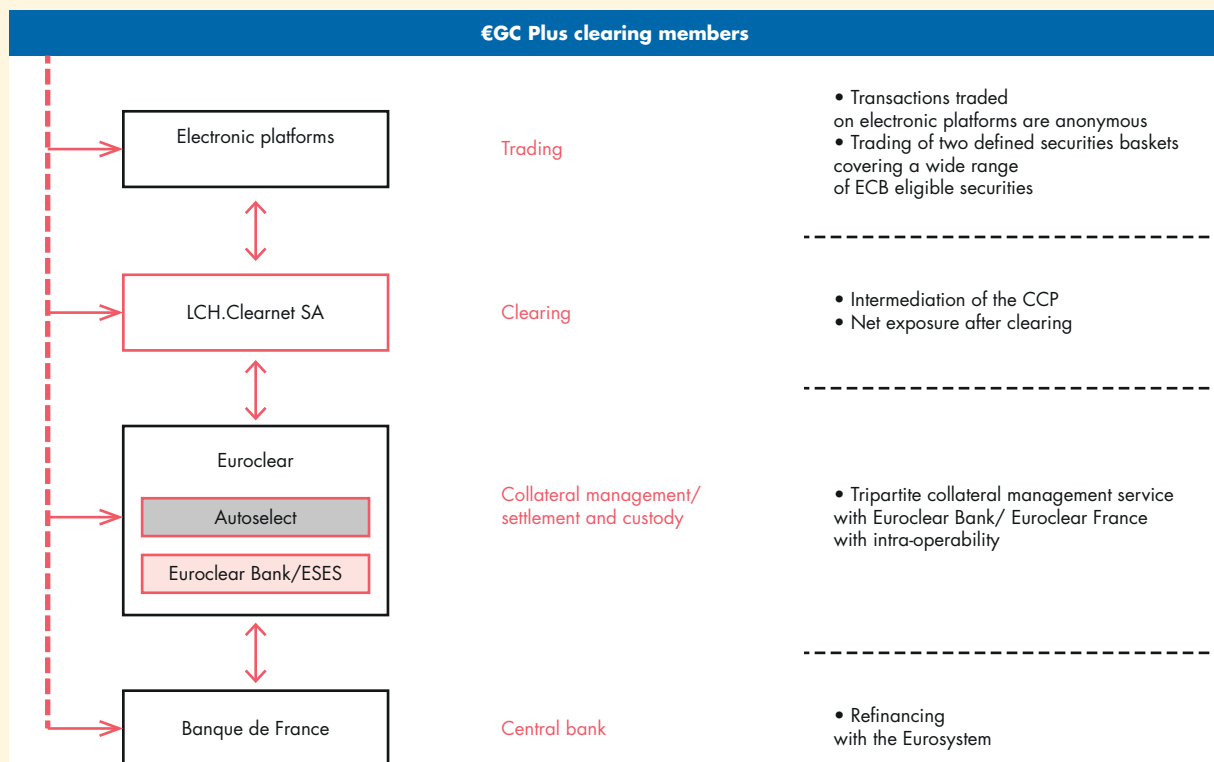
Since June 2014, the tripartite collateral management service of Euroclear France has been supplemented by a triparty repo offering called eurosGC Plus that is cleared by the French clearing house LCH SA. In this context, LCH SA provides its transaction completion guarantee and centralizes the management of counterparty default risk. The characteristics of this service are portrayed in the Box 4.

36 See the AFTI publication of 18 June 2014 entitled "VOTACCESS: three years of implementation": <http://www.afti.asso.fr>

37 As T2S does not have a trade confirmation function, the SBI subsystem has been maintained after the Euroclear France migration to T2S, with the creation of a link between SBI and T2S to generate the settlement.

38 See the 2017 Banque de France oversight report, available on its website: <https://www.banque-france.fr/sites>

Box 4: Diagram describing the eurosGC Plus service (cleared triparty repo)



In 2006, Euroclear France set up a platform for automated routing and marking of subscription/redemption orders for fund units (in particular UCITS) between the issuer of the order and the centralising agent. The platform also sends status messages and confirmation messages that allow the various parties to track the processing of their orders. A large majority of French funds are eligible for the order routing platform, which also supports foreign funds distributed in France, and allows automated processing of transactions on funds (STP or straight-through processing). It is widely used: the platform processes around 80% of all fund orders. The remaining 20% are processed outside the platform, either because the fund is not eligible or because orders are transmitted too late and are therefore given over the phone. Regardless of how orders are placed (i.e. via the platform or manually), settlement is made via the ESES France platform.³⁹

Euroclear France intends to adapt and broaden its service offering in the context of financial market integration since its migration to T2S in September 2016, in particular by expanding its network of links to other issuer CSDs (see Chapter 14).

3.2. ID2S

3.2.1. Presentation

ID2S is a new French CSD, authorised on 2 October 2018 under the European regulation, CSDR, to carry out its activities within the scope of commercial paper and in particular NEU CP (see Box 5). ID2S has also been involved in T2S, a pan-European securities settlement platform, since 28 October 2018.

ID2S, a public limited company majority owned by Orange Group,⁴⁰ operates a system for the settlement and delivery of financial instruments called the Rooster Securities Settlement System (RSSS).

ID2S is a new generation depository, the only newcomer to the European securities depository landscape, which has been able to take advantage of the absence of “legacy” to develop flows that minimise operational risk due to a total absence of manual intervention in the settlement process. It can therefore ensure total straight through processing (STP) from the NEU CP issuance to final settlement in TARGET2 Securities (T2S).

³⁹ Excluding “employee savings” type funds or funds whose distribution is strictly limited to one institution.

⁴⁰ Orange Group has a 93% stake in ID2S. The remaining 7% is held by Citigroup.

Box 5: NEU CP

NEU CP (Negotiable European Commercial Paper) is commercial paper issued by companies, financial institutions and public sector entities in order to cover their short-term financing needs. Typically, NEU CP has a maturity of approximately three months, extending to a maximum of one year. The issue is authorised on the basis of financial documentation which includes, among other requirements, an issuance programme.

The market comprises around 400 issuers and several hundred institutional investors (money market funds, etc.). The bulk of NEU CP activity takes place on the primary market. Transactions on the secondary market correspond to around 25% of primary market transactions.

Thanks to the NEU CP market, issuers can diversify their funding sources while investors can gain access to other (euro and foreign-currency denominated) investment vehicles. This market was reformed on 31 May 2016 in line with European regulations and international standards. In accordance with the provisions of the Monetary and Financial Code (Articles L.213-1 and D.213-1. *l et seq.*), securities issued after 1 June 2016 are “short-term negotiable securities”, following the changes introduced by the aforementioned reform, but their commercial denomination is NEU CP. The use of either of these names, legal or commercial, is equivalent.

ID2S is also the first CSD to apply distributed ledger technology (DLT), using a private blockchain (see Chapter 20, Section 2), to perform its notary function.

Using blockchain technology offers back-office enhancements such as a forgery-proof record chronology thanks to consensus validation processes (“nodes” in the blockchain) and the ability to go back to a reliable information source in the event of a data-integrity breach. Blockchain also offers tighter security by replicating data in the different nodes, which appears to be more efficient than using a conventional database.

ID2S also has a strategic partnership with NowCP, a multilateral trading platform licensed as an investment firm. NowCP is majority owned by Orange but also counts other NEU CP market players among its shareholders. ID2S offers real-time settlement for a trade executed on the basis of a one-off request arising during the D day and not one or two days before. In January 2020, issuers started using NowCP and ID2S for their short-term financing needs.

3.2.2. ID2S’ service offering

ID2S’ service offering reflects the possibilities offered by the new regulations. ID2S has no intention of replicating the existing depository model. Its ambition is to offer new opportunities to issuers and investors, within the framework of the objectives defined by the CMU. ID2S provides three core services as set out in the European CSDR regulation: a notary service, a centralised account maintenance service and a settlement service. Within the scope of its authorisation, ID2S can also provide four non-bank ancillary services: settlement matching and instruction routing; services related to the processing of corporate actions; allocation and management of ISIN codes; and provision of information, data and statistics.

3.3. Authorisation and oversight of CSDs

The authorisation and oversight of a CSD are carried out by the “competent authority” of the Member State in which the CSD is established.

CSDR authorisation is an important issue for European CSDs: while the EU Regulation provides for a “grandfathering clause” that allows existing CSDs to continue operating until the authorisation process has been completed, a refusal by the competent authority obliges the CSD to cease offering the three core services defined by CSDR: notary service, central securities accounts maintenance service and securities settlement service. Specifically, this would mean the cessation of its operations, either on a definitive or only a temporary basis if a new application is submitted that allows it to be authorised.

There may be one or more competent authorities for a given CSD, depending on the organisation chosen by each Member State. For example, two “competent authorities”⁴¹ have been designated in France (the *Autorité des Marchés Financiers*, or AMF – the Financial Markets Authority) and the Banque de France), while only one competent authority has been designated in Germany (the *Bundesanstalt für Finanzdienstleistungsaufsicht* or Bafin). The designation of two competent authorities in France extends the missions that had been entrusted to the Banque de France and the AMF before CSDR, the oversight of the ESES France⁴² and RSSS settlement systems and the supervision of the Euroclear France and ID2S CSDs, which manage the ESES France system and the RSSS system, respectively.

In addition, CSDR introduces a second type of authorities, the “relevant authorities”; i.e. the authorities responsible for overseeing the securities settlement system operated by the CSD, and the central banks of issue (of the central bank money used in the CSD). During the authorisation process of a CSD

⁴¹ See Chapter 18 on the oversight framework.

⁴² Euroclear France has been outsourcing the settlement of the transactions of Euroclear France participants to the pan-European T2S platform since September 2016; Euroclear France participants nevertheless maintain a contractual relationship with their CSD, and the ESES system is maintained independently of outsourcing to T2S. The Eurosystem oversees the T2S platform (with the ECB acting as lead overseer) and by a cooperative body bringing together all the central banks and market authorities of the jurisdictions in which at least one CSD participates in T2S, as well as the ECB and ESMA.

under CSDR, the CSD's "relevant authorities" may communicate to the competent authority their (non-binding) opinion on the characteristics of the settlement system and issue a reasoned opinion (legally binding)⁴³ regarding the authorisation of any banking services that the CSD wishes to provide to its participants. The Regulation provides for consultation and cooperation mechanisms between the different authorities.

In the case of Euroclear France and ID2S, the "relevant authorities" are: the Banque de France because of its oversight role over the securities settlement system, and the Eurosystem, represented by the Banque de France, as the central bank of issue of the euro, which is the only currency processed in Euroclear France and ID2S. In France this role is reinforced by the competent authority status devolved to the Banque de France, which ensures an effective link between the functions traditionally performed by central banks (system oversight and central bank of issue as the relevant authority) and the regulatory supervision of the French CSD (performed by the AMF).

A cooperation mechanism between the home and host Member States is also provided for when a CSD provides services in more than one Member State, in particular where the CSD's activities in the host Member State are viewed as "material"⁴⁴ for the proper functioning of the markets. The competent authority of the home Member State may decide to establish a college of oversight bodies.

CSDR also provides for continuous oversight of CSDs by their competent authorities after authorisation, and the authorities should in particular review the CSD at least annually to ascertain whether it still complies with the requirements of the Regulation.

Lastly, third-country CSDs may be authorised to offer services in EU countries provided that the European Commission has recognised the equivalence of the third country's legal framework with that of the EU and that the CSD has been recognised by the ESMA.

4. Other European CSDs and settlement outside Europe

In Europe, with the notable exception of Ireland,⁴⁵ there are at least one or more CSDs in each country. There are some 40 European CSDs, which are very diverse both in terms of size and operations, and some are specialised in certain categories of securities. While the two international securities depositories (or ICSDs) are in a niche of their own, the landscape of so-called "national" CSDs is heterogeneous and dominated by a few players whose size reflects that of the financial centres of their country of establishment.

4.1. International central securities depositories or ICSDs

The two international central securities depositories (ICSDs), Euroclear Bank (based in Belgium) and Clearstream Banking (based in Luxembourg) were established in the late 1960s – early 1970s at a time when there was significant growth – mainly in Europe – in the volume of securities issued to international investors, but with the special feature of being denominated in a currency other than that of their country of issue: these are called "Eurobonds".⁴⁶

Initially, the volume of Eurobonds in USD issued by US issuers to European investors also grew strongly; the Eurobonds investor base gradually expanded due to the fact that they were exempted from the rules applying in the various national markets. Eurobonds are indeed exempt from the national laws of both the issuers' establishment jurisdictions, as well as the establishment jurisdictions of ICSDs (market regulations, contractual frameworks in force in national bond markets, etc.). Nowadays, the Eurobonds market is by far the largest international capital market; it groups bond issues aimed specifically at cross-border distribution and at investors in Asia, the United States and Europe in particular.

These securities are issued in the form of one or more physical certificates. Until recently,

43 If the competent authority of a CSD receives a negative reasoned opinion and nevertheless wishes to grant authorisation, it must draft a reasoned opinion responding to the objections of the authorities consulted within 30 days. In the disagreement persists, a consulted authority may refer the matter to the ESMA, which will check the compliance of the final decision made by the competent authority.

44 In practice, a CSD is considered to have become "material" in another Member State when it accounts for more than 15% of the top tier notary/securities account maintenance services, or more than 15% of the settlement operations in this State, whether from an issuer or participant point of view.

45 The securities settlement system serving the Irish market is, for the time being, operated by Euroclear UK & Ireland, which is legally established in the UK on the same technical platform serving the UK market. In the perspective of Brexit, non-sovereign securities, currently processed by EU1, are expected to be transferred to Euroclear Bank (sovereign securities have been handled by Euroclear Bank since 2000).

46 The Eurobonds market expanded in the 1960s for issues denominated in US dollars, mainly due to regulatory constraints impeding financial operations between States and taxes on investors in the United States.

they were held in the vaults of banks (“registrars” or “common depositories” in the case of ICSDs, which used the same depository bank when both were involved in the issuance of the same security); as a result, the ICSDs had no direct relationship with issuers. This situation evolved in mid-2006, when the issuance process of the most commonly used Eurobonds changed, allowing the establishment of a direct contractual relationship between issuers and the ICSDs. Since then, issuers file their physical certificates of issuance with the ICSDs, and the ICSD records are considered the most authoritative source for determining both the amounts issued and the amounts outstanding.

Immobilising the securities allows the ICSDs to enter them by book entry into their systems and to offer them for settlement while avoiding any physical exchange of certificates. This centralising function played by ICSDs when they immobilise and facilitate the settlement and delivery of Eurobonds is still an important part of the business of international central depositories. The two ICSDs still concentrate a significant share of Eurobond issues, but some CSDs are also growing this business. Euroclear France has for some years been an issuer of Eurobonds, thanks to the introduction in France in 2000 of Euro Medium Term Note (EMTN) programmes under French or foreign law. However, Eurobond outstandings issued with Euroclear France remain significantly smaller than those of the ICSDs.

The growth of the Eurobonds market quickly gave Euroclear Bank and Clearstream Banking Luxembourg a critical size. The legal and tax characteristics of these securities give them a unique status in Europe. The development of their issuer CSD operations paralleled that of the settlement of these securities. Because of their international clientele, as “investor CSDs,” the two ICSDs developed a very strong network of links with other CSDs around the world, and thus facilitated the indirect access by investors from many countries to the services that complemented direct access. These links also enable them

to provide services for more “traditional” securities, e.g. equities and bonds, which are held with them after having been transferred via links established to issuer CSDs. They are thus able to offer intermediation services, in competition with global custodians (banks specialised in custody with a very broad international coverage) and certain CSDs, in many foreign markets. The two ICSDs currently account for about half of the settlement activity in Europe and of the value of securities held by CSDs established in Europe.⁴⁷ This high level of concentration reflects the centralisation of securities by investors from third countries, and to a lesser extent from European countries, as centralisation brings significant benefits in the management of their liquidity and assets.

As the settlement of Eurobonds in central bank money is difficult because they are mainly denominated in currencies other than the euro and are traded between market participants who mostly have no direct access to a central bank of the euro area, the two ICSDs have obtained bank authorisations to be able to grant intraday credit to their participants themselves, and thus ease settlement by allowing the provision of liquidity to the system. From the outset, ICSDs have combined central securities depository functions with banking services. They are now supervised not only as CSDs but also as credit institutions.

The granting of intraday credit involves the provision of cash accounts to settle securities transactions. A similar rationale underlies the granting by the ICSDs of intraday or overnight credit to participants to facilitate the settlement of their purchases of securities. Euroclear Bank and Clearstream Banking Luxembourg now offer tripartite collateral management services and have set up automated securities lending/borrowing programmes; they even guarantee to securities lenders that they will substitute for defaulting borrowers in the event that borrowed securities are not returned to them on the agreed date. The banking services offered by the ICSDs therefore allow the settlement of securities in commercial

⁴⁷ Most recent available data – 2018 <http://sdw.ecb.europa.eu/reports>

bank money. However, they are subject to additional credit and liquidity risks to which national central depositories that settle in central bank money are not subject.

While the ICSDs are the most emblematic examples of CSDs operating in commercial bank money, this is not their reserved domain: the German CSD Clearstream Banking Frankfurt, for example, in fact operates two settlement systems, one in central bank money and the other in commercial bank money. Clearstream Banking Frankfurt's commercial bank money system is technically operated on the same platform as that of Clearstream Banking Luxembourg, which allows a very smooth flow of securities between the participants of the German CSD and the Luxembourg ICSD. It is mainly intended for non-German securities held by CBF clients.

4.2. "National CSDs" in Europe

Almost all European countries have at least one CSD established in their jurisdiction to serve the domestic securities market. In most countries, only one CSD manages all the financial instruments traded in the market, but in some cases several CSDs coexist, with some of them for example specialising in specific categories of securities.

The size of a CSD thus largely reflects that of the market served, the largest in terms of settled amounts being Euroclear UK & Ireland in the UK, Euroclear France, Clearstream Banking Frankfurt in Germany, Monte Titoli in Italy and Iberclear in Spain. The activities are therefore very concentrated: according to the European Central Securities Depositories Association (ECSDA), at the end of 2016 the two ICSDs and the three largest CSDs accounted for 76% of the EUR 50.4 trillion in securities held in European Union CSDs. The size of the five largest national CSDs taken together is comparable to that of the two ICSDs. For more details or updated data on the operations of the CSDs established in Europe, refer to the ECSDA website, which publishes annually updated statistics.⁴⁸

4.3. CSDs elsewhere in the world: the examples of the United States and Japan

Two systems coexist in the United States. The Federal Reserve has set up a settlement system called Fedwire Securities, for government securities issued by the US Treasury as well as government agencies, government-sponsored entities, and certain international organisations. The securities are issued and registered electronically by Fedwire Securities and offered for settlement (either free of payment or delivery versus payment) in a manner very similar to that of the systems operated in Europe (indirect holding model, direct participation in Fedwire Securities being restricted to custodian banks and certain institutions such as the US Treasury, with associated central account maintenance). A private company called DTC (the Depository Trust Corporation, a subsidiary of the DTCC Group) also offers issuance, central account maintenance and settlement services for other categories of securities: listed shares, listed bonds issued by companies and municipalities, money market instruments, commercial paper, etc. DTC participants must settle their net balances at the end of the day, using a settlement bank, where appropriate, which sends orders to a system operated by the Federal Reserve (the National Settlement Service); the settlement bank must therefore be a member of this system.

In Japan, JASDEC acts as CSD for financial instruments issued by the private sector (listed and unlisted shares and convertible bonds, ETFs, shares in real estate funds, commercial paper, corporate bonds, etc.) and the public sector (bonds issued by municipalities, "FILP" bonds issued by the Japanese government but not recorded in the Japanese national debt, bonds issued by non-resident issuers, e.g. "Samurai bonds" denominated in yen and "Shogun bonds" denominated in other currencies, etc.). Securities are issued and transferred in dematerialised (paperless) form, under an indirect securities holding model.

48 <https://ecsda.eu/facts>

CHAPTER 13

Securities settlement systems

Updated on 17 December 2018

The dematerialisation and immobilisation of securities, as well as the increase in the volume of securities trades, both domestically and internationally, have made it necessary to set up securities settlement systems (SSS) which are managed by central securities depositories (CSDs, see Chapter 12). The operation of a securities settlement system is one of the three “core services” provided by a CSD (within the meaning of the European CSDR: see Chapter 12), and must be provided for an entity to qualify as a CSD – as well as at least one of the other two core services (notary and central securities accounts maintenance services). SSSs allow all securities admitted to a CSD to be processed, usually shares as well as bonds, or even fund units in certain CSDs.

SSSs come into the picture after the trade¹ and, if necessary, the clearing to allow the execution of securities contracts agreed between the parties, which results in delivery to the buyer of the securities underlying the transaction, in exchange for payment by the latter of the price agreed with the seller. The security of this operation requires that the organisation and rules of the SSS provide the guarantee that during execution of the transaction, delivery of the securities will occur if, and only if, the corresponding payment has been made, and reciprocally. The operational implementation of this principle of conditionality, called delivery versus payment (DvP), is one of the important tasks of SSSs.

SSSs can also provide for the delivery of securities without payment; this is called a free of payment (FoP) transaction. These free of payment transactions are used in the context of securities lending transactions (which can also be done in DvP) or collateral mobilisation to guarantee market transactions or credit from central banks.

As their name suggests, SSSs are “systems” and have no legal personality, unlike the CSDs that operate them.² They allow the securities to be transferred and the corresponding cash payment to

be settled in accordance with a set of contractually and legally enforceable rules. They thus manage the securities transaction flows, which are recorded in the securities accounts opened in the books of the CSDs.

The settlement systems operated by the CSDs were designed to ensure the operational and legal reliability of these securities transfers, which trigger the change of ownership for the benefit of the buyers. In addition, these systems use standardised messaging and processes, which allows all stakeholders to use a “common language” (international communication standards also facilitate access to the various European CSDs and are therefore now required by the European CSDR – see Chapter 12).

Due to the nature of their operations aimed at ensuring the smooth completion of trades in financial markets or enabling the posting of collateral (including in the context of monetary policy operations), SSSs are viewed as systemically important infrastructures.

In Europe, and in particular in the euro area, securities settlement systems, which had already been greatly improved during the 1990s and 2000s first to meet the international recommendations in this area and then gradually fine-tuned to improve the efficiency of settlement and the management of participants’ liquidity, are undergoing major further developments, with the entry into force of CSDR and, for most of them, the migration to T2S. This technical securities settlement platform, developed and operated by the Eurosystem, is described later (see Chapter 14).

1. Financial transactions and settlement instructions

The first “circulation” of a financial instrument takes place as soon as it is issued, which involves a trade and an exchange against cash in the so-called “primary” market: the issue is complete

¹ Or after clearing, when such a function exists in a market.

² Let us recall here that national central banks, acting as CSDs, can also operate securities settlement systems.

only if there is a buyer and an exchange takes place, resulting in the book entry of the issued securities in the securities accounts of the CSD's participants.

Once issued, most securities acquired by investors are then traded through buy and sell transactions in financial markets. These markets make up what is commonly known as the "secondary" market. The exchange of financial instruments is easier nowadays as it mostly takes place in dematerialised form via a simple set of accounting entries, the so-called book-entry form.

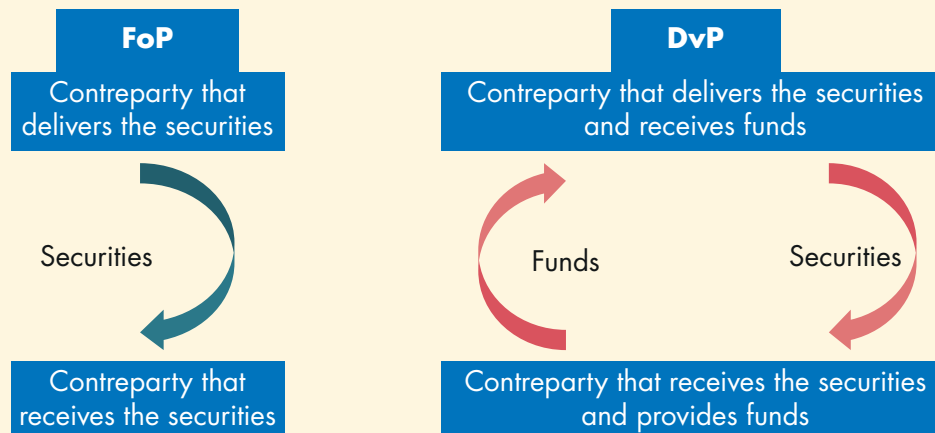
In the over-the-counter (OTC) market, once the trade has been struck and confirmed by the counterparties, the latter enter the corresponding instructions in the SSS, which processes them to allow the actual execution of the transaction. In the case of a regulated market, after the trade, executed orders are sent to the CCP, which then sends the instructions to the CSD.

1.1. The two main types of transactions

Transfers of securities between SSS participants can take place in two main ways, namely delivery versus payment (DvP) and free of payment (FoP).

- Delivery versus payment transactions include a securities leg and a funds leg. The transaction involves a transfer of funds in exchange for the delivery of securities (for example, in the event of a sale of securities or a repurchase agreement, commonly referred to as a "repo"). In practice the seller's custodian instructs the system to deliver a specific number of a specific type of securities (identified by their ISIN code) into the buyer's securities account, while the buyer's custodian arranges to pay into the seller's account the cash amount corresponding to the transaction. The organisation of the SSS must be such that it ensures that delivery of the securities takes place if, and only if, the corresponding payment has been made, and vice versa. The conditionality/simultaneity of this process is essential for the security of securities transactions and eliminates any risk of non-payment of securities or funds. This is by far the most commonly used type of transaction.
- A free of payment delivery does not have a funds leg but only a securities leg. This is, for example, the case for a securities lending transaction, a securities deposit as collateral or a margin call met exclusively with securities. However, in most systems

Box 1: FoP transactions vs DvP transactions



Box 2: The management of units or shares of investment funds in a CSD environment

In several European countries, in particular in France and Germany, securities representing the capital of investment funds (called “units” in the case of mutual funds and “shares” in the case of open-ended investment companies) are admitted to the operations of central depositories, like any other financial security. They are assigned an ISIN code at issue and are settled in the SSS.¹

There is also a secondary market for Exchange Traded Funds (ETFs), which are listed on an organised market. CSDs could play a role in the issuance and management of ETFs based on the model of the services they provide to open-ended funds. A prerequisite, however, would be the harmonisation of the management of ETFs, which is currently very diverse.

Any subscription/redemption order for units or shares of a fund affects the number of outstanding securities. The number of securities representing the capital of an open-ended fund may therefore change daily,² depending on the orders received. This specific feature has led to some adjustments in operational processes. A fund under French law, for example, has an issue account with Euroclear France, representing 100% of the issue. The main difference with an issuer of shares or bonds is that the CSD delegates to a financial intermediary, which acts as an issuer account holder, the management of a “quasi-issue account” enabling this intermediary to issue or redeem units or shares of the fund based on subscription and redemption orders. The centralisation of order taking is handled by a centralising agent, which receives all the subscription/redemption orders that are delivered to it by the entities marketing the fund (distributors) and communicates the information to the issuer account holder for the creation or deletion of units. Transactions in fund units generate instructions in the SSS under the same conditions as for other financial assets.

The T2S platform allows the settlement/delivery of fund units/shares (whether of open-ended funds or ETFs) provided they are admitted to the operations of a CSD. This should facilitate the cross-border distribution of funds in a CSD environment, since the links between T2S-connected CSDs cover 21 European states (see Chapter 14 on T2S).

As regards investment funds, several CSDs have set up automated platforms for the routing of fund unit or share subscription/redemption orders, the generation of settlement instructions and the management of corporate actions. Noteworthy in this respect are the service offerings developed by the two “international CSDs” (ICSDs) Euroclear Bank and Clearstream Banking Luxembourg (see Chapter 12), with the Fundsettle and Vestima platforms, respectively, to meet the cross-border distribution needs of funds. This appears to be a particularly high-growth segment in the current environment, according to a study by the European Central Securities Depositories Association (ECSDA) which brings together all European CSDs, in view of the increase in the distribution of funds in several EU Member States (around 80% of all UCITS are now marketed on a cross-border basis).

In France, the investment fund processing chain – from the custodian to the Euroclear France – is very integrated and is supported, via a dedicated platform (FSFOR), by an efficient automatic order routing system. Regardless of how orders are placed (i.e. via the platform or not), the settlement is now handled by T2S.³

1 This is not the case everywhere in Europe. For example, in Luxembourg and Ireland a so-called register model exists where a transfer agent (TA) can, in the case of “direct settlement” with the transfer agent, maintain the register of a fund and centralise all subscription and redemption orders of units or shares of this fund.

2 This is obviously not the case for a “conventional” company for which, apart from capital increase/decrease programmes and the issue/repayment of bonds, the number of shares and bonds outstanding does not change regardless of the volumes traded in the secondary market.

3 Except for closed funds (in particular employee savings funds).

these transactions require the entry of two instructions, one by the party who must deliver the securities, the other by the party who is to receive them. This avoids errors in the identification of the entity that will receive the securities;

- Lastly, some transactions, which are less common, may have two securities legs (for example in the case of an exchange of securities against securities).

Beyond these two main categories of transactions and the corresponding instructions, there are other types of instructions. One example is the delivery with payment (DwP) instruction, a new type of instruction in T2S that provides for the delivery of securities and a corresponding amount of cash by the same counterparty (used mainly by clearing houses).

Lastly, in some European Union countries, especially in France and Germany, the SSS ensures the settlement and delivery of securities representing the capital of investment funds, such as open-ended investment companies (OEICs), mutual funds, and innovation venture capital funds. Orders are delivered via a custodian to a centralising agent.

1.2. Transaction confirmation

After a trade has been struck in an OTC market, the parties must agree on its terms, i.e. the identification of the securities, price, quantity traded, settlement date and the counterparties. This is the confirmation process. The confirmation can be done in different ways, depending mostly on how the transaction was agreed.

In these markets, the counterparties must submit to each other the terms of the trade for verification, by SWIFT message or any other specialised messaging service. When the counterparties to a transaction go through a financial intermediary, they receive from their intermediary the information used for confirmation and state whether it corresponds to the agreed trade.

After the confirmations have been sent, both parties are contractually bound to each other by the terms of the transaction (obligation to deliver, and possibly obligation to pay). It should be noted that at this stage this mutual commitment has not yet (in most cases) had any effect at the level of the SSS, since the delivery-versus-payment instructions have not yet been sent to the system.

In recent years, automation processes have been implemented throughout the instruction processing chain, allowing for straight-through-processing (STP) and a reduction in operational errors, insofar as the settlement instructions (see below) are generated at the start of the transaction and there are no intermediate entries. The optimisation and increased reliability of flows have also helped to lower transaction processing costs. STP is not always possible, however, especially for cross-border transactions where manual procedures (fax etc.) are sometimes still in place.

1.3. Matching instructions

After a transaction has been confirmed, the custodian, who is in charge of the custody of the client's securities,³ sends settlement instructions to the SSS using the information it received from the client who is a counterparty to the transaction. The system then performs an initial verification that consists in checking the technical and formal validity of the instruction by making consistency checks (for example on the formats entered into the different fields of the instruction).

Matching allows participants in the SSS, i.e. entities that have opened securities accounts with the CSD and issued instructions to move securities in these securities accounts (for own account or for the account of their clients, see below) to verify that the instructions are in accordance with what has been agreed between the parties to the transaction by detailed comparison of the fields of

³ See Chapter 12 for a definition of custody and its players.

the two instructions received on behalf of the two counterparties. Matching relates to specific information or criteria (“matching criteria”), such as the number and type of securities (ISIN code), the settlement date, the securities accounts

and the cash accounts. This information must be identical on both sides for the two instructions to be matched. The matching process described above is primarily concerned with over-the-counter transactions, i.e. entered into bilaterally by

Box 3: The settlement date

Counterparties to a transaction must agree on a settlement date. The number of days between the date of the transaction and the date on which settlement occurs (the settlement date) is called the settlement cycle.

In its report published in March 1989,¹ the Group of Thirty (G30) recommended that the final settlement of securities transactions should take place no later than on T+3, T being the date of the transaction. In addition, the G30 also recognised that to minimize counterparty risks and market risks related to securities transactions, settlement on the day of the transaction should be considered as the ultimate goal to be achieved.

While the T+3 settlement has gradually been adopted in most countries, shortening the settlement cycle has so far proved elusive outside the European Union. The discussions on this subject in many countries have usually stumbled on the dilemma between the benefits, in terms of risk reduction and shortening of the cycle and, on the other hand, the risk of a greater number of suspense items (or settlement fails, see below), especially when transactions involve a long chain of intermediaries, which is often the case for cross-border transactions.

In the European Union, the settlement cycle has been set in CSDR (see Chapter 12) at the latest on the second working day after the trade, i.e. on T+2, for most securities transactions (transactions traded and executed on trading platforms). In most European countries the transition to T+2 settlement occurred in October 2014. The reform was preceded by extensive preparation by all relevant players at European level and coordinated within the framework of T2S governance bodies (see Chapter 14) and did not run into significant difficulties. In practice, the parties to a transaction may also contractually provide for a settlement cycle that is shorter than T+2. Nowadays most CSDs can even, from a technical point of view, offer settlement on T+0, i.e. on the same day as the transaction. Settlement on T+0 occurs for some OTC transactions and in particular for repurchase transactions (“repos”) the purpose of which is not in fact to buy securities but to obtain cash (the securities are then pledged as collateral), or for issue/placement transactions carried out by domiciliation agents with respect to money market securities.

In the United States, settlement cycles vary depending on the class of securities (T+0 for money market instruments, T+1 for US government securities, and, until September 2017, T+3 for equities and securities issued by local authorities and companies), but the Securities and Exchange Commission (SEC) adopted an amendment in March 2017 to reduce the maximum settlement cycle to T+2 as of September 2017. In Japan, the settlement cycle has also tended to decrease, with the transition from T+2 to T+1 for Japanese government securities as of May 2018; it can be T+2 for over-the-counter transactions, with the agreement of the parties, versus T+3 for other bond and share transactions.

¹ http://group30.org/images/uploads/publications/G30_ClearanceSettlement1988.pdf

two counterparties outside an organised market or a trading platform.

In an organised market or on more recent trading platforms created following MiFID 1 (see Chapter 5, Section 1.2.2), transactions can be matched by the platform based on the information provided by the counterparties. In that case, the instructions are already “pre-matched” when they get to the SSS. Most transactions dealt through organised markets are however cleared by a CCP which interposes itself between the counterparties (see Chapter 11): in this case, the CCP sends to the CSD pairs of instructions that have already been matched technically – or even cleared if the CCP offers the clearing function – which therefore do not need to go through the securities settlement system’s matching module.

Once they have been matched, the instructions become irrevocable (unless the parties both agree otherwise), which has the following operational and legal effects:

- Neither counterparty may unilaterally cancel or modify its instruction prior to settlement; the transaction can only be cancelled or modified if both counterparties agree and have received the corresponding amendment instructions;
- The counterparties are definitively committed to contractually fulfil their respective obligations to deliver the securities and, in the event of delivery against payment, to deliver the funds.

1.4. The settlement of transactions: delivery of securities and payment of these securities

After the corresponding instructions have been matched, the system will attempt to settle the transaction. This process involves checking whether the participant who must deliver the securities has enough securities in their account and whether the buyer has

the funds to pay the seller. If one of the two parties does not have the required securities or funds, the transaction is put on hold and other settlement attempts will be made later (first on the same accounting day and then, if the rules of the system provide for “recycling” over several subsequent days). If the securities or funds are sufficient, the transaction is said to be “settled” and becomes “final”, i.e. it can no longer be cancelled in the system. The parties to the transaction are then released from their mutual obligations.⁴

When both counterparties have enough securities – and, as the case may be, cash – the securities are then transferred from the selling participant’s account (for own account or for a client’s account) to the account of the buying participant (for own account or that of a client). The transfer of ownership of the securities is deemed to occur at the time of the credit and debit of securities on the relevant securities accounts. In the case of an indirect holding of securities via a financial intermediary (which participates in the system and therefore has an account with the central depository), the financial intermediary is then responsible for passing on the transaction initiated by its client – and which led to a book entry in the account opened in its name with the central depository – to the securities account which it maintains in its books on behalf of the client.

2. Operating organisation of securities settlement systems

2.1. Settlement in central bank money or in commercial bank money

As we mentioned in Chapter 12, settlement of the cash leg of the transaction settled at the CSD can be done either in “central bank money” or in “commercial bank money”: in the first case, the cash accounts used to settle the cash leg of securities transactions are opened in the books of

⁴ If one of the two parties then decides, for some reason, to request the cancellation of the already settled transaction, the cancellation request can be settled only by agreement between the parties and by sending to the system new opposite instructions (offsetting but totally independent from the first instructions). In the event of a profound disagreement between the parties, only legal action could decide a possible cancellation of the transaction, but even in this case the operational translation of the judicial decision would be the sending of new instructions, as the finality of the first transaction in the system can under no circumstances be challenged.

the central bank (for example, in the books of the Banque de France); in the second case, the cash accounts are opened either directly with the CSD (which must have obtained a banking license authorising it to open deposit accounts) or with a credit institution designated by the CSD.

2.2. Integrated model and interfaced model

In the case of a CSD operating in central bank money, the simultaneous and conditional delivery of securities and funds requires a close interaction between the SSS which manages delivery of the financial instruments (“the securities leg”) and the payment system that processes book entries in the cash accounts (“the cash leg”). There are two models for the settlement of securities transactions, depending on whether a common technical platform is used for the cash accounts and securities accounts of participants:

- the so-called “interfaced” model: the cash accounts and the securities accounts are located on two separate platforms. The accounts used to settle the cash leg of the transactions are directly the participants’ accounts with the central bank, and the securities accounts are located on the CSD’s technical platform. Therefore, settlement of the securities involves interactions (via interfaces) between the CSD’s SSS and the participant’s account in the central bank’s books. With the exception of the CSDs of Euroclear’s ESES platform (see Chapter 14), the interfaced model was used by all the big CSDs in the euro area before their migration to T2S: Monte Titoli, Iberclear, Clearstream, etc.;⁵
- the so-called “integrated” model: the cash accounts⁶ and the securities accounts are located on the same technical platform for settlement purposes, which facilitates the processing of transactions in real time. In the euro area, only the CSDs of the

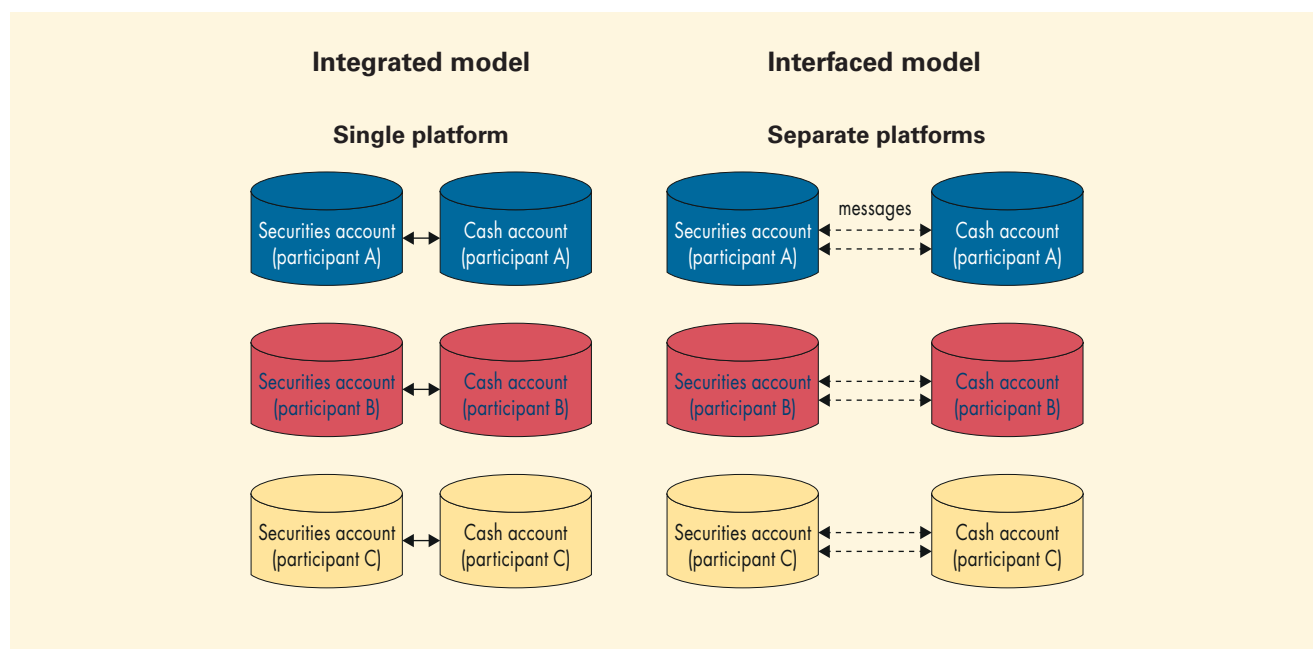
ESES platform operated using this model before T2S: the accounts used for the settlement of funds were considered, from a legal point of view, as open in the books of the national central bank, but their operational management was outsourced to the operator of the SSS on the same technical platform as the one carrying out delivery of the securities. The participants’ cash accounts were therefore managed by the CSD in the name and on behalf of the central bank, for the purposes of the settlement of securities transactions. The interactions with the RTGS system consisted in feeding the “technical” cash accounts of the participants in the SSS from their cash accounts in the RTGS system (and vice versa: transfer of funds available “in the SSS” to the participants’ cash accounts with the central bank). Apart from these interactions related to the supply (or removal) of liquidity, the “technical” cash accounts and the securities accounts were managed in an “integrated” way by the CSDs of the ESES platform, without the need for interfacing with another system.

The French market operated under the integrated model since the introduction of the RGV system by SICOVAM⁷ in 1998, and then the ESES platform by Euroclear in 2007 (based on the RGV system and extended to the CSDs of Belgium and the Netherlands). Securities accounts and cash accounts were managed on the same platform, by delegation from the central bank for the technical cash accounts. Although it had proven to be efficient and secure, especially for DvP transactions, the integrated model was not a practice shared by other markets, mainly because of the reservations made by some central banks about outsourcing the management of their settlement accounts to CSDs. After lengthy internal discussions within the Eurosystem, T2S was built in accordance with the integrated model, but the single settlement platform is managed by the central banks and not the CSDs (see Chapter 14).

⁵ There are several ways to organize the interface between the central bank and the CSD. The common practice is as follows: the CSD blocks the securities of the seller, sends a payment order to the central bank requesting the transfer of the countervalue of the securities from the buyer’s account to the seller’s account, and then, after execution of the transfer has been confirmed, releases the securities and transfers them from the seller’s account to the buyer’s account. In practice, the sending of debit and credit instructions to the central bank is/was done on a “net” basis, i.e. not transaction by transaction, but for a set of transactions.

⁶ Or more precisely the reflection of cash accounts held by central banks, which are directly connected to T2S.

⁷ For more details on RGV and SICOVAM, see Chapter 14..



2.3. Delivery-versus-payment (DvP) models

A CPSS report published in 1992 under the aegis of the Bank for International Settlements (BIS)⁸ identified three major models of DvP systems, forging a terminology that is still in use today:

- DvP Model 1: Gross (i.e. transaction by transaction) simultaneous settlements of securities and funds, one being contingent upon the other. This model eliminates the credit risk (or principal risk, i.e. the risk that the party that has already executed its own obligation does not receive the agreed securities or funds): if the necessary funds or securities balances are unavailable in the respective accounts of the participants, which the SSS operator can ascertain in real time, the transaction is "suspended". If it has not been settled by the end of the day, it is in some cases cancelled by the system. However, this model can lead to a chain reaction, with fails of other transactions – a weakness that the other models nonetheless also share. This is why the practice of recycling has become so widespread: if a transaction cannot be settled on the scheduled day, the system may make several settlement attempts ("recycling") the next day or – depending on system rules – on the following days. In addition, to mitigate this drawback, most systems built based on the DvP1 model also include so-called optimisation mechanisms (see 2.4 below);
- DvP Model 2: gross settlement of securities transfers throughout the day – in fact this is only a control that the required securities balances are available, since the securities are not delivered yet – followed by net settlement of the funds at the end of the daily process. In order to eliminate principal risk, the securities are delivered to the buying participants only against settlement (either in the central bank's books if settlement is "in central bank money" or in a commercial bank's books if settlement is "in commercial bank money") of all the net debit positions resulting from the day's transactions. With the passage of time and the emergence of more efficient technologies, this type of model has drifted towards an organisation where the settlement of funds takes place several times during the day;

⁸ "Delivery versus payment in securities settlement systems" September 1992 <http://www.bis.org/cpmi/publ/d06.pdf>

- DvP Model 3: net simultaneous settlement of securities and funds. The technical netting (this is a calculation of net balances, without the interposition of the CSD, and not a clearance in the CCP sense) therefore takes place for both the funds and the securities. The fact that the settlement is simultaneous is also intended to eliminate principal risk.

The DvP1 model is currently the most widely used in Europe because it is the one implemented by the T2S platform: transactions are settled individually for their gross amount as they arise. This model requires participants to maintain significant liquidity to meet their needs throughout the day, but platforms operating under this model, such as T2S (see Chapter 14), offer several features to reduce participant's liquidity needs (liquidity-saving features, see Chapter 14).

In the DvP 2 and 3 models, the frequency of settlements within the SSS and within the payment system, as well as the frequency of exchanges between the SSS and the payment system are also important because they determine the range of possibilities, in particular in terms of intraday liquidity provision. The provision of intraday liquidity assumes both that the SSS and the payment system offer several daily settlements (and not only one at the end of the day) and several daily interactions between the two, with different processes depending on the functioning of the payment system. The frequency of settlement cycles increases the effectiveness of the settlement process, but is limited by operational constraints. A CSD must therefore strike a balance between these two objectives in order to offer the best service to the participants of the SSS that it operates.

Using collateral to make transactions safer has become mainstream, which means that it is increasingly important for market participants to have full possession of acquired securities quickly in order to secure liquidity (from other players or central banks). In this respect, real-time settlement is a

definite advantage over deferred settlement since the transaction is completed and the acquired security is available immediately, which not only reduces the risk that the expected securities will not be received (this is in fact a "liquidity risk"), but also makes the security acquired in a "final" way immediately reusable by its buyer for some other need.

2.4. Optimisation mechanisms

The effectiveness of settlement depends first and foremost on the ability of SSS participants to effectively manage their liquidity in terms of securities and funds prior to settlement to minimize the risk of a settlement fail during the day and at the end of the day. If there is a shortage of liquidity, securities or cash lending facilities may be offered to participants, which greatly contributes to the effectiveness of the settlement process and the reduction of risk. In addition, organisational measures within the SSS, such as optimisation mechanisms or optimal sequencing of transactions, can usefully complement these services (see the T2S example in Chapter 14).

2.4.1. Liquidity management

Several lending schemes help improve cash or securities liquidity.

2.4.1.1. Securities lending services

Some CSDs organise a securities lending service that allows participants with ad hoc securities needs to call on those who have some to meet their delivery obligations. As in a repo, securities lending can lead to a temporary transfer of ownership of the securities to the borrower. The service is ancillary to the core services offered by a CSD.

Securities lending mechanisms help improve liquidity, and thus the proportion of transactions that are properly settled. The advantage for securities lenders, which are usually investors holding a portfolio of long-term – and therefore largely locked-in –

securities, is that it allows them to increase the profitability of these securities through the remuneration they receive.

When a CSD offers securities lending, it may either be restricted to the role of a technical organizer of the securities lending mechanism (non-banking-type service) or have a role in the transactions themselves by granting guarantees and underwriting securities lending commitments (banking-type service). In the latter case, the CSD acts not only as an agent but also as a counterparty or guarantor of its participants. This activity therefore requires a banking licence (see Chapter 12, Sections 1.4 and 2).

2.4.1.2. Intraday credit

One of the main cash liquidity management tools is intraday credit. This can be provided either by a settlement agent – which may be a central bank or a commercial bank – or by the operator of the system. This latter possibility also implies a banking license, as intraday credit is a form of lending subject to the same authorisation as longer-term loans:⁹ in Europe, both the Euroclear Bank and Clearstream Banking Luxembourg ICSDs have the required banking licenses to grant intraday credit.

Intraday credit is conventional refinancing, which is systematically collateralised by securities accepted by the entity granting the credit, i.e. “eligible securities”. For the Eurosystem central banks granting intraday credit, the eligible securities are the same as those eligible for monetary policy refinancing, which allows counterparties to use a single pool of collateral for all their transactions with the central bank, regardless of their maturity.

2.4.1.3. Auto-collateralisation

Initially developed by the Banque de France in collaboration with Sicovam/Euroclear France in the late 1990s for the RGV system, auto-collateralisation is an automated form of intraday credit. It consists in posting automatically as collateral with the central

bank either the securities that underlie the transaction (on-flow collateral), or other securities available in the buyer’s securities account (on-stock collateral), thus triggering the receipt of intraday credit by the participant exposed to a temporary liquidity shortfall. Auto-collateralisation thus makes it possible to settle a transaction even if the buyer does not have sufficient liquidity in their cash account.

Auto-collateralisation operations carried out by the national central banks in the T2S environment, such as the Banque de France since September 2016, are subject to automatic repayment during the accounting day and, if necessary, a compulsory repayment procedure at the end of the financial day. Since the deployment of T2S, auto-collateralisation is available in an increasing number of European countries (see Chapter 14, Section 2 for more information on T2S auto-collateralisation).

2.4.2. Organisational measures

The organisational measures implemented by the SSSs are intended to limit the risk of gridlock of the settlement process due to related transactions, for example in the case of successive sale/purchase transactions of similar types of securities, as well as to improve the efficiency of the settlement process during the day.

2.4.2.1. Combination of overnight and daytime settlement

The combination of overnight and daytime settlement gives rapidly participants (where possible) an overview of the status of their transactions. The overnight settlement process allows the stock of instructions already entered into the system to be verified and validated for immediate settlement with the new business day as settlement day (or a previous business day for failed settlement transactions and which are presented again on the following days, thereby improving the efficiency of settlement: see below). Overnight settlement therefore makes it possible (when it is technically possible)

⁹ For more details on central bank money vs. commercial bank money settlements, see Chapter 1.

to give participants full visibility over the status of their transactions more quickly.

After a window of technical maintenance of the system at the end of the night (usually), daytime settlement makes it possible to validate and settle (i) any new instructions as they are entered, with the current business day as the day of settlement and (ii) any transactions not settled during the overnight cycle (and of course any recycled transactions: see below).

At the end of 2017, 52% of the transaction volume (i.e. the number of transactions) processed by T2S was settled overnight, which represented around 30% of all transactions by value, all CSDs participating in T2S combined.

2.4.2.2. *Optimisation algorithms*

To ensure the smoothest possible settlement of the largest number of transactions, settlement engines include optimisation algorithms that determine an optimal settlement order designed to avoid gridlock resulting from securities or cash shortfalls or linked transactions (while giving precedence to the order of priorities of instructions given by participants).

2.4.2.3. *Partial settlement and division of transactions*

When the SSS detects a shortage of securities or cash, it may (where its rules permit and often during clearly identified time windows) settle the transaction partially, i.e. for the available amount of securities or cash. The non-settled balance of the transaction is then recycled, i.e. presented for settlement later. By allowing settlement in several stages for smaller amounts, partial settlement increases the smoothness and efficiency of settlements. Finer granularity is indeed a factor that can facilitate the settlement process.

In a real-time and gross settlement system, as is the case with T2S, partial settlement “windows” are set at specific times of the

day to allow for a snapshot of all matched instructions awaiting settlement and trigger the partial settlement of instructions up to the amount of the securities and/or cash resources available in the participants’ accounts. Amounts not settled at the end of the partial settlement windows are presented for real time settlement for their remaining balance, and then at the following partial settlement windows.

2.5. Settlement fails and market discipline

Among the validated and matched settlement instructions, some fail at the settlement stage. These failures (called fails) may be due either to a shortage of securities in the designated account of the seller/lender of securities, or to a shortage of cash in the designated account of the buyer/borrower of the securities.¹⁰

The instructions are then regarded as suspense items (which does not in any way extinguish the contractual obligations of the counterparties). Suspended instructions outstanding at the end of the accounting day can be “recycled” over a certain number of subsequent days by the system, which attempts to settle them just like any other matched instruction. Each SSS has its own rules regarding suspense items, which are part of the body of market discipline rules. Some SSSs may simply cancel pending transactions, leaving the affected participants to resend new instructions to the system. Others may allow a period of one or more days to allow defaulting participants to resolve the situation by contributing securities or cash.

ESES France recycles outstanding failed transactions, as do the other securities settlement systems that have migrated to T2S; in contrast, the French clearing house LCH SA cancels failed instructions at the end of the day and reinstates them in its daily clearing process.

In addition to the securities and/or cash borrowing services described above, certain

¹⁰ Short sales of securities, which experienced strong growth in the 2000s, led to an increase in fails due to a shortage of securities, which in turn led to the adoption of rules regulating and limiting this practice.

rules may also impose financial penalties on a participant which is late in fulfilling its obligations or force the defaulting participant to accept a compulsory buy-in of securities in the market when the transaction is not settled at the end of a predefined period.

In the case of a compulsory buy-in of securities, a third-party market player is mandated to procure the securities not delivered to the injured party; this market player then invoices the cost of the transaction to the defaulting counterparty of the initial transaction. For the financial industry this system is viewed as the most restrictive of all the available measures in case of a failure to deliver securities (cancellation of the transaction; financial indemnity/penalties against the defaulting party, etc.).

The European CSDR, adopted in July 2014 (see Chapter 12), introduces strong requirements regarding the compulsory buy-in of securities in the market in the event of a default lasting a few days, and makes them systematic – the exact duration of the periods depends on the liquidity of the security, estimated by broad categories. According to the draft technical standards implementing the provisions of CSDR sent by the ESMA to the European Commission in February 2016, and subject to the validation of these standards, CCPs will be responsible for executing buy-ins for the transactions they clear, while the buy-ins of non-cleared transactions will be managed by the parties to the transactions (whether these transactions were traded/executed on trading platforms or not). These requirements, which are to come into effect in the first half of 2020, are expected to result in significant adaptations of market practices as well as substantial IT developments for participants, CSDs and clearing houses.

The average rate and standard deviation of the suspense items observed in an SSS depend on several factors, some of which are inherent to the SSS (depending on the DvP model implemented, the efficiency

of the settlement engine, the interactions with a payment system, etc.) and others are exogenous factors (the number and value of transactions processed, the granularity of transactions, the quality of counterparties, market practices, etc.). At the end of 2017, the aggregate suspense rate (i.e. all participating CSDs combined) in T2S was around 2% in volume (number of transactions) and in value of transactions.

3. Conditions for participation in the SSS

3.1. General rules and main characteristics of participation

Not all market participants participate directly in the SSS: only some of them establish a contractual relationship with the CSD, and thus participate directly in the SSS, which allows them to open one or more securities accounts directly with the CSD. Thus, only certain categories of entities, of which a limited list is laid down by law, can become direct or indirect participants. In France (see Article L. 330-1 II of the Monetary and Financial Code), these are mainly credit institutions and investment firms, clearing houses and their members, other CSDs and certain government bodies such as the Treasury, the Banque de France and the Caisse des Dépôts et Consignations. The establishment of a restrictive list of entities and categories of entities legally entitled to participate in an SSS aims to contain the risks associated with the operations of the SSS, by ensuring that the direct participants have the financial and operational capabilities to send instructions to the SSS for potentially very large amounts and be able to meet all their obligations (including technical).

CSDR also introduces an obligation for CSDs to disclose their participation criteria, allowing fair and open access to entities belonging to the categories of entities legally entitled to participate directly in a securities settlement system. These criteria must be “transparent, objective and

non-discriminatory” (in practice, for example, they may be financial or operational), while considering risks to financial stability and the smooth functioning of markets. The objective is to strike the right balance between a sufficiently open access to the systems, while avoiding direct participants adding risk to the systems (and therefore to markets) due to financial weakness or technical or operational shortcomings.

The technical investment and the financial cost associated with direct access to the SSS make it necessary to have enough business volume to make these costs worthwhile. Small and medium-sized financial intermediaries therefore often choose to only access the SSS indirectly, by signing a contract with a direct SSS participant who will enter settlement instructions on their behalf.

Direct SSS participants can indeed send instructions to the system, for themselves or for third parties, the latter being referred to as “indirect participants” in the SSS. Indirect participants have no contractual relationship with the CSD, but only with the direct participant, who acts as their intermediary.

Participants also have the choice between opening a so-called “omnibus” account (account intended to accommodate the assets of all the clients of a given participant, excluding its own assets) or to open, also under their own responsibility, a set of so-called “segregated” accounts that will show in the books of the CSD the names of investors or categories of investors (or other financial institutions that have opted for indirect access to the CSD) opposite each “individual” account.

While the omnibus account appears in the name of the direct participant in the CSD’s records, the direct participant has no ownership interest in the account’s assets. It is to avoid any ambiguity in the event of bankruptcy of the direct participant that CSDR imposes at least a segregation between the participant’s own assets and

the assets of its clients. Within the assets of its clients, segregation or concentration in an omnibus account is a contractual choice of each client. In all cases, the direct participant must keep in its own books a register in the name of each client, and thus ensure the proper custody of clients’ assets. This system of internal segregation within intermediaries also makes possible the “waterfall” processing of corporate actions (see Chapter 12 for more information).

In France, however, a direct participant is fully responsible for the instructions that it has entered into the system, whether for its own account or on behalf of its clients; its contracts, in particular with indirect participants, cannot limit its liability in this respect (see Article L. 330-1 II of the French Monetary and Financial Code).

3.2. Links between CSDs (participation of a CSD operating an SSS in one or more other SSSs)

To allow its direct or indirect participants to trade in securities issued in another CSD (i.e. in another country, in most cases), while helping them to avoid having to become a direct or indirect participant in the issuer CSD, a CSD can set up a “link” between its SSS and that of the third party CSD: the CSD then becomes a direct participant in the SSS of the third party CSD. The operational translation of this direct link is the opening of a securities account in its name in the books of the issuer CSD. The CSD may also become an indirect participant through a direct participant (custodian): this is then an indirect link.¹¹ Between these two types of links are also the “direct operated” links, in which a custodian technically introduces the instructions for and on behalf of the CSD participating in a third party CSD and duly identified (via a “segregated” account) in the latter’s books. “Relayed” links, in which an intermediary CSD acts as a “relay” between the investing CSD and the issuer CSD, are also very common.

The harmonised technical environment of T2S facilitates the establishment of

¹¹ For the record, a financial player or an individual may go through a custodian directly to buy or sell securities issued in a State other than the one in which it is established.

links between CSDs, because settlement between the participants of two CSDs that have migrated to T2S has become similar to domestic settlement in terms of speed of processing, security and pricing. T2S thus encourages the setting up of new direct links – many European CSDs have confirmed their intention to create new links in the coming years – or the transformation of relayed links into direct links.

As a reminder (see Chapter 12), the term “investor CSD” refers to the CSD whose clients wish to process a security issued in another CSD, the “issuer CSD”. For example, if the participants of a CSD from country X want to buy/sell a security issued in the CSD of country Y, the CSD of country X is the investor CSD and the CSD of country Y is the issuer CSD. The links established by a CSD thus allow its clients to access a wider range of securities, through a single point of entry, by economically streamlining access to different markets and collateral management.

The links allow financial players to carry out cross-border transactions, in the broad sense of the term (between players from different jurisdictions or between players of the same jurisdiction over securities issued in another State) and thus contribute very significantly to the integration of financial markets. However, they carry specific risks because of their greater technical complexity and possible legal uncertainty resulting from differences in the national laws involved in these transactions.

For example, there may be uncertainty regarding the applicable law if a participant defaults. Divergences may also appear between the rules governing the various SSSs, in particular the rules on settlement finality (which have however been harmonised for all SSSs that have migrated to T2S: see Chapter 14). In this respect the harmonisation of national laws relating to the holding and transfer of securities between countries of the European Union (including within the euro area) remains a major objective in the coming years.¹²

A complete harmonisation of national laws is of course too much to hope for in the short term, since it would imply material changes in certain laws, which would have a considerable impact on the countries/markets concerned. However, incremental progress, although initially seemingly limited, is reasonably conceivable.

In addition, the links between CSDs tend to increase interdependencies within the financial markets: an operational incident or a default in one SSS could lead to other defaults or settlement failures in the SSSs with which it is associated, and thus even affect participants who were not counterparties to any transaction processed by the SSS concerned. Refer to Chapter 12 for a description of the risk management measures involved in establishing a link, in particular the legal risks.

From an operational point of view, CSDs may decide to offer via links the same services as those offered usually to their clients: depository, cash or securities lending, collateral management, custody and settlement. The choice of features offered through a link will contribute to the link’s design. CSDs may have different operating organisations; the investor CSD must have a good understanding of the functioning of the issuer CSD to assess the associated operational risk, and reduce it, if necessary, by setting up specific measures. Because of the increased legal and operational risks, CSDs must therefore design any links between SSSs in a prudent and appropriate manner. Operational issues are sometimes very closely linked to legal issues, for example reconciliation processes must be sufficiently frequent and robust to establish the holders of title to the securities.

The establishment of a link between two SSSs operated by CSDs based in different jurisdictions is not, however, the only way for banks and investment firms established in a jurisdiction to make transactions in securities issued in other country. Indeed,

¹² In this respect, the reader can refer to the work of the T2S Harmonisation Steering Group (see Chapter 14 – Section 7.1) and the work of the European Post Trade Forum (EPTF), a group of experts convened under the auspices of the European Commission and whose report was issued in May 2017 as well, as a consultation launched by the latter at the end of 2017. https://ec.europa.eu/info/sites/info/files/170515-eptf-report_en.pdf

custodians have established sometimes very extensive networks of entities established in different countries, which directly (or indirectly) participate in the SSSs operated by local CSDs, which represents an alternative access channel to markets in addition to the links between SSSs. In practice, there is currently a large majority of cross-border transactions via custodians compared to transactions via the links between SSSs.

3.3. FoP or DvP-type links

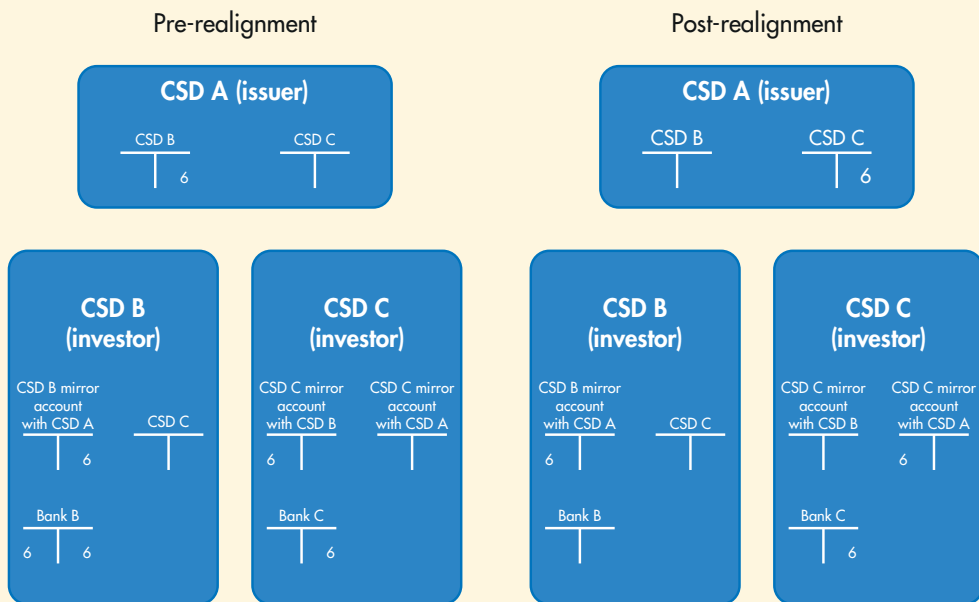
CSDs can design links between each other as FoP-only (free of payment) or FoP and DvP (delivery versus payment). FoP-only links dissociate the cash and securities legs. Although they are technically simpler to

implement for CSDs, they involve a greater operational risk in their use for transactions involving a cash leg (since its settlement is de facto completely disconnected from the settlement of the securities leg). However, this type of link is very useful for FoP transactions, i.e. with no cash leg, such as for example most collateral transfers to the Eurosystem central banks.

DvP-type links make the settlement of the cash and securities legs contingent upon the availability of sufficient cash and securities in the accounts of the two participants. They prevent any provisional transfer of securities before the transaction is final, and therefore offer greater legal certainty to the participants of both SSSs. However, they are usually more expensive to set up because

Box 4: Example of a realignment of securities accounts in the context of links between CSDs

Let us take the example of an issuer CSD A and two investor CSDs B and C. If a participant of CSD C buys securities from a participant of CSD B, the realignment consists in the transfer of securities from B’s securities account with A to C’s securities account with A, so that it effectively is C – and not B – who is the new ultimate owner of the securities in the books of the issuer CSD. At the same time, the pre-existing exposure between C and B is cancelled.



they are complex from an operational point of view. The new links established by Euroclear France to other CSDs that have migrated to T2S are DvP links, thanks to the technical harmonisation allowed by T2S, which significantly simplifies the DvP links and provides optimal technical and operational conditions. In order to ensure the finality of a transaction involving a link, the items entered on the credit and debit sides of the securities accounts held by the various CSDs of the relevant link are adjusted gradually, in accordance with a chronology that makes it possible to ensure that securities accounts of the “downstream” CSD are not credited before the securities accounts held by the “upstream” CSD (respectively the investor CSD and the issuer CSD in the case of a link involving only two CSDs). This is called a “realignment of accounts” (see Box 4).

4. Risks and oversight of SSSs

4.1. The risks associated with SSSs

The Principles for Financial Market Infrastructures (PFMI, see Chapter 18) are partially applicable to SSSs: the principles applicable to SSSs fairly broadly overlap with those applicable to the CSDs that operate them, and supplement them on certain points described below. This distinction is specific to securities settlement systems and does not apply to payment systems or financial instrument clearing systems. The distinction is explained by the very systemic nature of SSSs, and the desire to treat them in a specific way.

After the stock market crisis of 1987 and the ensuing meltdown in stock prices, the Bank for International Settlements (BIS) was concerned about the risk of contagion from securities settlement systems to payment systems and the entire financial system. Several types of risk have been identified in the functioning of markets, the most significant of which are principal risk (if the default materialises after the non-defaulting counterparty has made its payment or

delivered its securities, it is exposed to a risk of loss on the amount of the transaction) and the systemic risk that would result from a snowball effect between the participants in one or more SSSs as a result of one or more initial securities or cash settlement defaults, which could affect the stability of financial markets as a result of the liquidity crisis and loss of principal suffered by some market participants. The creation of a strong link between the delivery of securities and the payment of funds, making them contingent one upon the other and simultaneous, eliminates principal risk.

Another risk, related to the inability of the seller/lender of securities to meet its delivery obligations, typically in the event of insolvency, is the risk associated with the replacement cost: the purchaser or the borrower of securities is then exposed to an opportunity cost. The purchaser/borrower of securities may then be required to buy/borrow securities in the market, at a price that is different from the original transaction, to meet its own delivery obligations in the case of chain transactions on the same securities. Even if it may seem counter-intuitive, replacement risk, unlike credit risk (or principal risk) can never be eliminated completely (except in the case of a performance guarantee given by a clearing house for example) but merely mitigated using techniques such as securities lending.

It is fundamental for a CSD to clearly define its rights and obligations, as the operator of the SSS, and those of its participants, as well as certain key aspects of the processes. Legislation in different European countries requires payment system operators to define several “moments” in their rules, in particular when the instructions are deemed to have been entered into the system and when they become irrevocable.

The national legislative provisions (in France, Article L. 330-1 of the Monetary and Financial Code) result from the transposition of a European Directive called the Settlement Finality Directive (SFD) adopted in 1998

(SFD 1) and amended in 2009¹³ (SFD 2: see Chapter 12, Section 2). Under this Directive, a European SSS is governed by the national law of a Member State chosen by its participants, provided that at least one of the participants is established in that Member State. A legal risk could arise, for example, if the rules prescribing the finality of the settlement are not clearly established or applied uniformly in both jurisdictions in the case of cross-border transactions, creating legal uncertainty as to the applicable law. Please refer to Chapter 5 for a more detailed description of the concept of settlement finality, and the moments that delineate it.

4.2. Oversight of SSSs: the role of central banks and market authorities

The central bank of the country in which the SSS is located is usually in charge of its oversight. Because of the close interconnection between the SSS and the payment system operated by the central bank and in a context where CSDs mostly operate in central bank money, it is indeed necessary (and legitimate) for the central bank to ensure that this interconnection does not create a risk for its payment system. In addition, CSDs are an important operational vehicle for implementation of the Eurosystem's monetary policy (see Chapter 12). Lastly, in close connection with their mission of defining and implementing monetary policy, central banks aim to contribute to the stability of the financial system.

This is the case in France, where oversight of the settlement system is devolved to the Banque de France by Article L. 141-4 of the Monetary and Financial Code: "The Banque de France oversees the security of the systems used to [...] settle and deliver financial instruments." To this end, it has powers to check documents and carry out on site inspections and has been designated as the "competent authority" of the CSD which operates the French

settlement system for the purpose of implementing the European CSDR (see Chapter 12, Section 2 for a description of the division of powers between the Banque de France and the AMF and Chapter 18 for the oversight framework).

The example of the oversight of ESES France

The oversight, which aims to ensure the smooth conduct of settlement transactions, is exercised continuously. This involves regular monitoring of activity statistics, suspense rates and system availability as well as communication on any important issue (e.g. the transition to settlement on T+2, migration to T2S, tracking the system settlement rate or operational incidents impacting system availability, etc.).

In France, the oversight of the SSS is conducted by the Banque de France, jointly with the Financial Markets Authority (AMF). The Banque de France and the AMF are, pursuant to Article 11 of CSDR, "competent authorities" for the authorisation and supervision of Euroclear France, the CSD that operates the ESES France settlement system (see Chapter 12, Sections 2 and 3). Cooperation is extended to the Belgian and Dutch authorities since the CSDs of the three countries share the same settlement platform and have also delegated to their parent company, Euroclear SA (ESA), the provision of numerous support services such as IT, human resources, financial management, etc. In this context, the national authorities in charge of the regulation and oversight of CSDs have developed from 2006 onwards a framework for cooperative oversight of ESA,¹⁴ which is governed by a Memorandum of Understanding in which the Belgian authorities, namely the Banque Nationale de Belgique (BNB) and the *Autorité des services et marchés financiers* (Financial Services and Markets Authority - FSMA) have been designated as "coordinating authorities".

Formalised assessments of the system against international standards (PFMI: see Chapter 18) are carried out regularly,

¹³ Directive 98/26/EC on settlement finality in payment and securities settlement systems Directive 2009/44/EC.

¹⁴ The cooperative oversight, however, only applies to ESA's support functions.

usually every three years. The last joint assessment of ESES and the ESES CSDs (Euroclear France, Euroclear Nederland and Euroclear Belgium) was published in September 2015.¹⁵ This assessment was the result of the joint work of six authorities: the central banks and market authorities of each of the three countries in which the ESES CSDs are established.

4.3. Assessments conducted by the Eurosystem as a user

4.3.1. Assessments of SSSs and of the links between SSSs

The Eurosystem uses SSSs and the links between SSSs to allow its counterparties to provide it with collateral in support of monetary policy and intraday credit operations. To ensure that these settlement systems and the links between them do not expose it to inappropriate risks on the collateral thus posted¹⁶ (in particular via a legal or operational challenge to its access to the securities delivered to it as collateral, or technical or legal obstacles which would delay this access and could expose it to adverse market movements in the event that the securities received as collateral have to be realised) the Eurosystem conducts various cyclical and ad hoc assessments of the SSSs and the links between them.

A first set of standards established by the Eurosystem as a user was set up in 1998. It then gradually evolved and was formalised in a document called the User Assessment Framework, the latest version of which dates from January 2014¹⁷ and is based first and foremost on the work done by the national central banks to oversee SSSs and the links between SSSs, and complements it with user standards that meet the Eurosystem's legal and operational requirements.

The deployment of T2S had already simplified the requirements of the User Assessment Framework, in particular for the links established between two CSDs participating in T2S, which share a certain

number of operational characteristics (e.g. system operating days and hours) and legal features (settlement finality).

Implementation of CSDR recently led to a further substantial reduction in the Eurosystem assessment framework: the provisions of CSDR have been compared to the Eurosystem user standards and it is clear that most of them will be covered by CSDR. The Eurosystem will therefore rely heavily on the work done by the competent authorities of the CSDs and on the assurance of compliance with CSDR's requirements implicit in an authorisation; the few residual standards (not covered by CSDR) will be addressed either contractually between the national central banks and the CSDs to which they resort, or by laws or regulations in each jurisdiction. The residual standards will ensure that the national central banks, as direct participants of the CSDs, are not at legal risk and have rapid access to the collateral, whatever the situation (in particular, their property rights over securities given to them as collateral must be clear and unambiguous and must not be challenged by the liquidation of the CSD). These residual standards also lay down operating rules, including the opening dates and hours of the system. The reader can refer to Decision No. 2018-03 of the Governor of the Banque de France, published on 16 April 2018,¹⁸ for more details on this new, simplified approach.

4.3.2. Assessments of tripartite agents

CSDs providing tripartite collateral management services may also become eligible for Eurosystem operations as "tripartite agents" if their triparty repo model (see Chapter 12, Section 3) meets the Eurosystem criteria. The monetary policy counterparties of a national central bank of the Eurosystem may then post securities as collateral to said central bank via these triparty repo services.

The Eurosystem criteria were consolidated in 2017 and published on the ECB's website.¹⁹ They form a body of standards

¹⁵ <https://www.banque-france.fr>

¹⁶ Monetary policy decisions by the Governing Council of the ECB are implemented in a decentralised manner, i.e. by the national central banks of the Eurosystem for counterparties established in their jurisdiction, with nevertheless a pooling of income and losses.

¹⁷ <https://www.ecb.europa.eu>

¹⁸ <https://publications.banque-france.fr>

¹⁹ <https://www.ecb.europa.eu>

designed to ensure, among other things, the following:

- central banks can realise (sell) with great legal certainty the securities which are given to them in triparty repo, i.e. will not see their rights of ownership questioned by obstacles of a legal or operational order if they are required to acquire full ownership and/or sell the securities in the event of default by a counterparty;
- the overall value of all securities posted within the framework of a triparty repo cannot decline in an uncontrolled manner, which could lead to insufficient collateralisation of a counterparty's exposures at the central bank. For example, in the event of an imminent coupon payment of a bond (which leads to a temporary decrease in the value of the bond), collateral substitution mechanisms are provided to ensure the constancy of the value of securities posted as collateral;
- triparty repo tools must allow the collateralisation of Eurosystem eligible securities only, the list of which is published daily on the ECB's website;
- tripartite agents, who are made aware of the Eurosystem valuation of the securities eligible for refinancing, must ensure the confidentiality of these valuations and not use them for purposes other than the sole management of the triparty repo tool when it is used with the Eurosystem.

CHAPTER 14

TARGET2-Securities (T2S)

Updated on 17 December 2018

T2S, the technical settlement platform developed and operated by the Eurosystem, is an essential contribution to the integration process of European financial markets. This initiative of the Eurosystem, launched in 2008 and gradually rolled out between June 2015 and September 2017, has already made it possible to harmonize many settlement characteristics (within the euro area and in the non-euro markets that have decided to join T2S) and provides a solution to the disadvantages of the fragmentation of European markets with respect to the settlement of securities. It has developed alongside European regulatory initiatives (such as the European CSDR) and political initiatives (the Capital Markets Union – CMU project launched by the European Commission in 2015), the latter having benefited from the role of T2S as a catalyst for the harmonisation of financial markets in Europe.

By the end of 2018, 23 European CSDs had migrated to T2S, including some CSDs established outside the euro area. This high level of participation demonstrates the expected benefits of T2S in terms of settlement efficiency and harmonisation. As mentioned in Chapters 12 and 13, T2S is not, within the meaning of CSDR, viewed as a securities settlement system¹ – where the latter is defined as the settlement function of a CSD – but as a technical platform to which CSDs that have decided to participate in T2S outsource their settlement operations.

In 2001, at the instigation of the ECB, the CESR² and the European Commission, a group of financial sector experts was set up to study the European securities settlement market, which appeared to be highly fragmented. This group published two reports, in November 2001 and then in April 2003, commonly referred to as the “Giovannini Reports” (named after the group’s president, Alberto Giovannini). These reports highlighted various obstacles (or “barriers”) to a smooth flow of securities between European countries, attributable in particular to tax rules, legal aspects, management procedures for corporate

actions,³ technical or organisational aspects, etc. (see table in Section 7 of this chapter).

These “barriers” were compounded by the high number of infrastructures. Organised by domestic market and fragmented, the European settlement landscape in general, and in the euro area in particular, lacked harmonisation, which entailed significant costs for all non-domestic market participants, even European ones, whether they were financial service providers or investors. Despite the existence of a single currency, these costs were such that they hindered the development of cross-border securities circulation within the European Union and especially in the euro area. This is the problem that T2S has solved.

1. The driving role of the Eurosystem and the governance of T2S

1.1. The principles underlying T2S

While some groups, such as Euroclear with its ESES system, had previously implemented internal projects for the development of single settlement systems (see Box xx), it was difficult to expect the European CSDs to agree on a common infrastructure, due to differences of interest between groups as well as the coexistence of competing and technically different models. As we mentioned in Chapter 13, the French system (RGV, which became ESES France) was based on the so-called “integrated” model in which the cash and securities accounts are managed on the same platform (the technical management of cash accounts in central bank money being delegated by the central bank to the CSD); while the German system was based on the so-called “interfaced” model, in which cash accounts and securities accounts are managed on two separate platforms.

The Eurosystem therefore took determined measures to create a common settlement platform, to contribute to the objective of a better integration of European markets.

1 A securities settlement system makes it possible to hold and transfer securities free of payment or versus payment (see Chapter 13).

2 The Committee of European Securities Regulators (CESR), was an independent European committee bringing together the European regulators of financial markets. Created in 2001 by the European Commission, it was replaced on 1 January 2011 by the European Securities and Markets Authority (ESMA).

3 The term “corporate actions” refers to all events that may occur during the life of a security. Some occur on a fixed date (coupon payments, redemptions), others are exceptional (stock splits, public tender offers, etc.) and are usually more complex. Through one of its permanent working groups, the Corporate Actions Sub-group, T2S has contributed significantly to the harmonisation of “transaction management”, i.e. the management of corporate actions such as market claims and transformations.

Box 1: General principles of TARGET2-Securities

Principle 1: The Eurosystem shall take on the responsibility of developing and operating T2S by assuming full ownership.

Principle 3: T2S shall not involve the setting-up and operation of a CSD, but instead will serve only as a technical platform for providing settlement services to CSDs.

Principle 5: The T2S settlement service will allow CSDs to offer their participants at least the same level of settlement functionality and coverage of assets in a harmonised way.

Principle 7: T2S shall require participating CSDs to be designated under the Settlement Finality Directive (SFD) in their respective jurisdiction.

Principle 9: The primary focus of T2S shall be settlement services in euro.

Principle 11: T2S shall allow users to have direct connectivity to its platform.

Principle 13: All CSDs settling in euro central bank money shall be eligible to participate in T2S.

Principle 15: All CSDs connecting to T2S shall do so under a harmonised contractual arrangement.

Principle 17: T2S settlement rules and procedures shall be common to all participating CSDs.

Principle 19: T2S services shall be compatible with the principles of the European Code of Conduct for Clearing and Settlement.

Principle 2: T2S shall be based on the TARGET2 platform and will hence provide the same levels of availability, resilience, recovery time and security as TARGET2.

Principle 4: The respective CSD users' securities accounts shall remain legally attributed to each CSD.

Principle 6: Securities account balances shall only be changed in T2S.

Principle 8: T2S shall settle exclusively in central bank money.

Principle 10: T2S shall be technically capable of settling currencies other than the euro.

Principle 12: CSDs' participation in T2S shall not be mandatory.

Principle 14: All CSDs connecting to T2S shall have equal access conditions.

Principle 16: All CSDs connecting to T2S shall have a single calendar of opening days and harmonised opening and closing times for settlement business.

Principle 18: T2S shall operate on a full cost-recovery and not-for-profit basis.

Principle 20: T2S shall support the participating CSDs in complying with oversight, regulatory and supervisory requirements.

Source: ECB.

At the end of a market consultation phase, followed by a user requirements definition phase, which took place successively between 2006 and 2008, the ECB's Governing Council decided in July 2008 that the Eurosystem would set up a technical

settlement platform, entrusting the IT developments and the technical operation of the platform to four national central banks (Deutsche Bundesbank, Banco de España, Banque de France and Banca d'Italia, the so-called "4CB").

The implementation of T2S is based on twenty principles (General principles of TARGET2-Securities: see Box 1) which were approved by the ECB's Governing Council and form the basis of the T2S architecture and the distribution of various players' roles. These principles stress that the Eurosystem is not intended to replace the CSDs (see Principle 3), but to offer them a unified technical settlement solution (the other two core services of CSDs, the notary function and central account maintenance service, are not outsourced to T2S, nor their so-called ancillary services. These functions are defined in Chapter 12). Moreover, participation in T2S is not mandatory, membership is up to each CSD.

One of the key features of T2S is that it operates in "central bank money": settlement of the cash leg of transactions processed by participating CSDs is done in the books of a central bank.

1.2. The governance of T2S

The governance of T2S is conducted by stakeholders directly involved in the platform:

- The European Central Bank (ECB), as project manager and operator of T2S;
- The national CSDs, as managers of the securities accounts, designated as "participants" in T2S;
- The National Central Banks (NCBs) as the cash account managers, also designated as "participants" in T2S.

Beyond these direct stakeholders, the "users" of T2S – i.e. participants in CSDs, mainly banks and investment firms – are also involved in the governance of T2S. It is indeed these market players, in particular the custodians, who are best able to assess the extent to which T2S meets the expectations of issuers and investors, and their own expectations in terms of more fluid access to the various European markets. They are represented at the level of each market in the national user groups (see below). However,

the participants in CSDs, although they are T2S "users", have no direct contractual relationship with T2S: they maintain commercial and contractual relations with the CSDs for their securities accounts and with the NCBs for their cash accounts.

The governance is based on an agreement between, on the one hand, the Eurosystem and the CSDs (the T2S Framework Agreement), and on the other hand, between the Eurosystem and the non-euro central banks that have made the decision to make their currency eligible for the settlement of transactions in T2S under the Currency Participation Agreement⁵ (to which up to now only the Danish central bank is a party). The purpose of this governance structure is to ensure that all T2S stakeholders (the ECB, national central banks, CSDs and their users) are involved in the functional and strategic decisions relating to T2S. Lastly, the T2S platform is owned by the Eurosystem.

The Governing Council is responsible for defining the strategic priorities of T2S and its oversight, due to the importance of the project for the Eurosystem and for European integration in general.

The operation of T2S is the responsibility of the Market Infrastructure Board⁶ whose members are appointed by the Governing Council. The MIB develops proposals for the Governing Council on strategic issues related to T2S and manages relationships with all stakeholders. The MIB is made up of members of the Eurosystem, members of the non-euro NCBs participating in T2S, and independent experts (non-NCB).

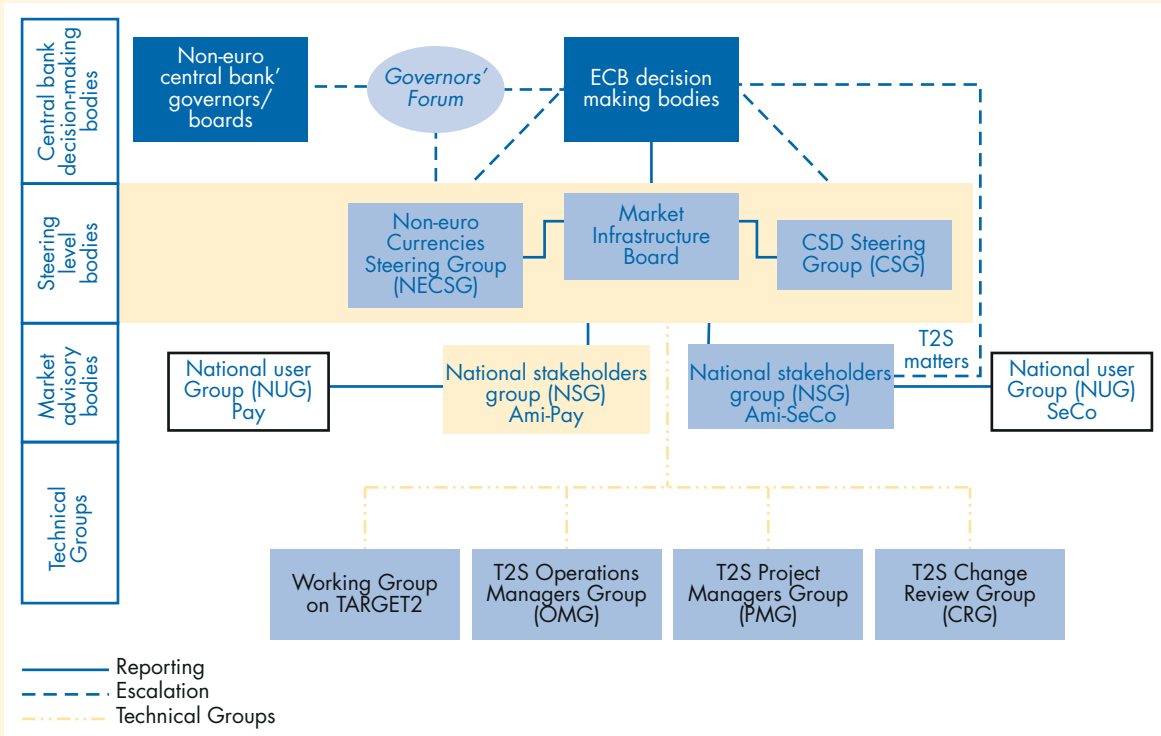
The CSD Steering Group (CSG) comprises the CSDs (and is chaired by one of them) and is responsible for coordinating the CSDs participating in T2S with the Eurosystem. To improve this coordination, the CSG also includes, as observers, representatives of the MIB and CSD participants.

The Advisory Group on Market Infrastructures for Securities and Collateral (AMI-SeCo)

4 See Chapters 12 and 13.

5 Framework agreement setting out the responsibilities of the Eurosystem and the non-euro central banks participating in T2S. Management of the cash accounts of the non-euro central banks remains under their control.

6 The MIB is part of a broader strategic vision of the management of operations and development of the services of technical platforms such as TARGET2 and T2S, as well as new market infrastructure projects such as TARGET Instant Payment Settlement Service (TIPS) and the consolidation of T2 and T2S (RTGS services). For more details, see Chapter 7, Section 6.

Box 2: The governance of T2S

Source: ECB.

advises the Eurosystem on T2S issues to ensure that T2S operations meet the needs of the market. The advisory group is therefore composed of about fifty representatives of all stakeholders (CSDs, the ECB and national central banks) and users (market infrastructures, banks), as well as observers (the European Commission and the ESMA in particular). In addition, and given the importance of harmonisation for the success of the T2S project, the AMI SeCo has from the outset set up a dedicated structure in charge of studying harmonisation issues and proposing standards: the “Harmonisation Steering Group” (see below).

The National Stakeholders Groups (NSG) are the links between the AMI-SeCo and the different national markets. They collect the opinion of T2S users in each national community regarding the developments

contemplated for T2S, as only a few participants from each national community are members of the AMI-SeCo.

Furthermore, technical groups made up of experts in ad hoc fields make it possible to address, among others, issues relating to the management of T2S developments and of operational procedures.

2. T2S operations

T2S is a platform for the settlement and delivery of securities in central bank money, whose primary settlement currency is the euro, while being multi-currency and thus offering the possibility of settlement in other currencies if a central bank outside the euro area wants to connect to T2S. This has been the case since October 2018, when

the Danish krone joined T2S. The platform has a distinctive operational organisation compared to the usual SSSs of CSDs, because it is integrated and international. This is because the location of the securities accounts of a number of CSDs and the cash accounts (in euros) of various NCBs within a single technical platform allows cross-border and national transactions to be processed using identical operational processes and at the same cost. Thus, in theory, the participating banks of the CSDs using T2S could use only one euro account and (possibly) only have one connection with a single CSD. This operational framework reflects the importance of the cross-border dimension of T2S.

2.1. The “integrated model”

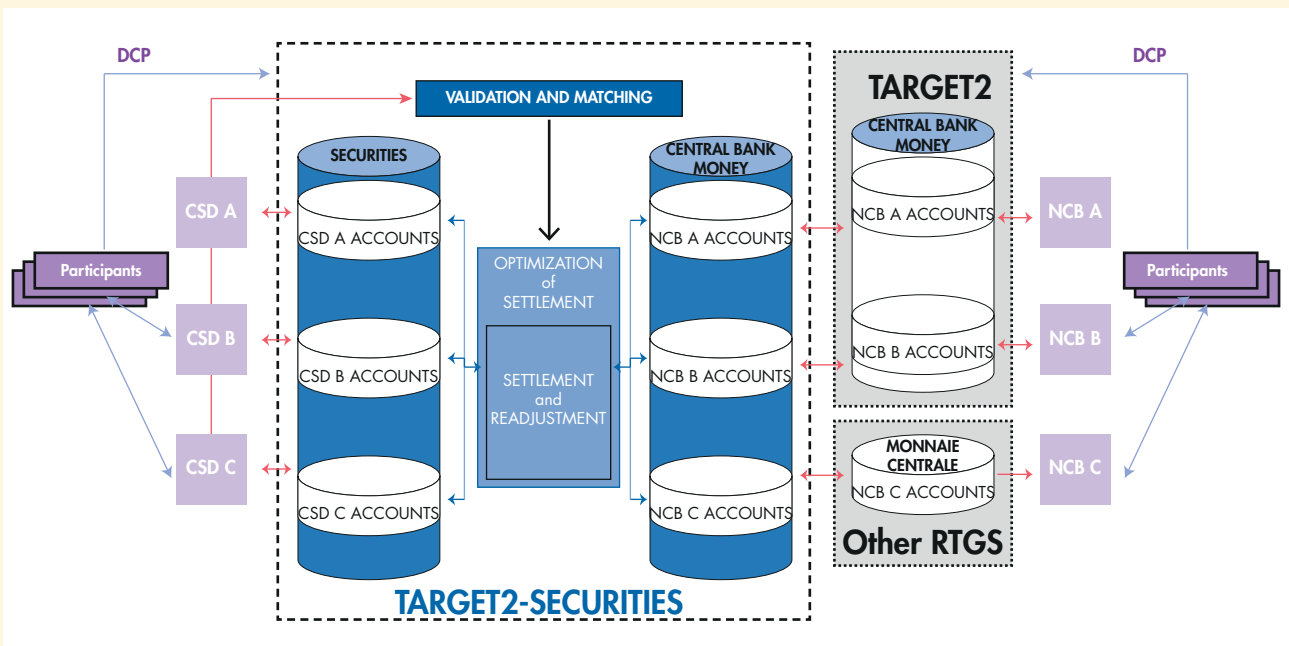
T2S operates an “integrated” model: the cash accounts dedicated to the settlement of transactions processed by T2S and the securities accounts are located on the same technical platform, which allows real-time

settlement (see Chapter 13 for more details). The CSDs outsource the delivery of the securities leg to the T2S platform while settlement of the cash leg is done through dedicated cash accounts (see Section 2.2 of this chapter) managed by the T2S platform. DVP settlement is therefore efficient, secure and fast. The organisation is similar to that implemented in Euroclear’s ESES system, where the management of cash accounts was outsourced by central banks to the CSDs. In contrast, in the T2S environment, it is the management of securities accounts that is outsourced by the CSDs to T2S.

2.2. Settlement in central bank money: the dedicated cash accounts (DCAs)

The dedicated cash accounts (DCAs) managed by the T2S platform interact with the cash accounts opened by the participants in the TARGET2 platform or in the RTGS systems managed by the non-euro area central banks. The DCAs can

Box 3: Structure of securities and cash accounts in T2S



Source: ECB.

be credited every day by the participants, either by automatic and recurring liquidity transfers (standing orders) or by one-off transfers (current orders). Residual liquidity in the dedicated cash accounts is automatically transferred by T2S at the end of the day to the cash accounts in TARGET2, before the change of accounting day. This same mechanism applies to the Danish krone and any other currencies (other than the euro) that might become eligible for settlement in T2S. For the record, the use of central bank money is one of the PFMI (see Chapter 17), and an essential prerequisite for financial stability, to which T2S contributes directly.

As part of the TARGET2 and T2S consolidation project (see Chapter 7, Section 6), operation of the DCAs will be improved. In particular, it will no longer be necessary to systematically transfer at the end of the day the cash remaining in the DCAs to the cash accounts in TARGET2.

2.3. The centralisation of liquidity

To meet the flexibility needs of the various market players using T2S, and to adapt to the different markets, T2S offers several options for organising cash management. For example, thanks to the common settlement engine, T2S makes it possible to centralize liquidity within a single cash account and to use this cash account for all settlements within all CSDs using T2S, without introducing any difference in processing from one CSD to the next, or from one central bank to the next.

Similarly, the centralisation of securities with one CSD is possible, while using one or more cash accounts, even if these have been opened in several central banks. This centralisation under smooth operating conditions is nevertheless contingent upon the establishment of operational links between the CSDs. In addition, this type of centralisation remains more difficult to implement due to the incomplete harmonisation of European securities markets (see Section 7 of this chapter).

2.4. The settlement process

The T2S settlement engine delivers real-time gross settlement with minimal liquidity requirements thanks mainly to sophisticated settlement algorithms. The algorithms can identify complex chains of transactions involving several counterparties that can be settled simultaneously, thus minimising the risk of bottlenecks, delays in settlement and settlement fails. T2S also handles “technical netting”, which is the calculation of net positions that allow a participant to buy securities using liquidity obtained from the sale of other securities. This type of optimisation is performed for all pending instructions. In some cases, it also relies on the sequencing of instructions to manage a waiting list of instructions eligible for settlement, based on the different priority levels of instructions. Lastly, it can apply full settlement if the securities and cash are in sufficient supply, or partial settlement if there is a partial lack of securities or cash, provided the two parties agree.

These T2S settlement modules are complemented by sophisticated settlement and consumed liquidity optimisation functions to achieve the greatest efficiency and security in settlement while not generating unbearable liquidity requirements for the participants.

2.5. The settlement and consumed liquidity optimisation functions

T2S aims to achieve the highest level of settlement efficiency while minimising liquidity consumption, by reducing securities and cash settlement fails, better organising resources, and recycling instructions to increase the success rate of settlements. By mid-2018, the settlement rate was around 98%, both in terms of value and volume (all participating CSDs combined), which is in line with the objectives initially set for T2S in terms of settlement efficiency. The figure improved over the first months of actual use, and the Eurosystem, the CSDs and their participants are making sure that it is further improved, whether through technical changes or the adaptation of practices to the new tool.

Box 4: Operational research at the service of market infrastructures

In T2S, the two settlement processes, i.e. the daytime and night-time processes, do not work in the same way. In the daytime process, between 05:00 and 18:00, transactions are settled as they arrive in the system. During the night-time process, from 19:30 to 03:00, transactions are processed in batches. As a matter of fact, it is during this overnight process that most transactions are processed.

To process the batches of transactions presented at night, the design of the T2S settlement engine drew heavily from work inspired by operational research and resulted in the development of a real Mathematical Optimisation Module capable of selecting transactions that can be settled. The required securities and cash must of course be available for a transaction to settle and the transaction may be subject to complex functional rules such as auto-collateralisation or partial settlement. Lastly, the selection is carried out by optimising two criteria: the volume, i.e. the number of transactions settled, and the value, i.e. the sum of the amounts settled.

The handling of these complex functional rules is based on operational research techniques, which allows them to be taken into account to determine the largest set of valid transactions.

The transcription of the data generated by the functional rules in the form of equations leads to a number of equations and variables roughly equal to the number of transactions. Applied to T2S, the result is a system of several million equations for as many variables. The extremely high volume to be processed in a very short time (less than one hour) also increases the difficulty, as well as the fact that at the end of the processing, a “binary” result is expected (a transaction is either settled or rejected, no intermediate state is possible).

The system of equations thus obtained is then solved using dedicated mathematical software. The properties of the algorithm used guarantee overall optimisation of the process. In addition, during the optimisation process it is possible to know the gap between the current settlement and the “optimal” settlement. Lastly, the software is able to provide a valid intermediate solution in case of a sudden interruption or limited time.

The mathematical modelling used avoids the pitfalls and possible biases of a “conventional” algorithm, such as the one used for gross settlement (GROSS), which runs in accordance with a predefined order and for which all the interdependencies between the rules must be planned and covered during development. Lastly, maintenance is simplified: a change in a functional rule only imposes a change in the system and not a redesign of the entire process.

Once the modelling phase was completed, the results were quickly better than those obtained previously using “conventional” GROSS-type algorithms. This work was continued to perfect the first experiments. Several resolution methods were developed to ensure the relevance and quality of the results produced.

The effectiveness of settlement and the minimisation of liquidity needs are further enhanced by the use of other optimisation features: partial settlement and auto-collateralisation. T2S provides for the use of partial settlement during certain time windows throughout the day:⁷ for example, if the quantity of securities is insufficient

at a time “t”, settlement will be made by T2S for the quantity of securities available, and the remaining amount will be settled at a later stage.

T2S also offers auto-collateralisation, inspired by the liquidity management techniques that prevailed in the French settlement systems.

⁷ The number of partial settlement windows has been increased since the platform was rolled out in June 2015: there are now five of them, at 08:00, 10:00, 12:00, 14:00 and 14:15 for 15 minutes.

This mechanism allows banks holding a DCA, known as payment banks, to obtain liquidity from a central bank, in exchange for securities eligible for refinancing operations of the relevant national central bank (the national central bank of the Eurosystem or the central bank of Denmark, depending on the currency of settlement). This is “central bank auto-collateralisation”, which allows the automatic provision of liquidity by the granting of intraday credit by the NCB, guaranteed by eligible collateral. CSD participants in the T2S environment can thus benefit from liquidity during the day, which makes it easier to settle transactions and, as a result, to improve the settlement rate.

Auto-collateralisation relies on:

- securities already held by the buyer (“auto-collateralisation on stock”);
- or the securities that are being purchased (“auto-collateralisation on flow”).

This mechanism, which is essential for optimising liquidity, relies on the use of settlement in central bank money, as the latter is able to grant intraday credit to payment banks efficiently and securely.

This possibility of optimised management has been extended by the payment banks to their own clients. This so-called “client collateralisation” is made possible by the T2S functionalities.

2.6. The processing of a transaction by T2S

CSD participants have the option of using T2S either through their CSD, in which case it is an indirect connection to T2S, or directly, for those who have chosen the status of “directly connected participants” (DCP).

For participants connected indirectly to T2S, there is no change from the situation prior to T2S since they can continue to have a relationship only with their CSD, which redirects their transactions to T2S

for settlement. DCPs send their payment and securities transfer orders directly to T2S. DCPs are T2S users who have been certified by the Eurosystem and authorised by a CSD or an NCB to technically link directly to T2S to use its services, without having to resort to the technical interface of a CSD and/or an NCB. The link however is only technical: DCPs’ cash and securities accounts continue to be held by their central bank and their CSD, respectively.

If the instructions have not been matched by the T2S user CSD, T2S matches the instruction with the corresponding instruction received from the participant’s counterparty (purchase of securities against cash payment on one side; sale of the same securities and receipt of the same amount of cash on the other). When the settlement date is reached, the T2S platform ascertains that there are enough securities and funds available in the securities accounts and dedicated cash accounts in T2S for the transaction to be settled. If this is the case, T2S settles the transaction.

2.7. The operating day

A T2S operating day (D) begins on D-1 at 18:45. It ends at 18:45 on D. It includes the end and beginning phases of the day.

The end-of-day process, from 18:00 to 18:45, closes the settlement process for the day, allows the preparation of recycling (on the next settlement day) of instructions present in the system but not yet settled on the day that ended with the 18:00 “cut-off” and allows the flushing of some instructions, in particular those that could not be matched within 20 days following their entry into the system. The process also prepares the end-of-day reports and account statements. Once these preparations for the next day have been completed, the “start-of-day” process can begin. It runs from 18:45 to 20:00 and enables the change of date, the revalidation of pending settlement instructions, the updating of certain repository data and preparation of the night cycle.

2.8. Cross-border settlements

As stated previously, T2S makes cross-border settlement identical, in terms of costs, risk and technical process, to “domestic” settlement, since it centralises the securities accounts of several CSDs and the cash accounts (in euros) of several NCBs within a single technical platform. It greatly enhances the integration of securities settlement within the European Union. Before T2S, a participant was obliged to resort to several CSDs, themselves possibly linked to other CSDs, to access the different markets, or to go through an intermediary (custodian) that provided the access to each market. The diagram below illustrates this architecture.

In contrast, T2S is a hub at the heart of the euro settlement process,⁸ to which the CSDs are linked, allowing cross-border settlement to be as effective as domestic settlement.

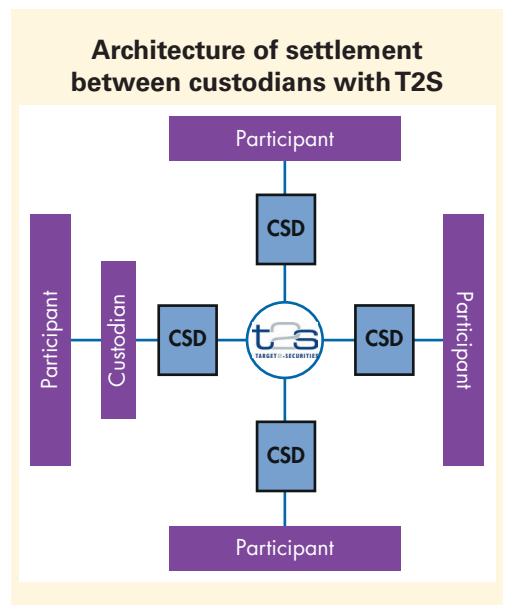
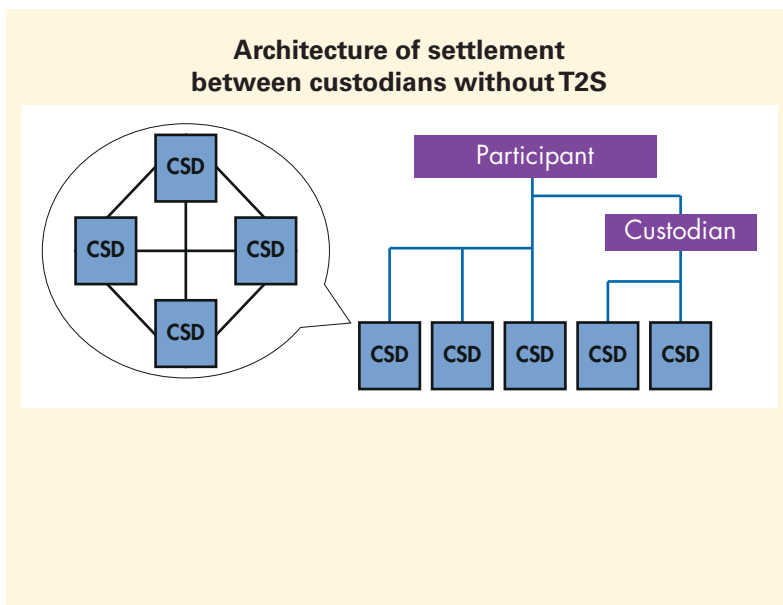
The cross-border movement of securities in T2S is essentially based on the establishment of links between the CSDs, which are technically implemented on the T2S platform (accounts opened by an investor CSD in the books of an issuer CSD

to reflect the assets of its participants for a given security). The establishment of links remains the sole responsibility of the CSDs, which must assess their relevance in terms of activity, and then set them up legally (see below and Chapter 12).

Indeed, one of the ways for investors established in a market to access securities issued in other markets is to use the links between its “domestic” CSD (“investor CSD”) and “issuer CSDs”. This possibility existed before T2S both in Europe and with CSDs from other continents, but these links were rarely used, almost exclusively for FoP exchanges⁹ and with very few DvP exchanges in central bank money. T2S significantly facilitates the establishment of links between participating CSDs, including DvP links due to the technical and operational harmonisation it brings about between these CSDs. The establishment of links between CSDs participating in T2S is therefore expected to accelerate in the coming years. The T2S platform therefore allows, all else being equal, a better cross-border circulation of securities (including collateral) and contributes directly to the objective of mitigating the fragmentation of markets.

8 Or in any other currency for which the central bank of issue decides to join T2S.

9 Free of payment. See Chapter 13.



Box 5: The links between CSDs

A link between securities settlement systems is a set of technical and legal arrangements for the transfer of securities between systems. A direct link is an account opened by a CSD, called the investor CSD, in the books of another CSD, called the issuer CSD, to facilitate the transfer of securities between the participants of these CSDs. The links can also be relayed, i.e. involve an intermediate CSD.

The Eurosystem periodically assesses the links between CSDs to determine whether they can be used by its counterparties. As of 22 November 2018, there were 62 eligible direct links and 26 eligible relayed links.

Investor CSD	Issuer CSD	Belgium	Denmark	Germany	Greece	Spain	France	Italy	Lithuania	Luxembourg	Portugal	Malta	Netherlands	Austria	Slovenia	Slovakia	Finland	Number of direct links per investor CSD	Number of relayed links per investor CSD			
		Euroclear Bank NBB-SSS	VP Securities A/S	Clearstream Banking AG (CBF) CBF-CREATION	CBF-system	BOGS	Iberclear-ARCO	Euroclear France	Monte Titoli	CSDL	Clearstream Banking S.A. LuxCSD	Interbolsa	MaltaClear	Euroclear Nederland	OeKB CSD GmbH	KDD	CDCP			Euroclear Finland		
Belgium	Euroclear Bank	D	D															13	0			
	NBB-SSS																					
Denmark	VP Securities A/S																					
Germany	Clearstream Banking AG (CBF)																					
	CBF-CREATION	R	R		R	R	R	R		D	R		R	R	R	R	R	1	12			
	CBF-system	D	D				D	D	D	D	D	D	D	D			R	10	1			
Greece	BOGS				D													1	0			
Spain	Iberclear-ARCO				D		D	D					D	D				5	0			
France	Euroclear France	D	D		D	R	D		D					R				5	2			
Italy	Monte Titoli	D	D		D	D	D	D		D			D	D				9	0			
Lithuania	CSDL								D									1	0			
Luxembourg	Clearstream Banking S.A.	D	R	D		D	D		R	R		R	R	R	D	D	D	8	6			
	LuxCSD	R			D			R	R				R	R				1	5			
Portugal	Interbolsa							D					D					2	0			
Malta	MaltaClear				D													1	0			
Netherlands	Euroclear Nederland	D																1	0			
Austria	OeKB CSD GmbH				D		D	D					D					4	0			
Slovenia	KDD																					
Slovakia	CDCP																	62	26			
Finland	Euroclear Finland																					
Number of direct links per issuer CSD		4	4	3	0	0	9	3	3	6	5	0	5	3	0	1	6	4	2	2	2	62
Number of relayed links per issuer CSD		0	3	1	0	0	1	2	0	3	3	0	0	3	4	1	1	2	2	26		

Source: ECB (<https://www.ecb.europa.eu/paym/coll/coll/ssslinks/html/index.en.html>), Banque de France.

However, at this stage, not all CSDs offer the CSD investor function (by setting up links with other CSDs) because this function involves providing participants of such an investor CSD not only with settlement services, which T2S facilitates greatly, but also all the asset servicing (everything that pertains to the life of the securities held, such as the processing of corporate actions, management of the taxation of securities, etc.) that accompanies access to securities issued via another CSD, which is much more complex and expensive.

2.9. Settlement finality in T2S

The Settlement Finality Directive (SFD) organizes the protection of instructions entered into a notified system in the event of the default (opening of administration or insolvency proceedings) of a participant (for more details on the SFD, refer to Chapter 5, Section 3.3). All T2S stakeholders, CSDs and central banks have agreed on common rules in this field:

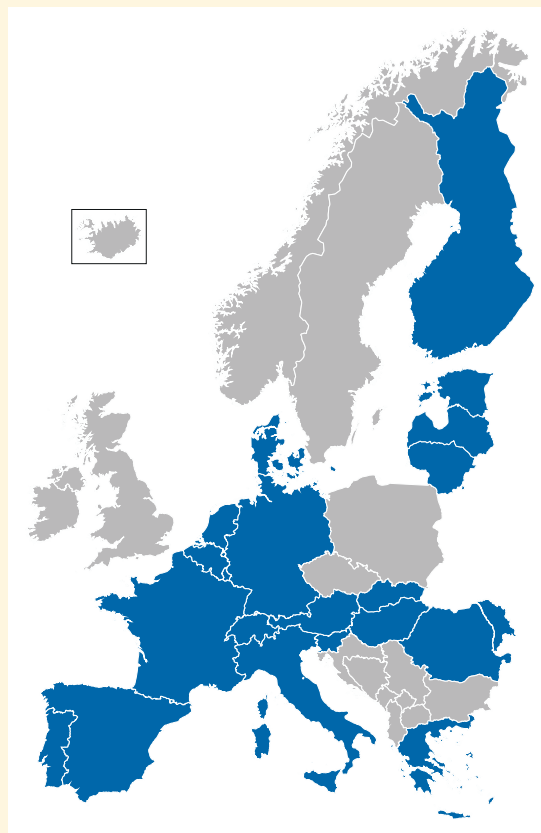
- an instruction is deemed to have been entered in the system ("SF1" moment) when it is validated in T2S;
- an instruction becomes irrevocable ("SF2" moment) when it is matched in T2S: it can no longer be modified or deleted by either counterparty alone but can be changed if both parties agree;
- T2S then settles it ("SF3" moment) (see Chapter 13, note 4).

These common rules provide increased legal certainty, especially for cross-border transactions. Each CSD adapts its contractual documentation accordingly at the time of its migration to T2S.

3. CSDs and central banks that have decided to participate in T2S

Together with the central banks of the Eurosystem and Denmark's Nationalbank (the Central Bank of Denmark), 21 European

Box 6: Countries in which a CSD participates or has committed to participate in T2S



Germany: Clearstream Banking A.G.; Austria: Oesterreichische Kontrollbank Aktiengesellschaft; Belgium: Euroclear Belgium ESES and National Bank of Belgium Securities Settlement System (NBB-SSS) – (titres d'Etat); Denmark: VP Securities A/S; Spain: Iberclear - BME Group; Estonia: Eesti Väärtpaperikeskus; Finland: Euroclear Finland Oy; France: Euroclear France ESES; Greece: Bank of Greece Securities Settlement System (BOGS); Hungary: Központi Elszámolóház és Értéktár Zrt. – KELER; Italy: Monte Titoli S.p.A.; Latvia: Latvijas Centralais depozitārijs; Lithuania: Lietuvos centrinis vertybinių popierių depozitoriumas; Luxembourg: LuxCSD SA; Luxembourg: VP Lux Sàrl; Malta: Malta Stock Exchange; Netherlands: Euroclear Netherland ESES; Portugal: Interbolsa – Sociedade Gestora de Sistemas de Liquidação e de Sistemas Centralizados de Valores Mobiliários, S.A.; Romania: Depozitarul Central S.A.; Slovakia: Centrálny depozitár cenných papierov SR, a.s.; Slovenia: KDD – Centralna klirinško depotna družba, d.d.; Switzerland: SIX SIS Ltd/VP LUX S.à.r.l.

Source: ECB.

<https://www.ecb.europa.eu/paym/t2s/stakeholders/csd/html/index.en.html>

national CSDs committed to using T2S from its launch. In July 2012 they signed the T2S Framework Agreement outlining the responsibilities of the Eurosystem and the CSDs participating in T2S and the fact that each CSD remains responsible, in accordance with the laws of its own jurisdiction, for the management in T2S of the securities accounts of its clients. The balances of these

securities accounts are recorded in T2S, and accessible to CSDs and their users in real time, to be entered into their own systems.

The French CSD Euroclear France migrated to T2S in September 2016, together with the CSDs of the Netherlands and Belgium (belonging to the Euroclear group), which shared the same ESES settlement platform.

Some euro area CSDs do not use the T2S services, for various reasons. Examples include the Euroclear Bank and Clearstream Banking Luxembourg ICSDs that are operating a commercial bank money settlement system (see Chapter 12). As for the German Clearstream Banking Frankfurt CSD, it only migrated its central bank money system (CBF-System) in February 2017, the commercial bank money system (CBF-Creation) remaining outside T2S.

In contrast, several CSDs established in countries outside the euro area have chosen to participate in T2S. This is the case, for example, of the Swiss, Hungarian and Romanian CSDs, which migrated the settlement of their transactions in euro but not for their transactions in national currencies at this stage. T2S was designed from the outset as a multi-currency platform, which allows it to process Danish krone transactions since October 2018, in addition to the euro transactions that have been processed since the launch of the platform; other currencies could follow in the medium term.

“Tailored” participations or adapted securities ownership schemes may be provided for in a few special cases such as the Polish market, which has not yet migrated to the euro¹⁰ or the Irish market.¹¹

4. The gradual go-live of T2S

To allow a gradual ramp up of T2S, the migration of the CSDs to T2S took place in five successive waves between June 2015 and September 2017.

Beyond these initial five waves of migration, the CSDs wishing to join T2S later will be able to do so after a phase of technical tests conducted in cooperation with the Eurosystem and their participants, as was the case with the other CSDs.

The fourth wave of migration in February 2017 led to a sharp increase in daily average volumes settled by T2S (see Chart 1). These figures remained stable at this high level in the months that followed, peaking in December 2017 at an average of 571,879 transactions per day.

The daily average value of settled transactions increased in the same proportions, with a peak in December at EUR 884,4 billion per day (see Chart 2). Settlement efficiency has remained stable at a level exceeding 97%.

¹⁰ Since the national CSD had not migrated to T2S, the Polish central bank (NBP) has not planned to migrate to T2S for the management of its cash accounts. However, some market participants in the Polish market have asked the NBP to open cash accounts in euros for T2S settlements. Insofar as the Polish CSD has not joined T2S, the aforementioned cash accounts will be linked to the securities accounts opened in the books of the Austrian CSD.

¹¹ Ireland is the only European country that does not yet have a domestic CSD, as Irish securities use the CREST platform of the Euroclear UK & Ireland CSD. As the Irish and UK markets have decided not to migrate to T2S, the Irish market has requested that Irish securities be admitted to T2S via the CSDs of the ESES platform, as an investor CSD. In a post-Brexit context, Ireland's central bank is looking into the various options available.

Wave 1 22 June 2015 - 31 August 2015	Wave 2 29 March 2016	Wave 3 12 September 2016	Wave 4 6 February 2017	Final wave 18 September 2017
Bank of Greece Securities Settlement System (BOGS) Depozitarul Central (Romania) Malta Stock Exchange Monte Titoli (Italy) SIX SIS (Switzerland)	Interbolsa (Portugal) National Bank of Belgium Securities Settlement Systems (NBB-SSS)	Euroclear Belgium Euroclear France Euroclear Nederland VP Lux (Luxembourg) VP Securities (Denmark)	Centrálny depozitár cenných papierov SR (CDCP) (Slovakia) Clearstream Banking (Germany) KDD – Centralna klirinško depotna družba (Slovenia) KELER (Hungary) LuxCSD (Luxembourg) OeKB CSD (Austria)	Nasdaq CSD (grouping the Baltic CSDs) Iberclear (Spain)

Chart 1: Average daily volume of settled transactions and settlement efficiency by volume (2017)

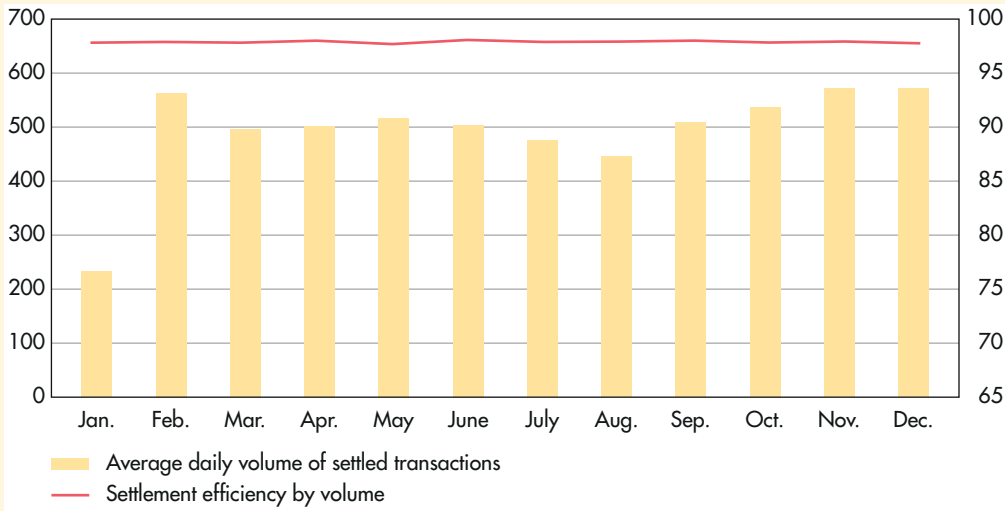
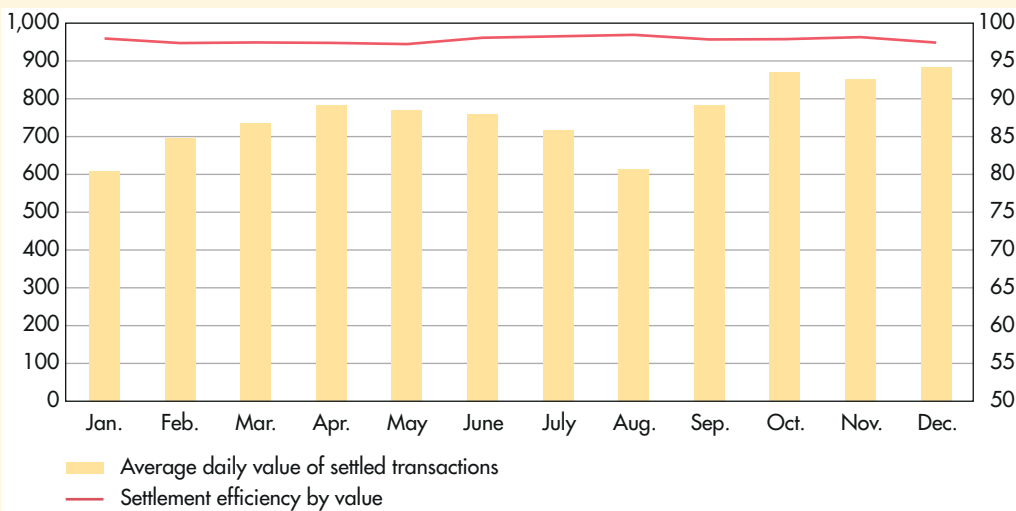


Chart 2: Average daily value of settled transactions and settlement efficiency by value (2017)

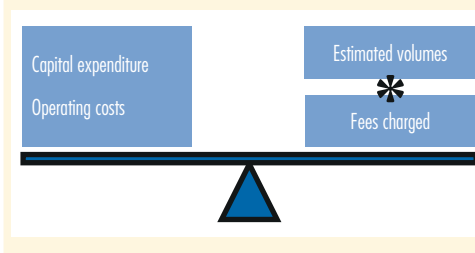


Source: ECB - <http://www.ecb.europa.eu/paym/t2s/about/multimedia/html/t2s2017.en.html>

5. The financing of T2S

The Eurosystem, which financed the construction of the T2S platform, intends to recover the full costs. Cost recovery will be achieved when the revenue received since the launch of the platform, and resulting from its use by participants (CSDs, central banks, credit institutions with securities accounts and cash accounts), covers the development and operating costs.

The principle of T2S cost recovery



Source: ECB.

The following principles were followed for invoicing:

- the objective is not to generate profits, but full cost recovery based on estimated volumes;
- simple and transparent fee policy;
- equal fees for all national CSDs;
- no volume-based discounts;
- stability of the fee schedule: on the basis of settlement volume projections made at this time, the fee schedule was decided in 2010 by the Governing Council, which set a single price of 15 euro cents for the settlement of an instruction for the period from the go live of T2S until December 2018. A revised fee schedule was applied as of 1 January 2019, with a new price of 19.5 euro cents per transaction.

6. T2S oversight

Although T2S is not formally regarded as a securities settlement system, the systemic nature of T2S as a technical settlement platform has led the Eurosystem to apply to it an oversight mechanism similar to that of securities settlement systems (see Chapter 13).

T2S oversight is thus carried out jointly by the national central banks and the financial market authorities of the various jurisdictions in which at least one CSD has contractually committed to outsource its settlement service to T2S, with the ECB and ESMA co-chairing this cooperative body of the oversight group. The 21 CSDs that have migrated to T2S are established in 21 Member States of the European Union and the European Economic Area: the oversight group therefore brings together the competent authorities of these 21 Member States in addition to the ESMA and the ECB.

A preliminary assessment of T2S against ESCB-CESR standards¹² was finalised in early 2014 and then published by the ECB and ESMA. The assessment of certain standards had remained open, in particular that of settlement finality, pending common, finalised and legally enforceable rules. This was done with the coming into force in March 2018 of the “Collective Agreement” between all the central banks and the CSDs participating in T2S, which harmonised the three finality moments among all of them. Since then, the oversight of the “funds” part of T2S has been a part of the overall assessment of TARGET2,¹³ because the cash accounts are legally opened in the national systems that make up T2 (e.g. TARGET2-Banque de France), and are carried out in accordance with the Principles for Financial Market Infrastructures – PFMI (see Chapter 18).

Apart from the “funds” part of T2S, it is also assessed against the PFMI. The T2S operator initially provides a self-assessment by answering a questionnaire; the final evaluation is conducted on the basis of this self-assessment, which is analysed critically by comparing it in particular with all the T2S documentation (contractual items, operating manuals, etc.). The substance of a number of topics are assessed for the first time, including the finality of T2S settlement thanks to the signing of an agreement in principle by all the CSDs and central banks participating in T2S and the actual transposition of these principles into common procedures, as well as the delivery of new functionality in T2S.

7. Concrete examples of harmonisation by T2S and other market unification drivers, T2S benefits

7.1. The harmonisation imposed by T2S and the associated governance

For T2S, the main objective of harmonisation has been to exclude national specificities from its operational functioning. This is why,

¹² The ESCB-CESR standards were non-binding standards adopted by European regulators for the oversight of CSDs and SSSs mainly. They have been replaced – with respect to the CSDs and SSSs – by CSDR since its entry into force.

¹³ The report of the assessment of T2 against the PFMI is here: http://www.ecb.europa.eu/pub/pdf/other/t2_disclosurereport_201606_en.pdf?8341c2a74d87b322292738afa9c331a3

as part of the governance of T2S, actions have been implemented to promote the creation of a single body of rules for post-trade processes in the T2S community and thus contribute to financial integration in Europe. Specifically, harmonisation was first advanced for the functions whose harmonisation was necessary to avoid replicating national specificities for the operational blueprint of the T2S system (which would have been an impossible task). T2S has thus already largely contributed to the harmonisation of post-trade processes in Europe by specifying certain functionalities, such as the standardised use of certain fields for matching, so that the various market participants can access all T2S markets in a harmonised manner. In the same way, T2S has imposed a single communication standard, namely the ISO 20022 messages. Thus, by simply migrating to T2S, a large number of markets have automatically adopted some standards of the T2S environment, such as:

- ISO 20022 messages;
- matching fields;
- operating day and calendar;
- definition of the three finality “moments”: the moment the settlement instruction enters T2S, the moment this instruction becomes irrevocable (can no longer be changed by either party without the agreement of the other), and the moment the settlement is made.

This harmonisation was based on the work of the different T2S governance groups aimed at unifying market practices, as well as the legal and regulatory framework necessary for the smooth running of T2S. The T2S Advisory Group and subsequently the AMI-SeCo in particular mandated the T2S Harmonisation Steering Group (HSG) to promote post-trade harmonisation, monitor the dissemination of standards in the T2S markets and identify implementation difficulties, so as to encourage good market practices.

The T2S markets are thus regularly assessed by the HSG for the compliance of their technical, regulatory and market activities with the 17 harmonisation standards identified in a first report,¹⁴ in July 2011. Two broad categories of standards had been identified: on the one hand, the so-called “priority 1” standards, viewed as necessary for the proper functioning of T2S and thus viewed as prerequisites for the operational launch of the system, on the other hand the so-called “priority 2” standards representing longer term harmonisation objectives¹⁵ and therefore not viewed as prerequisites for the launch of T2S. However, the definition and the supervision of implementation of these standards started concurrently. Priority 1 standards, the implementation of which is not yet finished, continue to be monitored by the HSG. The implementation of priority 2 standards, some of which are much more complex, should eventually allow market participants to reap the full benefits of the T2S technical platform.¹⁶

The HSG produces an annual progress report on T2S harmonisation that portrays the compliance status of each market. The ninth progress report, released in October 2018,¹⁷ shows that the different national markets connected to T2S have improved their overall compliance over the past four years. However, it also shows that the harmonisation of certain areas remains difficult, as evidenced by the example of the standards on corporate actions,¹⁸ due to national differences in corporate actions management and processes.

Corporate actions management falls outside the scope of T2S, but T2S offers CSDs functionality for effective corporate actions management. Although T2S has flexible tools that can be adapted to the different corporate actions management models, there is a need for harmonisation in this area. This is most evident for cross-border transactions, where securities are held in several CSDs and transactions take place between several CSDs.

14 <https://www.ecb.europa.eu/paym/t2s/progress/pdf/ag/mtg14/item-8-2-1st-t2s-harmonisation-progress-report-to-ag.pdf?b5560efb011fd29c6271bdfe3cbeb8f6>

15 Legal harmonisation, standards for corporate actions, place of issue, tax procedures, transparency of registered shareholders, access to the market, portfolio transfer.

16 A reform of the oversight of harmonisation is being discussed with the main stakeholders (markets, CSDs, etc.).

17 <https://publications.europa.eu/en/publication-detail/-/publication/03506518-d800-11e8-90c0-01aa75ed71a1>

18 For example, dividend payments, redemptions of securities, stock splits, etc.

To this end, the HSG has created the Corporate Actions Subgroup (CASG) made up of experts from CSDs, CCPs and participants. This group is dedicated to the definition and analysis of standards relating to corporate actions, and the oversight of T2S markets for the implementation of standard rules for corporate actions processes. The CASG also produces an annual compliance analysis report of each market regarding corporate actions standards in T2S.

7.2. Harmonisation work still remaining to be done beyond T2S

The T2S project has removed a significant number of the 15 Giovannini barriers for the relevant markets, in particular as a result of the common technical characteristics that are imposed on CSDs that participate in T2S and, consequently, on the markets that these CSDs serve. The following table gives an overview of how T2S, as well as the European CSDR (see Chapter 12) have contributed to the removal of the Giovannini barriers.

However, some of these barriers have proved difficult to eliminate, resulting in only limited development of cross-border settlement between domestic CSDs in central bank money. The trend towards market unification must therefore be completed, and the opportunity to continue and accelerate the harmonisation process has begun to materialise with the Capital Market Union (CMU) project. One of the components of this initiative launched by

the European Commission in 2015 was the setting up in early 2016 of a group of post-trade experts – the European Post-Trade Forum (EPTF) – to help the European Commission to develop legislative proposals and other initiatives in the post-trade landscape, including collateral management services, in line with the overall CMU objective of developing cross-border financing and financial investment within the European Union. The EPTF produced a report¹⁹ in May 2017 on the impact of regulatory changes on the technical, legal and tax barriers to post-trade activities identified by the Giovannini Group. It also identified new barriers or impediments to the provision and use of post-trade services in the perspective of the CMU. In particular, it listed six barriers (some of which had already been identified in 2001 by the Giovannini Group), the removal of which has a high priority: the inefficient management of withholding tax, legal inconsistencies, the fragmented management of corporate actions and of shareholder meeting processes, the inconsistent application of segregation rules, the lack of harmonisation in the rules and processes for investor registration and identification, and lastly the complexity of the post-trade reporting structure.

Following the publication of the EPTF report, the European Commission launched a consultation in the autumn of 2017 to gather feedback from market players on the need for further harmonisation in the post-trade environment, the results of which will serve as the basis for its work in this area.²⁰

19 https://ec.europa.eu/info/publications/170515-eptf-report_en

20 https://ec.europa.eu/info/consultations/finance-2017-post-trade_fr

Giovannini barriers	Contribution of the T2S platform to removal of the barrier	Contribution of CSDR to removal of the barrier
Differences at the IT (Information Technology) level	Yes	No
National restrictions on the place of clearing and settlement	Yes	No
Differences in the rules governing corporate actions	Yes *	Yes *
Intra-day settlement finality	Yes	Yes
Obstacles to remote access to national clearing and settlement systems	Yes	No
Harmonisation of the opening hours of settlement systems for all European Union equity markets	Yes	Yes
Harmonisation of operating hours and settlement deadlines with TARGET	Yes	No
National differences in market practices relating to securities issues	No	Yes *
National restrictions on the location of securities	No	Yes
Restrictions on the activity of primary dealers and market makers	No	No
All financial intermediaries established within the EU should be allowed to offer withholding tax agent services in all Member States	No	No
Any provisions requiring that taxes on securities transactions be collected via local systems should be removed to ensure a level playing field between domestic and foreign investors.	No	No
Absence of an EU-wide framework for the treatment of ownership of securities	No	No
National differences in the legal treatment of bilateral netting of financial transactions	No	No
National differences about how to resolve conflicts of laws	No	No
* The migration to T2S or the implementation of CSDR contributes to the removal of the barrier Source: ECB - T2S and CSDR contribution to the removal of the Giovannini barriers.		

CHAPTER 15

Collateral

Updated on 17 December 2018

Collateral consists of any guarantee used in the financial sector, i.e. mainly securities and cash, but also precious metals such as gold, or other types of goods.¹ In this chapter, we will discuss collateral in the form of securities, which is the one with the strongest links to the functioning of financial market infrastructures.

The link between collateral and financial market infrastructures is twofold: on the one hand, certain market infrastructures such as central counterparties or payment systems may require participants to post collateral for their proper functioning and security; on the other hand, central securities depositories play an essential role in the collateral posting process. In other words, market infrastructures are both users of collateral and intermediaries or service providers in its circulation.

However, the need for collateral is significant, especially since the 2008 financial crisis, due to new market practices and regulatory reforms to strengthen the security of the financial system.

Due to their role in the use of collateral, financial market infrastructures are crucial in the face of these needs: to improve the management of their clients' collateral, they are required not only to develop services for optimising this management but also to facilitate the circulation of assets, in particular

by increasing interoperability between the various collateral management platforms.

1. The role of collateral

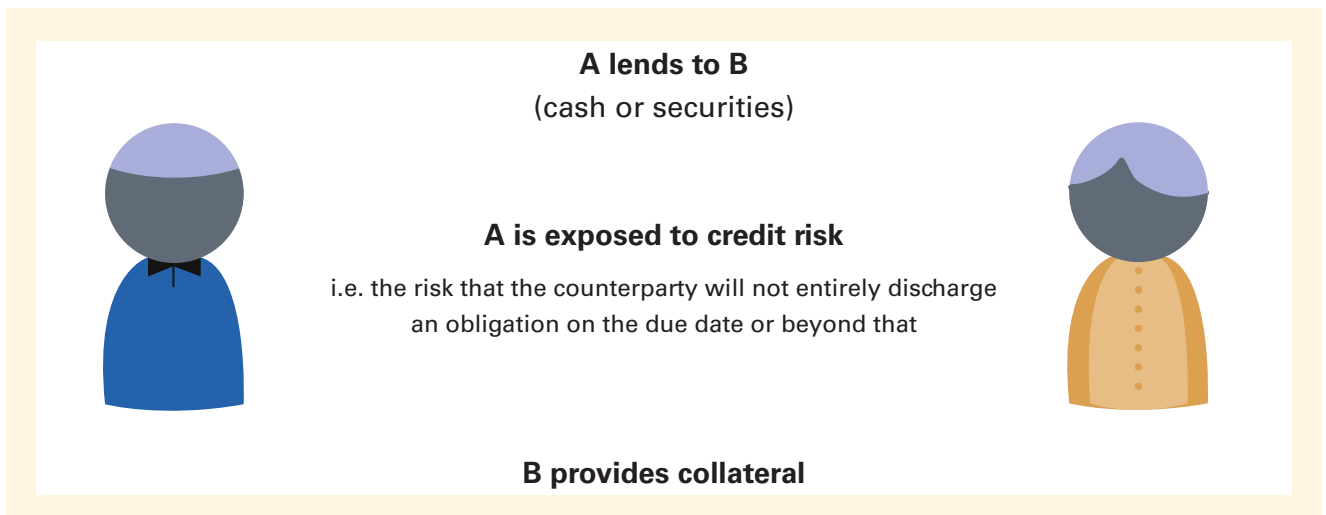
Collateral is used to protect the creditor against credit risk (in the case of a loan) or replacement risk (in the case of a derivatives transaction).

1.1. Collateral for loans

Certain financial transactions involve a credit risk, i.e. the risk that one of the counterparties will default before having fulfilled its obligation (for example, repaying liquidity borrowed on the interbank market). To offset this risk, collateral is used by the counterparties to the transaction. It corresponds to the financial guarantee that a creditor (counterparty A in the diagram below) benefits from to protect itself against the risk of default of its debtor (counterparty B). In the event of default by debtor B, creditor A has the right to keep the assets posted as collateral to “realise” them by way of sale or appropriation and thereby cover the financial loss suffered.

Different types of financial assets (financial instruments, cash or other assets) may be posted as collateral for financial transactions, provided that they meet a number of criteria and that there is an adequate legal

¹ Buildings, valuable paintings, etc.



framework to set up the financial guarantee and realize the asset in case of default.

Posting assets as collateral, also called “mobilisation” of collateral, is a form of protection for the creditor, similar to the provision of sureties by guarantors for example. The liquidity of the assets posted and, above all, their credit quality, make them a privileged means of protection for securing financial transactions.

In financial markets, the collateralisation of transactions using securities is used widely in the derivatives market and in the context of securities financing transactions.

1.2. In the derivatives market, collateralisation allows both parties to cover the replacement risk

The collateralisation of transactions in the derivatives market ensures the maintenance of the financial terms of a derivatives contract even in the event of default by one of the counterparties. It thus prevents the non-defaulting counterparty from incurring a loss in the event of adverse changes in market conditions.² Although the practice has existed for a long time in organised markets, it gained momentum in the 1990s along with the growth of OTC transactions. For example, the 2014 Margin Survey of the International Swaps and Derivatives Association (ISDA) states that by the end of 2013, around 90% of all OTC derivatives were already collateralised, regardless of the type of derivative.³

This proportion is still increasing, since the Basel Committee on Banking Supervision (BCBS) and the International Organisation of Securities Commissions (IOSCO) recommended in a report published in September 2013 and amended in March 2015⁴ that uncleared derivatives should be collateralised systematically via the establishment of margins: the initial margin and the variation margin.⁵ This obligation came into force gradually from early 2017 in Europe.

The initial margin is the amount of collateral needed to cover each counterparty against the risk of default of the other counterparty; it is calculated to cover any expected changes in the value of each participant's position (potential future exposure) in the event of a default by the participant, until the position of the defaulting participant is replaced by new transactions at the market price. It varies depending on market volatility and the expected time to unwind a transaction. The variation margin corresponds to the amount of collateral collected and paid necessary to ensure the maintenance of the financial terms in view of actual changes in market prices.

2. Factors causing collateral requirements

2.1. Central bank policy on collateral and its evolution

The use of collateral is systematic when liquidity is granted to the banking system by central banks (although the legal form of liquidity provision and the type of collateral accepted may vary depending on the monetary policy framework of each central bank). Indeed, the role of central banks is not to take risks and, to protect the quality of their balance sheets, most of them are legally obliged to lend only against collateral.

The total amount of collateral deposited with central banks has increased due to changes in the monetary policy framework adopted as a result of the financial crisis that began in 2007.⁶

2.2. Financial market infrastructures' increasing reliance on collateralisation

Collateral is crucial for the proper functioning of financial market infrastructures, for two main reasons.

Some of them, such as central counterparties (CCPs) or Deferred Net Settlement systems (DNS), are exposed to the credit risk of their

2 In the case of an interest rate swap, the counterparties exchange a fixed interest rate for a variable interest rate. If the counterparty that is supposed to provide the variable interest rate defaults, it will no longer provide it and the non-defaulting counterparty will have to find another counterparty that can provide the variable interest rate against the fixed rate. The financial terms of this exchange may have changed between the time when the two original counterparties entered into the first interest rate swap and the time when the non-defaulting counterparty will have to find a new substituting counterparty, and the terms of the swap contract may have become less profitable for the non-defaulting counterparty: this is called the replacement cost.

3 <https://www.isda.org/keiDE>, April 10, 2014, P3, point 6.

4 <https://www.bis.org/bcbs>, Key principles and requirements, p.4 et seq.

5 See Chapter 11, Central Counterparties.

6 See Section 5.1 of this chapter.

Box1: The collateral used for the monetary policy of the Eurosystem

The Eurosystem's refinancing operations are secured by assets pledged as collateral with the central bank. In order to ensure equal access to the refinancing of euro area monetary policy by all counterparties irrespective of their country of residence, the Eurosystem collateral framework defines which assets are eligible, their valuation and what haircut (discount) is applied, in a uniform manner for all Eurosystem countries.

Eligible securities of the Eurosystem are identified in a single list, the principle of which was decided in 2004. Previously and since the establishment of the Eurosystem, the list of collateral eligible for monetary policy operations was not a single list, it was partly fragmented across the different euro area countries. This situation was attributable to the need to make allowance for different national specificities, but led to inequality in the implementation of the Eurosystem's monetary policy, which is supposed to be single. Monetary policy counterparties could post one type of collateral in some euro area countries, but not in others. The establishment of a single list of collateral eligible for the entire Eurosystem has helped to address this fragmentation. This was prepared by harmonisation efforts between the various central banks to eliminate as much as possible the national specificities of collateral eligible for the central bank's refinancing operations.

The list of eligible securities is published daily on the ECB website. These are marketable assets, the characteristics (issuer, maturity, liquidity, etc.) of which offer sufficient quality for the Eurosystem: <https://www.ecb.europa.eu/mopo/assets/assets/html/index.en.html>

In addition to marketable assets, the Eurosystem also accepts credit claims as collateral (referred to as non-marketable assets). These are credits granted by credit institutions that are monetary policy counterparties to commercial enterprises (which are their debtors). The Eurosystem has also set quality requirements for credit claims to be eligible. This concerns in particular the credit quality of the debtor to which the monetary policy counterparty credit institution granted the loan, which must be high. Indeed, in the event of default by the monetary policy counterparty, the Eurosystem will be protected by the fact that it will become the creditor of the commercial enterprise to which the monetary policy counterparty granted the loan. It will be this commercial enterprise that will repay the Eurosystem instead of the defaulting monetary policy counterparty. The share of credit claims in the amount of collateral posted by monetary policy counterparties is around 18%, with significant disparities depending on the country.

This framework can be adapted to deal with financial shocks such as the financial crisis that started in 2007 (change in the requirements regarding the credit quality of eligible collateral for example, see also Section 5.1 of this chapter).

participants, and protect themselves by asking the latter to provide some form of guarantee: the participants post collateral to their infrastructure (see 2.2.1 and 2.2.2).

Other types of infrastructure, such as central securities depositories (CSDs) or real-time gross settlement systems (RTGS), use collateral as a tool to facilitate and optimize the flow of transactions within the system (see 2.2.3).

2.2.1. Covering the credit risk of central counterparties

Through the mechanism of novation, CCPs interpose themselves between two market counterparties in each transaction. The CCP thereby becomes the sole seller to every buyer and the sole buyer to every seller. As a result, it assumes the credit risk of each transaction (after multilateral clearing).

To manage this risk, CCPs require collateral contributions from their members in the form of initial margins, variation margins and participation in default funds (see Chapter 11 on CCPs, Section 3).

CCPs therefore make margin calls very frequently – usually one or more times a day – depending on the changing exposure of each member and market volatility. Compared with collateralised but non-cleared transactions, the advantage is that margin calls are based on the overall net exposure to the CCP and not on each of the bilateral exposures.

The desire to strengthen the management of risks related to financial markets has led to the promotion of CCP intervention. As has been the case for listed derivatives traded in an organised market for a long time, the regulation on over-the-counter derivatives (EMIR in Europe) makes clearing by a central counterparty mandatory for standardised derivatives. This generates a need for collateral, in particular to respond to margin calls made by the CCP.

2.2.2. Credit and liquidity risk coverage in Deferred Net Settlement (DNS) systems

In deferred net settlement systems, the final settlement in the accounts of the counterparties to the transaction does not take place in real time, but once or several times a day, usually during the settlement in central bank money (see Chapters 8 and 10). As a result, DNS systems create liquidity and/or credit risk between participants.

The various mechanisms for protecting DNS systems and their participants against this risk usually include the establishment of a mutual guarantee fund, fed by all participants based on their average debit balances and/or the provision of individual, non-pooled guarantees; individual guarantees are used, for example, in the case of very large amount payments.

The requirement to set up such risk management systems was reinforced by the Principles for Financial Market Infrastructures (PFMI)⁷ and by the texts that have transposed them in the different jurisdictions.

⁷ For more details on the PFMI, see Chapter 18.

Box 2: Settlement risk management systems in the CORE(FR) and EURO1 systems

Regulation (EU) No 795/2014 of the ECB of 3 July 2014 on the oversight requirements for systemically important payment systems (ECB/2014/28) provides that systemically important payment systems must set up mechanisms to prevent credit risk. To cover this risk, cash or assets such as securities may be posted as collateral.

For example, STET, the operator of the retail payment system CORE(FR), has set up a default risk management mechanism based on a mutual guarantee fund, backed by individual guarantees; the guarantee fund and the individual guarantees are in the form of cash accounts opened with TARGET2-BANQUE DE FRANCE (T2-BF) (see Chapter 10).

The “EURO1” payment system for large-value euro transactions, operated by EBA Clearing, provides for the collateral to be deposited as cash in an account opened in the ECB's books (see Chapter 8). This fund covers the maximum debit position of a defaulting participant in respect of its individual obligation (cleared position presented for TARGET2 settlement at 16:00). Participants in EURO1 contribute equally to the guarantee fund and, in the event the fund is realised and a call-for-funds is issued, the non-defaulting participants have a claim against the defaulting participant.

2.2.3. The granting of intraday credit in Real Time Gross Settlement Systems (RTGS)

In RTGS systems, which are mechanically more liquidity-intensive than DNS systems (see Chapter 6), intraday credit mechanisms have been established to allow a smoother settlement of transactions.

This intraday credit, granted by the central bank which operates the system (in the case of payment systems) or which provides the cash settlement service (in the case of settlement systems) is most often collateralised and free of charge, and allows participants to settle their transactions during the day, even if they do not have a sufficient cash balance, provided they have collateral and repay the credit at the end of the day.

The Eurosystem therefore requires collateral in exchange for the intraday credit that it grants to TARGET2 participants. As an example in France, in TARGET2, the maximum amount of intraday credit available to each participant is equal to the value of the collateral basket held by the participant with the Banque de France – which grants it this intraday credit – less the amount of collateral already used in the context of monetary policy operations, i.e. refinancing (see Chapter 7).

In T2S, provided that the participant has elected this option, the intraday credit is automatic if the cash balance is insufficient to settle the securities, if the securities purchased (auto-collateralisation on flow) or other securities owned by the participant (auto-collateralisation on stock) are eligible for this auto-collateralisation. In this case, the securities are automatically collateralised in exchange for the amount of intraday credit needed to settle the transaction (see Chapter 14 on T2S).

2.3. Growing risk aversion promotes secured bank financing

Since the beginning of the crisis in 2007, credit institutions and other financial players

have tried to reduce their exposure to counterparty default risk.

In Europe, this trend resulted in a significant increase in the share of so-called “secured”, as opposed to “unsecured” interbank financing. This increased use of collateralised transactions is evident in both short-term and long-term markets. Repo transactions have increased significantly since 2009. Issues by banks of so-called “covered” bonds increased sharply between 2007 and 2016, with amounts issued in France rising from EUR 200,055 million in 2007 to EUR 308,627 million in 2016.⁸

2.4. New regulatory requirements for OTC derivatives

The Pittsburgh G20 Summit in 2009 signalled a desire to improve risk management practices on OTC derivatives transactions.

In the United States and Europe, this requirement has been reflected by the Dodd-Frank Act and the European Regulation called EMIR,⁹ respectively (see Chapter 11 on Central Counterparties).

Standardised OTC derivatives transactions must be cleared by a CCP since 2014.

The collateralisation of non-standardised OTC derivative transactions was the subject of international work by the Working Group on Margin Requirements (WGMR), which brought together representatives of the Basel Committee and the International Organisation of Securities Commissions (IOISCO). In September 2013, this group adopted collateral exchange requirements relating to the exchange of daily variation margins, which was already a common market practice, and the exchange of initial margins calculated using a model proposed by ISDA and segregated (each counterparty must segregate the collateral received from each of its counterparties). This latter requirement was not until now a market practice: it increases the demand for good quality collateral. These requirements came into force in early 2017 in the European Union.

⁸ <https://hypo.org/app/uploads>, “European covered bonds fact book 2017”, p. 598.

⁹ The Regulation is available on the ESMA website via this link: <http://eur-lex.europa.eu/legal-content>

Box 3: What are the consequences for OTC derivatives market reforms?

A working group under the aegis of the Bank for International Settlements, the Macroeconomic Assessment Group on Derivatives (MAGD), sought to estimate the effect of the OTC derivatives reforms implemented after the financial crisis by comparing their benefits to the costs they generate (costs for financial institutions, increase in the demand for high-quality collateral, increase in the financing costs of these institutions, and resulting increase in the price of financial services).

In its report published in August 2013, “Macroeconomic effects of OTC derivatives regulatory reforms” (<http://www.bis.org/publ/othp20.pdf>), the MAGD tested several scenarios, depending in particular on the level of clearing.

In its central scenario, the MAGD estimates that these reforms would contribute 0.12% of annual GDP growth while avoiding a new crisis that derivatives might otherwise cause.

Macroeconomic benefits and costs of OTC derivatives regulatory forms

Change in expected GDP after full implementation and effects of reforms

(in per cent)

	Low-costs scenario (high netting)	Central scenario	High-costs scenario (low netting)
Benefits ^{a)}	+0.16	+0.16	+0.16
Costs ^{b)}	-0.03	-0.04	-0.07
Net benefits	+0.13	+0.12	+0.09

a) Reduction in output losses from financial crises, computed as the estimated decline in the probability of financial crises propagated by OTC derivatives exposures multiplied by the average cost of past financial crises.

b) Effect on GDP of higher prices of financial services, as evaluated by a range of macroeconomic models. The table reports the GDP weighted median effect calculated by these models.

Even before the entry into force of these regulatory requirements, there was increasing collateralisation in the market for non-cleared over-the-counter (OTC) derivatives. The increased use of collateralisation in this segment reflects a more prudent management of the risk of counterparty default.

According to ISDA estimates, the collateral posted against non-cleared OTC derivatives transactions nearly doubled between 2007 and 2008 and then remained at significantly higher levels than before the crisis, in proportion to the number of trades struck.

2.5. The requirements laid down by the Basel III regulations

The reforms initiated by the Basel Committee on the prudential regulation of credit institutions (Basel III) aim in particular to improve the management of bank liquidity risk by creating two ratios: the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). In particular, the LCR requires credit institutions to have a reserve of liquid assets that is big enough to cope with a significant liquidity crisis lasting one month. As a result of this new set of regulatory measures, demand for this type of

asset has increased: the Committee on the Global Financial System has estimated the additional demand at some USD 4 trillion.¹⁰

3. The legal framework for collateral mobilisation

3.1. The two legal instruments of collateral mobilisation

The repurchase agreement, commonly called a “repo,” and the pledge are the two most emblematic techniques for mobilising collateral, but they are not the only ones. For example, collateral can also be posted by buying/selling or borrowing securities.

3.1.1. Posting collateral with transfer of ownership (repurchase agreement)

The repurchase agreement (“repo”) implies that, during the duration of the transaction, the ownership of the assets constituting the collateral is transferred from the party providing the collateral (the collateral giver) who is the debtor of the underlying transaction (the cash loan) to the party receiving the collateral (collateral taker) who is the creditor of the transaction. At the end of the loan agreement, the assets posted as collateral are returned to the debtor, if the latter has not defaulted.

In a repo, the ownership of the securities posted as collateral is transferred to the party receiving them from the outset of the transaction. The latter therefore becomes the recipient of the proceeds of any corporate actions occurring during the repo. It will for example receive any coupons or dividend payments. In addition, the transfer of ownership also allows the party receiving the collateral to reuse the assets¹¹ during the duration of the transaction, but the collateral must be returned to the original collateral giver at the end of the agreed period.

3.1.2. Posting collateral without transfer of ownership (pledge)

In the case of a pledge, the debtor (i.e. the counterparty providing the collateral)

remains the owner of the assets making up the collateral for the duration of the transaction.

The securities therefore remain registered in the account of the “collateral giver” and the latter therefore remains the recipient of the proceeds of any corporate actions. In addition, since ownership of the securities deposited as collateral is not transferred to the collateral taker, the latter can only reuse the collateral (“re-hypothecation” or “re-pledge”) with the collateral giver's agreement.

Under a repurchase agreement or a pledge, the posted collateral can be liquidated by the creditor if the debtor does not fulfil its obligations on the due date (i.e. does not repay the loan). Of course, if the cash lender is not in a position to return the collateral, the borrower would not be obliged to return the cash.

3.2. The legal framework of collateral in the European Union and in France

The posting and use of collateral have been harmonised within the European Union by Directive 2002/47/EC on financial collateral arrangements, known as the “collateral” directive. This text was transposed into French law by the ordinance of 24 February 2005.

Directive 2002/47/EC provides in particular:

1. The recognition by the Member States of the two collateral schemes: with transfer of ownership (repo); without transfer of ownership (pledge). French law, which was traditionally based on the use of guarantees in the form of real collateral without transfer of ownership, mainly in the form of pledge, had already evolved in the 1990s toward greater flexibility by accepting, on the one hand, mechanisms based on a transfer of ownership and, on the other, the pledge of financial instrument accounts. The system of financial guarantees in France which was in force before the Directive thus largely met its requirements and therefore did

¹⁰ Report of the Committee on the Global Financial System no. 49, “Asset encumbrance, financial reform and the demand for collateral assets”, May 2013 Cf. <http://www.bis.org/publ/cgfs49.pdf>

¹¹ A collateral taker may reuse the collateral received. It can be sold or reused for another repo transaction.

not need to be modified substantially for its transposition.

2. The extension of the scope of financial guarantees to all legal persons, provided that one of the counterparties is a regulated institution.
3. The reduced formalism of the setting up and implementation of these guarantees. The 2005 ordinance provided for a reduction in the formalities¹² for setting up a guarantee. In addition, the obligation to refer to local market framework agreements, such as those of the *Autorité des Marchés Financiers* (AMF – Financial Markets Authority), was abandoned and the reference to them became optional.
4. The possibility for the creditor-beneficiary of the pledge to reuse the pledged securities in exchange for the obligation to return them. The 2005 ordinance introduced the right of reuse into French law, because it was totally ruled out in the previous legal framework. It specifies that the parties must agree on this right by contract. The right of reuse, which was one of the main new features introduced by the 2002 Directive, significantly enhanced the flexibility of collateral arrangements (without transfer of title), lowered their cost for the collateral giver and increased their economic appeal for the beneficiary of the pledge. However, this possibility of reuse has increased the interdependencies between market participants, which carries risks for financial stability. Therefore, to improve the transparency of collateral reuse, the Securities Financing Transactions Regulation (SFTR)¹³ of 25 November 2015 establishes minimum transparency requirements for the reuse of collateral, such as disclosure of risks incurred and the need for prior consent.¹⁴
5. The possibility of implementing mechanisms to reduce the number of transactions, such as netting the mutual obligations of the parties.

6. A financial collateral arrangement is legally enforceable and binding on third parties in collective proceedings as well as civil enforcement proceedings.

The legal framework introduced by transposition of the 2002 Directive assures creditors that the guarantees they have at their disposal remain fully effective in the event of default by their debtors, even if collective proceedings are opened against the latter.

Lastly, Member States must apply a conflict of laws rule which provides that the location of the account in which the collateral securities are booked determines the law applicable to the collateral agreement.

The 2002 Directive was subsequently supplemented by Directive 2009/44/EC, transposed into French law by the ordinance of 8 January 2009.

3.3. Framework agreements for collateral management

In most cases, OTC transactions in financial markets are entered into on the basis of framework agreements drawn up by professional associations. These framework agreements provide a framework for the contractual definition of the terms of future transactions, including the type of collateral accepted, cases of default by the counterparty, events leading to early termination of transactions, set-off of reciprocal claims and calculation of an overall net balance, the frequency of margin payments, the method of calculating any haircuts as well as the reference rate chosen for the calculation of the collateral cash amount.

Once this framework agreement has been established, the parties refer to it for each new transaction. They may, if necessary, define on a case-by-case basis specific conditions applying to a given transaction.

In the absence of a framework agreement, both parties would be obliged to explicitly

¹² Such as the establishment of a document in a specific form or in a particular way, the registration with an official or public body or in a public register, advertising in a newspaper or magazine, an official register or publication or in any other form, the notification to a public officer or the provision, in a particular form, of evidence concerning the date of establishment of a document or an instrument, the amount of the financial obligations covered or any other subject.

¹³ Regulation (EU) 2015/2365 of 25 November 2015 on transparency of securities financing transactions and of reuse and amending Regulation (EU) No 648/2012, known as SFTR, in force since 12 January 2016.

¹⁴ Article 15 “Reuse of financial instruments received under a collateral arrangement” has been applicable since 13 July 2016. It provides that after being informed by the party receiving the security under a collateral arrangement (i.e. no transfer of ownership), the collateral giver must officially give its consent for the reuse of the collateral by the creditor.

define all the aforementioned contractual points for each transaction.

The most common framework agreements are the Master Agreement of the International Swaps and Derivatives Association (ISDA) and its Credit Support Annex (CSA) for collateral management in derivative transactions, the General Master Repurchase Agreement (GMRA) established by the International Capital Market Association (ICMA) for repos and the Global Master Securities Lending Agreement (GMSLA) established by the International Securities Lending Association (ISLA) for securities lending transactions. These framework agreements are adapted by national banking and market associations to reflect the specificities of their market. For the French market, for example, the framework agreement of the French Banking Federation (FBF) relates to transactions in financial futures.¹⁵

At the European level, the European Master Agreement,¹⁶ a framework agreement relating to financial instrument transactions, is proposed by the European Banking

Federation – with the collaboration of the European Savings Banks Group and the European Association of Cooperative Banks.

3.4. Assets that can be used as collateral meet high quality requirements

Each collateral taker determines in advance the characteristics of the assets that it accepts as collateral. Collateral-related requirements can be contractual or regulatory.

In bilateral transactions, these requirements are usually formalised by standardised agreements between the counterparties.

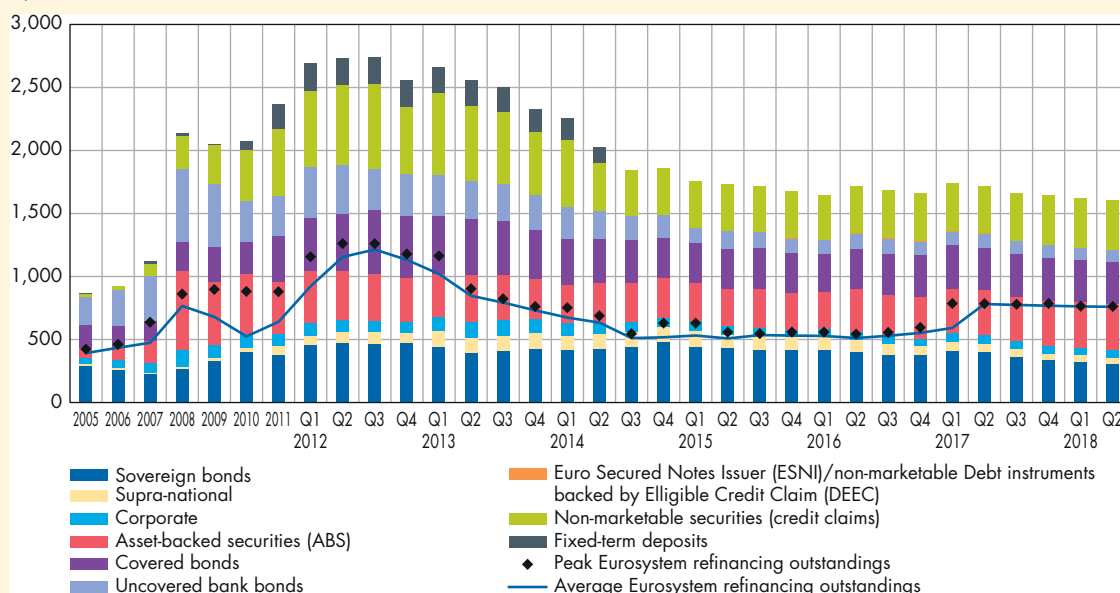
In the case of refinancing operations with central banks or the posting of collateral with a clearing house, the quality of the collateral accepted by the various players is usually governed by statutory, regulatory or prudential requirements, which define for all the counterparties concerned the typology and characteristics of the assets eligible as collateral (see, for example, the breakdown by asset type of the collateral eligible for the Eurosystem in Chart 1).

15 <http://www.fbf.fr/fr/contexte-reglementaire-international>

16 <http://www.ebf-fbe.eu/uploads>

C1: Breakdown by asset type of the collateral eligible for the Eurosystem

(EUR billions)



Source: Banque de France.

4. How collateral is implemented

4.1. Collateral management in practice

For a financial institution, whether collateral is taken or provided, managing the collateral means conducting the following due diligence very frequently (usually at least once daily):

- **Evaluate the assets within its portfolios, all of the contracts that have been and are to be collateralised**, i.e., one's stock of assets and contracts that the collateral is supposed to cover. **If possible**, the valuation is based on the current market price – i.e. the portfolio **is marked-to-market** – or, if not, on a theoretical model¹⁷ (“mark-to-model”), in particular if the assets or contracts are not sufficiently liquid. In Europe, the European Market Infrastructures Regulation (EMIR¹⁸) stipulates that this valuation must be carried out at least daily for OTC derivatives. The valuation allows the holder of the contracts to determine the exposure, i.e. the loss to which it is exposed in the event of default by the counterparty.
- **Value the collateral based on its market price**. A discount or haircut can be applied to the market price of the collateral, i.e. it can be valued at a price below its market value to reflect the risk that the collateral may depreciate between the valuation and the time when it is (possibly) realised, i.e. used. The haircut depends on the type of collateral and in particular the credit, liquidity and market risk that it carries: cash has a haircut of zero because it is issued by a central bank (no credit risk) and because it is immediately available (neither liquidity risk nor market risk); shares or long-term bonds issued by private-sector entities carry a high market risk and require higher haircuts, as well as bank loans, which are illiquid and therefore cannot be easily realised.
- **On the basis of this valuation, make margin calls if necessary**. As the value of the assets used as collateral and the value of the credit risk to be covered are continually changing due to market fluctuations, counterparties must pay variation margins to adapt to these market developments to maintain the financial terms of the transaction.
- **Reconcile its portfolios with those of its counterparties**. This consists in reconciling the portfolios of contracts to identify, for each transaction subject to collateralisation, any valuation differences. In fact, in the case of uncleared transactions, each party values all current transactions as well as the collateral stock provided or taken, then the two parties compare the results of their respective valuations. Disagreements may arise from differences in the chosen price source or in the stocks of contracts. A reconciliation of the contract portfolios on both sides may then be necessary. For financial institutions, EMIR requires that reconciliations be carried out at a frequency varying between once a day and once every six months, depending on the number of transactions carried out.
- **During the day, the financial institution may need to substitute assets**, for example if one of the assets held as collateral is sold by the provider of collateral or if the asset is subject to a corporate action (see Chapter 12 on central securities depositories).

All of these tasks can be very time consuming and require substantial resources, especially since recent regulatory changes (EMIR in particular) have increased the control, monitoring and reporting requirements. Mismanagement of collateral exposes the institutions involved to credit, liquidity, compliance and reputation risks. Conversely, good collateral management can also become a source of income for financial institutions. That is why, depending on their size and business volume, financial institutions may either

¹⁷ <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1536934253222&uri=CELEX:32012R0648>, Article 11, Risk-mitigation techniques for OTC derivative contracts not cleared by a CCP, § 2.

¹⁸ EU Regulation No 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories (EMIR). For more details on EMIR, see Chapter 11.

perform these procedures themselves or delegate them to a third party, for example their custodian or their central securities depository, by subscribing to collateral management services.

4.2. The different operational procedures for using collateral

There are two methods for using collateral. The first, used in repurchase agreements, is to deliver the securities to the account of the collateral taker. In the collateral pledge system, the securities are usually blocked by a mechanism for identifying this reservation (earmarking) on the account of the collateral giver opened in the books of the CSD. However, it remains possible to deliver the securities pledged as collateral to a specific account of the collateral taker.

The term “earmarking” is however also used in the sense of “allocation”¹⁹ and then refers to a method of managing collateral in relationship to each transaction that it guarantees.

In the “earmarking” collateral management method (in the sense of “allocation”), the identified assets are earmarked to, and therefore collateralize, a specific transaction. While the earmarking method has the advantage of allowing a precise and adjusted management of the asset allocation to match refinancing needs, it requires frequent margin calls to ensure that the risk is at all times perfectly covered. Given the operational costs, the earmarking method limits the ability of counterparties to manage their collateral dynamically.

In the so-called “pooling” or pooled collateral management method, it is possible to set up an overall collateral portfolio with the collateral taker. This portfolio is then used to collateralize a set of credit transactions, as needed, without specific securities being assigned individually to guarantee a specific credit transaction. The pooling method allows a much more flexible and cost-efficient management of the collateral.

When the collateral consists of marketable assets, these transactions are based on conventional settlement mechanisms (see Chapter 12 on central securities depositories), which places the CSDs at the heart of collateral management operations.

When the collateral consists of non-marketable assets such as credit claims, the collateral processing channel must be determined by the counterparties of the transaction. Unlike the collateral processing channel for marketable securities, this one does not go through a market infrastructure. For example, Paris-based credit institutions can assign the eligible credit claims they hold to the Bank of France (central bank), merely by delivering computer files to a processing system.

4.3. Cross-border collateral management operations

From an operational point of view, the cross-border posting of collateral (or, as the case may be, the posting of collateral between different CSDs within the same country) is usually carried out using the links between CSDs. As explained in Chapter 12, a “link between CSDs” is a contractual and technical arrangement that allows a CSD to give its clients access to securities held in another CSD without requiring said clients to be direct participants in the other CSD. Links are therefore an important means of facilitating cross-border transactions and contributing to market integration.

However, links do not necessarily exist between all CSDs. In the absence of links between the CSDs, collateral takers can decide to use correspondent banks to handle the circulation of the collateral.

This is even more of a problem for the central banks of the Eurosystem. Within the Eurosystem, each national central bank (NCB) is obliged to accept from its counterparties any eligible asset on the Eurosystem's single list, i.e. the list of assets accepted as collateral. This list comprises assets from the

¹⁹ The term is used to describe two distinct realities, which can be confusing.

Box 4: The operational mechanism for mobilising collateral with the Banque de France and its evolution towards a European system (ECMS)

Adopted since 2008 by the Banque de France with the 3G system (*Gestion Globale des Garanties* – Overall Management of Guarantees), the pooling system has replaced the earmarking system (allocation) that prevailed until then, because of the simplicity it offers counterparties in their collateral management. All assets pledged as collateral with the Banque de France supply a collateral portfolio specific to each monetary policy counterparty. This portfolio enables the counterparty to cover its line of credit with the Banque de France on an aggregate basis, whether it covers monetary policy refinancing transactions, intra-day credit in TARGET2 or loan facilities. The same baskets of collateral can also be used in interbank transactions via the tripartite collateral management service called €GCPlus (see dedicated box below). Due to its flexibility (in terms of collateral substitution) and its size (often much larger than the credit lines granted by the Eurosystem) margin calls are infrequent, which is a major asset.

See https://publications.banque-france.fr/sites/default/files/medias/documents/bulletin-de-la-banque-de-france_172_2008-t2.pdf#page=41 (in French).

This collateral management system will evolve in the direction of greater integration within the Eurosystem.

At present, each of the 19 central banks of the Eurosystem has its own collateral management system for monetary policy. As a result, some functions are not harmonised, and operating, management and maintenance costs are significant. The Eurosystem has therefore decided to pool this service by creating a single service called **ECMS** (European Collateral Management Service). Like Target 2, ECMS does not question the principle of the decentralised implementation of monetary policy. It is a collateral mobilisation and management service that each national central bank uses to carry out these transactions. It incorporates all the collateral mobilisation functions used by the various central banks, and harmonises and automates them as much as necessary: one example is the CCBM mechanism (see below). However, each central bank remains responsible for its mobilisation operations and collateral management. This pooling therefore implies a prior effort to harmonise the collateral mobilisation and management practices implemented by the various central banks for monetary policy operations, which contributes to strengthening the integration of the European capital markets, and which is nearing completion.

The ECMS project was approved by the ECB's Governing Council in December 2017 (<http://www.ecb.europa.eu/press/pr/date/2017/html/ecb.pr171207.en.html>) and will be launched in November 2022. The Banque de France is taking an active part in its development.

different countries of the euro area. However, national central banks only hold securities accounts with the CSD of their domestic jurisdiction.

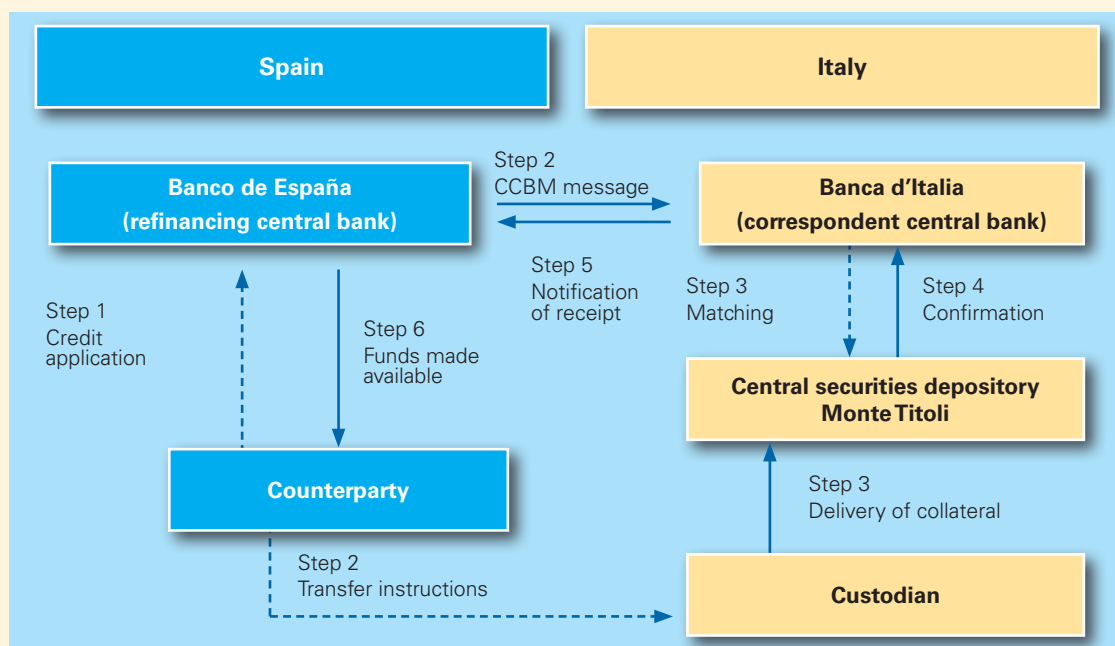
The current Eurosystem policy restricts the possibility for NCBs to have direct access to a foreign CSD. This is a restriction on the use by an NCB of a securities account opened in its own name in the books of a CSD located in the jurisdiction of another EU Member State to receive securities issued

in this CSD as collateral in the refinancing operations of the NCB. This restriction policy, called “prohibition of remote access” has two main reasons:

- Eurosystem neutrality policy: remote access to a CSD could distort competition between (I)CSDs. The risk that NCBs would only use remote accounts with a few CSDs could have led the market to interpret this concentration as an implicit indication of a Eurosystem preference.

Box 5: How does the Correspondent Central Banking Model (CCBM) work in the Eurosystem?

How a counterparty established in Spain can use eligible assets issued and held in Italy to obtain a credit from Banco de España:



A Spanish credit institution that is a monetary policy counterparty wants to obtain refinancing from the Banco de España by posting Italian marketable assets that it holds with the Italian central securities depository Monte Titoli.

Step 1 – The Spanish credit institution contacts Banco de España (central refinancing bank) to request the credit and to announce its intention to use the correspondent central bank method – CCB – to post marketable assets that it holds in Italy as collateral.

Step 2 – Based on the information provided by the counterparty, Banco de España sends a message to Banca d'Italia asking it to receive Italian securities from the counterparty on its behalf. At the same time, the counterparty issues instructions for the marketable assets to be transferred (or instructs its custodian in Italy to transfer them) to the account of Banca d'Italia with Monte Titoli, the Italian CSD. Therefore, in this example, Banca d'Italia acts as correspondent central bank for Banco de España, the central refinancing bank.

Step 3 – After receiving the message from the Spanish central bank, Banca d'Italia ascertains that the marketable assets have been transferred to its account with Monte Titoli. The counterparty (or its custodian) will have previously delivered the marketable assets to the account of Banca d'Italia in accordance with Monte Titoli's delivery procedures.

Step 4 – When the delivery has taken place, Monte Titoli sends a confirmation message to Banca d'Italia.

Step 5 – As soon as the latter receives the confirmation message from Monte Titoli, it performs certain internal procedures (for example, determining the price of the assets). It then sends an acknowledgment of receipt to Banco de España. Banca d'Italia holds the assets on behalf of Banco de España, thus effectively acting as its custodian.

Step 6 – After receiving the acknowledgment of receipt of the assets, Banco de España credits the funds to the credit institution.

- **Cost considerations:** to be completely neutral, this solution would have required NCBs to remotely access all CSDs, forcing them to manage different national practices, technical interfaces, messages and accounting treatments. This would have resulted in additional costs for each of the central banks.

Procedures for the cross-border posting of collateral have therefore been set up which allow a counterparty to post with its refinancing NCB assets issued and held outside the jurisdiction of the NCB. In addition to the use of links²⁰ between central securities depositories, the Eurosystem has set up a system of correspondent central banks linking all the Eurosystem NCBs. In this system, each central bank may act on behalf of the others as a custodian (or “correspondent”) for the assets issued in the CSD of its national jurisdiction. This is the Correspondent Central Banking Model (CCBM) established by the Eurosystem in 1999 (see Box 5).

Designed as a temporary alternative to the links between CSDs, the CCBM has remained very popular, since in 2017 around 50% (in market value) of the collateral posted on a cross-border basis with the Eurosystem was mobilised through the CCBM. Cross-border collateral (posted via the CCBM and via the links) amounts to around 15% of total collateral.

5. Collateral management tools

5.1. A growing need for collateral?

At the global level, the risk of a collateral shortage – or scarcity – was a strong concern for market participants in the early 2010s. For example, depending on the source, estimates of additional collateral requirements following the Dodd-Frank Act in the United States and the European financial markets infrastructure regulation (EMIR) ranged from USD 200 billion²¹ to USD 2,000 billion.²² For its part, the Committee on the Global

Financial System (CGFS) pointed out that while an aggregate shortage of collateral was not evident, situations vary across jurisdictions.²³ Shortages of collateral could occur in some countries with a small pool of available outstanding government bonds or where government bonds were deemed risky by market participants.

Beyond the geographical distinction, fragmentation has sometimes been observed between the various economic players or sectors. For example, some market participants have feared an imbalanced distribution between good- and poor-quality collateral. Insurers and asset managers are structural holders of very high-quality assets, which they hold until maturity. These include government securities, of which nearly 50% - according to the IMF - are held at the global level by these investors, who keep them in their portfolios and do not circulate them. Conversely, other investors such as non-financial companies, which may use derivatives and therefore need eligible assets to meet collateralisation requirements, often lack high-quality assets.

However, with hindsight, it appears that this risk of shortage of collateral has not really materialised. It has been offset by a plentiful and increasing supply, which has made up for the growth in demand. The increase in available collateral was driven by the higher volume of debt issuance by governments and companies and by the sustained issuance of covered bonds, which are usually viewed as quality assets. In addition, in response to the crisis, central banks – including the Eurosystem - have usually softened their eligibility rules for collateral, thereby increasing the volume of assets that can be accepted as collateral.²⁴

Despite the increase in collateral available, shortages or fears over the availability of collateral that may have existed following the financial crisis, as well as a sharp increase in collateralised transactions, highlighted the importance of managing collateral in the most efficient way possible.

20 Insofar as this link has been declared eligible by the Eurosystem.

21 Global Financial Stability Report, *International Monetary Fund, Washington DC*, April 2010.

22 “Optimizing collateral: in search of a margin oasis”, *Tabb Group*, June 2012.

23 “Asset encumbrance, financial reform and the demand for collateral assets”, *CGFS Publications No 49*, May 2013.

24 This was for instance the case of the ECB, which in September-October 2008 lowered its credit quality requirements for eligible marketable securities (with the exception of ABS).

5.2. Intermediaries and market infrastructures have been developing new services to optimize collateral management

In many institutions, collateral management has traditionally been decentralised at the level of each business line, or even portfolio, and/or even each geographical entity. Since each of these stakeholders could use different custodians for the custody of their assets, this could even further increase the fragmentation of collateral for the same legal and economic entity.

In response to the increase in collateral requirements, financial institutions have sought to lower the costs of this activity by consolidating, streamlining and optimising the management of collateral.

Intermediaries such as custodians and central securities depositories (CSDs) have a very precise view of the assets of financial institutions. They have therefore been able to develop a wide range of collateral management services. These services mainly focus on marketable assets.

Although the services offered by market infrastructures and custodians are all different, they can be classified, following the CPMI's report on "Developments in collateral management services",²⁵ in the broad categories described below.

5.2.1. Aggregate view of all the holdings of a client

This service offered by some custodians and CSDs provides clients with an aggregate view of all their holdings, in particular by setting up links with other custodians and CSDs. The latter send to the service provider CSD or custodian information on the securities held with them at a defined frequency, which may be close to real time.

5.2.2. Giving single access to all (or a substantial part) of the holdings of a client

This service consists not only in offering the client an aggregate view of the different assets it holds, but also in enabling it to mobilise assets easily, regardless of where they are held.

For example, the European CSDs (and the ICSDs) have agreements with other central securities depositories. Euroclear has developed a service called "open inventory sourcing" which allows it, on the back of agreements with CSDs located in Asia and Europe, to offer easy mobilisation of assets. In addition, in September 2014, Euroclear and DTCC signed an agreement to facilitate the payment of margins and, ultimately, the transfer of collateral between the two entities. Similarly, in November 2014, as part of the Liquidity Alliance programme,²⁶ Clearstream signed agreements with four CSDs worldwide (Iberclear in Spain, Cetip in Brazil, ASX in Australia and Strate in South Africa) to mobilise assets held with them.

These cooperation initiatives increase the mobility of collateral between the various market participants and thus help to address the fragmentation of the post-trade arena. In this respect, the rollout of T2S represents a significant step forward in Europe, since clients of different CSDs can exchange their securities and cash in real time and in a harmonised manner on the same settlement platform.

5.2.3. Collateral optimisation services

Beyond the services facilitating the circulation of assets, market infrastructures and custodians have developed management systems that are capable of evaluating the consolidated need for collateral of their clients, selecting the assets that meet the eligibility criteria of counterparties and market infrastructures, pricing them and mobilising them optimally,

25 "Developments in collateral management services" – Committee on Payments and Markets Infrastructures - September 2014 - <https://www.bis.org/cpmi/pub/d119.htm>

26 <http://www.clearstream.com/clearstream-en/newsroom/>
<http://www.clearstream.com/blob/74068/>

if necessary by substituting assets, and all this almost instantly.

These services are commonly based on so-called “best-collateral” algorithms. These algorithms select, among the client’s collateralizable assets, those which fulfil the eligibility criteria of the need to be covered, while being the cheapest to mobilise from the collateral giver’s point of view. The providers of these optimisation services must therefore take into account the requirements defined by each party to the various transactions. These optimisation services include tripartite collateral management services.

These services allow a financial institution to delegate the management of its collateral to a tripartite agent acting on behalf of the collateral giver and the collateral taker. Financial institutions can delegate all or part of the collateral management operational processes, which can be extremely resource intensive. Thanks to the large number of transactions they process, these tripartite agents offer sophisticated optimisation mechanisms at a relatively low cost.

In Europe, these tripartite management services are offered mainly by the big CSDs: Euroclear Bank, Euroclear France on the basis of the Autoselect mechanism, Clearstream Luxembourg and Clearstream Frankfurt thanks to the CmaX and Xemac mechanisms, as well as Monte Titoli in Italy and Iberclear in Spain. In the United States, tripartite collateral management services are offered by one of the two major US custodian banks: Bank of New York Mellon.²⁷

Then, when a market participant does not have enough high-quality collateral, but other non-eligible assets, it can resort to “collateral transformation”²⁸ services provided by market infrastructures, in particular CSDs and ICSDs. These services often use traditional instruments such as repos or securities lending: a market participant provides non-eligible securities

(of mediocre quality or illiquid) as security for a loan of securities that comply with the eligibility criteria. The lender of eligible securities is paid for the service.

These activities are not new in themselves, but have grown substantially to meet the increased demand for collateral.

Furthermore, some CSDs have partnered with clearing houses to set up and offer joint services spanning the entire securities processing chain. Subscribers to these services can perform repo transactions with short maturities, in real time and on anonymous trading platforms, with clearing and novation by a CCP, while benefiting from tripartite collateral management services. Thanks to agreements with central banks, the collateral exchanged on these platforms can also be posted as collateral with central banks. In Europe these services are currently the GC Pooling services, offered by the Deutsche Börse group, and the €GCPlus services offered by Euroclear France and LCH SA (see Box 6).

In the Eurosystem, individual central banks accept collateral delivered via tripartite agents. The CCBM cross-border collateral mobilisation scheme within the Eurosystem has even been adapted to mobilise collateral through tripartite agents and across borders. For example, a German bank can obtain credit from the Bundesbank by using the tripartite services provided by Euroclear Bank (the tripartite agent).

Lastly, the CSDs ensure that circulation of the collateral is as easy as possible. This is the context in which the multilateral trading facility Elixium (subsidiary of the Tradition Group), supported by Euroclear, is positioned. This framework makes it possible to connect all types of participants: banks, sovereign funds, asset managers, pension funds, corporate treasuries, which thus have transparent and simplified access to a wide range of assets, e.g. government debt, corporate bonds or equities.

27 The other major US depository bank, JP Morgan Chase, decided to terminate its triparty collateral management service in late 2017.

28 https://www.dnb.nl/binaries/415234_DX0_DNB_OS_12-05_eng-WEB_tcm46-309555.pdf

Box 6: The €GCPlus service

In 2010, driven mostly by the Banque de France, the major institutions of the Paris market initiated the development of new services for repo transactions in euros.

The objectives of the project were threefold:

- to upgrade the Paris market place in terms of value-added services around the repo market which, with the crisis, had become a major bank refinancing tool;
- to propose an alternative to the only competing offering, namely “GC Pooling” developed by Clearstream/Eurex in Frankfurt;
- to promote a single market for collateral in the euro area by increasing the smooth flow of transactions.

Since June 2014, the tripartite collateral management service of Euroclear France has been associated with the €GCPlus clearing service of the French clearing house LCH SA. This tripartite collateral management service involves a mandate given to Euroclear France by the counterparties to handle the management and optimisation of their financial instruments posted as collateral. In addition, LCH SA assumes the role of guarantor to each trade and centralises the management of counterparty default risk. These services were developed by Euroclear France; they are open to clearing by LCH SA and provide access to Eurosystem funding operations via the Banque de France.

The operation of €GCPlus can be summarised as follows (see also Chapter 12, Box 74):

- Market participants have access to several electronic trading platforms and anonymously display their interest in borrowing or lending cash in euros against two standardised baskets of collateral. The first basket is made up of securities eligible for the Liquidity Coverage Ratio and the second basket comprises securities eligible for Eurosystem refinancing (excluding ABS); all the securities in the two baskets are therefore eligible for Eurosystem refinancing.
- When interests meet, the transaction is cleared through LCH SA.
- Euroclear allows automated and optimised collateral management. In the case of a cash borrower, one example of optimisation consists in selecting securities that minimise the volume of collateral.
- The Banque de France allows collateral takers to post the securities they receive to its pool of collateral to access Eurosystem refinancing.

All the flows between the electronic trading platforms, the counterparties' back-offices, the clearing house, Euroclear and/or the Banque de France are automated (Straight Through Processing - STP), from the trade to the settlement.

5.2.4. Securities lending against securities

Securities lending against securities is an over-the-counter contract whereby a lender temporarily transfers ownership of securities to a borrower in exchange for other securities that the lender needs. The

securities that are the subject of the transfer of ownership serve as collateral for the loan of the other securities, i.e. those that the borrower needs. The securities lender also receives compensation, which is the loan rate. The level of the rate reflects the demand for the securities lent.

6. Collateral risk management

While the use of collateral makes it possible to secure financial transactions and the functioning of financial market infrastructures, it nevertheless requires appropriate risk management. This concern is reflected in the emphasis given to collateral in the PFMI (see Chapter 18), in the G20 recommendations, and in the establishment of regulation by the European Commission.

6.1. Collateral-related recommendations for market infrastructures

The 5th Principle of the PFMI, entitled “Collateral”, recommends that a market infrastructure that takes collateral to manage its credit exposure to its participants should only accept collateral with low credit, liquidity and market risk. Another recommendation is that it should define and apply reasonably conservative haircuts and concentration limits.

6.2. G20 support for FSB recommendations

Moreover, in their November 2011 statement,²⁹ the Group of 20 called for stronger regulation and oversight of shadow banking and supported eleven key recommendations by the Financial Stability Board (FSB) in a report of October 2011.³⁰ Following the publication of this report, five working groups were formed at FSB level. Their work themes (money market funds, securitisation, repurchase agreements and securities lending and borrowing) were chosen to reflect the decisive role that these players or technical or financial activities played in the 2007-2008 crisis and their weight in the financial system.

One of these groups worked on the theme of “Reducing risks, including procyclical risks, arising from repo and securities lending transactions”; and published in August 2013³¹ recommendations aimed at:

- enhancing the transparency and regulation of repos and securities

lending transactions (cash collateral reinvestment rules, securities reuse requirements, etc.)

- defining methodological standards for calculating haircuts and the level of minimum haircuts applicable to certain repos and securities lending transactions, to limit the excessive use of leverage and the associated procyclicality;
- establishing standards and procedures for the collection and aggregation of data on repos and securities lending transactions to enhance market transparency.

6.3. The European Commission regulation on securities financing transactions

In addition, the European Commission, in line with the FSB's recommendations for greater transparency on repos and securities lending transactions, issued a regulation at the end of 2015 on the transparency of securities financing and reuse transactions. This Regulation ((EU) 2015/2365), known as the Securities Financing Transactions Regulation (SFT), was published in the Official Journal of the European Union on 23 December 2015 and entered into force on 12 January 2016.

Its objective is to enhance transparency in the market for securities financing transactions and the reuse of financial instruments provided as collateral by counterparties. This is aimed at allowing regulators and supervisors to monitor the accumulation and distribution of risks associated with these transactions, and to improve investor information.

The SFT Regulation introduces three new types of requirements.

1. The obligation to declare SFTs to trade repositories. This reporting requirement applies to any financial and non-financial counterparty established in the European Union that is party to a securities financing transaction. It also

29 <http://discours.vie-publique.fr/notices/112002365.html>

30 “Shadow Banking: Strengthening Oversight and Regulation” - <http://www.fsb.org/wp-content/>

31 “Policy Framework for Addressing Shadow Banking Risks in Securities Lending and Repos” http://www.fsb.org/2013/08/r_130829b/

applies to all their branches, irrespective of their place of residence, as well as to European branches of counterparties established in a third country. Depending on the type of counterparty, this obligation will apply gradually from 2018. Nevertheless, since 12 January 2016 (effective date of the Regulation), all counterparties must keep a record of any SFT that they have entered into, modified or terminated for at least five years after the end of the transaction.

2. The obligation to publish information on the use of SFTs and total return swaps. Fund management companies must include specific information (detailed in the annex to the Regulation) in their periodic reports and in their pre-investment documents (including the prospectus). This requirement applies to UCITS and alternative investment funds authorised by the Alternative Investment Fund Managers Directive (AIFMD). The requirement relating to periodic reports has been in effect since 13 January 2017. The obligation relating to pre-contractual documents has applied since 12 January 2016 for funds established after that date and

since 13 July 2017 for funds established before that date.

3. Transparency of the reuse of financial instruments received under a collateral agreement. The following conditions must be fulfilled by the receiving counterparty before it exercises its right of reuse:
 - the counterparty providing the collateral must be duly informed of the risks and consequences of the reuse;
 - the collateral giver must give its prior consent;
 - the financial instruments to be reused must effectively be transferred from the account of the collateral giver to the account of the collateral taker.

This system increases transparency regarding the use and circulation of collateral within the framework of SFTs and enables the authorities – in their various missions – to better monitor the risks associated with collateral.

CHAPTER 16

Trade repositories

Updated on 17 December 2018

According to the definition in the CPSS-IOSCO report entitled Principles for Financial Market Infrastructures, or PFMI,¹ a trade repository is “an entity that maintains a centralised electronic record (database) of transaction data”. In this respect, trade repositories constitute a new, very specific type of financial market infrastructure in that they do not process transactions themselves, like central counterparties (CCP) or securities settlement systems (SSS) systems, but manage and store data relating to financial transactions. While they predated the 2008 financial crisis, they have since grown in importance, especially as a means of increasing the transparency of over-the-counter (OTC) derivatives markets.

1. What are trade repositories?

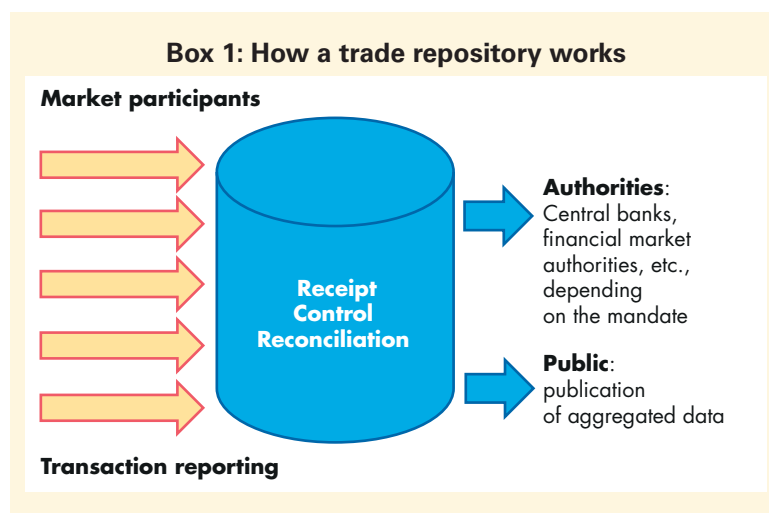
1.1. Definitions

Trade repositories (TR) are financial market infrastructures operated by legal entities tasked with recording data about financial transactions, which include derivatives trades, securities lending and borrowing, repurchase agreements and foreign exchange transactions.

Trade repositories are unquestionably one of the most important global market infra-structure innovations of recent years on account of their ability to make the opaque OTC derivative market transparent. But they were actually first created to meet different needs, relating mainly to the confirmation and recording of credit derivatives.²

1.2. The role of trade repositories

The role of trade repositories is to ensure transaction transparency for market participants and regulators. By centralising the collection, storage and dissemination of data, a trade repository can contribute significantly to increasing the transparency of transaction data communicated to



regulators and the public, and thereby help detect and prevent market abuse and promote financial stability.

This role is particularly important for OTC transactions, for which there is no organised market capable of ensuring transparency. Counterparties to OTC derivatives transactions are allowed to report the related data themselves. In some cases, they may delegate this reporting role to a third party (the central counterparty in the case of cleared transactions, for example). Accessing this information is important in particular to enable central banks to obtain a consolidated view of risks, prudential supervisors to monitor the exposures of institutions under their responsibility and market regulators to identify any market manipulation. Trade repositories also make aggregated information available to the public.

Trade repositories can also provide auxiliary services such as transaction confirmation, transaction life cycle payment calculation or data updating.

1.3. History

Trade repositories first emerged with the development of the credit derivatives

¹ <http://www.bis.org/cpmi/publ/d101a.pdf>; see Chapter 18.

² See history in Section 1.3

market (credit default swaps, or CDS), which expanded rapidly in the late 1990s and early 2000s. It is estimated that only 15% of transactions in 2003 were recorded electronically. At that time, most trading was done orally – a source of errors – and transaction confirmation could often take up to a month, leading to a growing risk of unidentified or unreconciled trades between the market's financial institutions and corporate players. Aware of the need to eliminate this risk, a number of national and transnational authorities pushed for the development of an electronic CDS reconciliation and processing service.

Market participants joined forces with the Depository Trust & Clearing Corporation (DTCC), a US company offering post-trade services in the US and international financial markets, to create Deriv/SERV, an automated CDS reconciliation and confirmation platform. By a few years after its creation in 2003, and then throughout the financial crisis, this new service was being used to confirm and record more than 95% of all CDS transactions worldwide.

Once this problem solved, regulatory authorities and market participants then found the downstream processing of CDS transactions to be another source of concern. For example, the process of recording and reconciling changes and amendments to CDS contracts, which are often sold or transferred several times before maturity, remained manual in most cases. To remedy this situation, a new infrastructure, DTCC Trade Information Warehouse (TIW), was created in 2006 in the United States. This automated trade repository was designed to store and process all CDS contracts, throughout their life cycle. In 2007, TIW held information on more than 2.2 million outstanding CDS contracts, an estimated 98% share of existing CDS transactions worldwide.

Following the 2008 financial crisis, the role of trade repositories increased significantly, extending from credit derivatives to other asset classes.

2. Accelerated regulation: the obligation to report derivative transactions and the associated consequences

At the Pittsburgh Summit in September 2009, G20 leaders indicated their willingness to increase the transparency and security of international markets. The liquidation of Lehman Brothers and near-bankruptcy of insurer AIG thus prompted numerous reforms targeting OTC derivatives.

2.1. G20 decisions

Indeed, these crises had revealed a number of fault lines, in particular the lack of visibility on financial players' positions, the massive concentration of derivatives positions in certain portfolios and the huge difficulty for liquidators and authorities to identify counterparties and transactions in order to be able to unwind trades. This pointed to the urgent need to make such products transparent by law, in order to avoid another financial crisis.

In the case of the Lehman Brothers failure in 2008, for example, it was initially very difficult to identify all the credit derivative transactions for which Lehman Brothers was the reference entity,³ which made liquidation extremely complex. The episode highlighted the usefulness of reporting the various contracts for which Lehman Brothers was the reference entity in one place, to make it easier to measure the financial exposure of the entities that had sold hedges against the bank's default.

Against this backdrop, the G20's final communiqué established an obligation to register OTC derivative transactions with trade repositories. By recording these transactions centrally and standardising the related information, for any market segment rather than just CDS, trade repositories could give regulators a consolidated view of derivatives activity and facilitate global exposure calculations, which until then had not been possible in all derivative market segments because

³ A CDS in which the reference entity is Lehman Brothers is essentially an insurance product designed to protect the contract's holder against the bank's default. The CDS' seller is the counterparty exposed to Lehman Brothers default risk.

of disparities in the available information. In the Lehman Brothers example described above, systematic use of trade repository-based transaction reporting could have facilitated the calculation of counterparties' effective CDS market exposure to that bank, which would have mitigated the flare-up of interbank market risk aversion sparked by the institution's failure.

2.2. EMIR

In Europe, this G20 declaration resulted in *Regulation (EU) No 648/2012 of the European Parliament and the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories*.⁴ This regulation, which came into force on 16 August 2012 and is better known as the European Market Infrastructure Regulation (EMIR), implements the PFMI principles with respect to CCPs and TRs in the European Union. EMIR accordingly laid down an obligation to report all derivative transactions via trade repositories, established rules to govern these infrastructures and defined standards for their operation, control, monitoring and supervision, in accordance with the PFMI.

The reporting obligation under EMIR has been in effect since 12 February 2014 and applies to all derivative transactions, without exception. It should be noted that in the European Union, EMIR requires all derivative transactions, whether concluded on a market platform or over the counter, to be reported to a trade repository. This is not the case in all jurisdictions: in the United States, for example, only OTC derivatives have to be reported. The G20's pledge is reflected in the US in one of the Dodd-Frank Act's provisions, which requires disclosure to swap data repositories⁵ (SDR) of OTC derivative transactions.

Another notable difference between European and US legislation is the principle of single or dual reporting. The Dodd-Frank Act requires that only one of the two counterparties reports the transaction to an SDR,⁶ whereas EMIR currently requires

each counterparty to report the transaction separately.⁷ This dual disclosure is designed to ensure better data quality than that of a single disclosure system in which only the trade repository validates trades.

The obligation to record transactions with trade repositories is a work in progress, as illustrated by the adoption in November 2015 of the SFTR,⁸ an EU regulation intended to improve the transparency of securities financing transactions carried out in the bloc. This Regulation was adopted specifically in response to the publication in 2013 of the Financial Stability Board's recommendations on shadow banking regulation, which notably included improving the transparency of securities lending and borrowing and repurchase transactions.⁹

During the financial crisis, these transactions were a source of contagion, leverage and pro-cyclical effects and were thus identified by European legislators as needing more monitoring and transparency.

Article 4 of the SFTR accordingly imposes an obligation to report securities financing transactions to trade repositories for all transactions entered into after the Regulation's entry into force on 12 January 2016.¹⁰

3. The emergence of new players and their various business models

There are a number of co-existent business models for trade repositories.

In Europe and the United States, trade repositories are mainly held by private financial market infrastructure groups operating all along the securities processing chain. These groups generate revenue by collecting fees from reporting entities, although little information is available on the actual operating margin of this infrastructure group business segment. It is the dominant model worldwide, as deployed notably by the DTCC group, which manages eight

⁴ <https://eur-lex.europa.eu/legal-content>. For further details on EMIR, see Chapter 11, Section 4.3.

⁵ The US equivalent of trade repositories.

⁶ Determining which entity must report to the SDR is subject to specific rules relating to the types of counterparties in the transaction (swap dealer, major swap participant, etc.).

⁷ Under European regulations, a single transaction can thus be reported in two different trade repositories.

⁸ Securities Financing Transactions Regulation. <http://eur-lex.europa.eu/legal-content>.

⁹ Securities financing transactions give market participants access to guaranteed financing by enabling them to use their assets as collateral to finance their activity. They notably include the temporary collateralisation of assets in exchange for financing (for example, securities lending and borrowing, repurchase agreements, securities purchase and resale or sale and repurchase, and loans with margin calls).

¹⁰ And publication of the associated technical standards. The SFTR also stipulates implementation deadlines for certain counterparties, ranging from 12 to 21 months.

Box 2: Trade repositories and equivalent entities in the Financial Stability Board's 24 jurisdictions

TR name	Location	Jurisdictions in which TR is authorised to operate
Trade repositories (TRs)		
BM&F Bovespa	Brazil	Brazil
BSDR LLC	US	(US)
CCIL	India	India
CETIP	Brazil	Brazil
Chicago Mercantile Exchange Inc.	US	Canada, (US)
CME European Trade Repository	UK	EU
DTCC-DDR	US	[Australia], Canada, (US)
DTCC Data Repository – Japan	Japan	[Australia], Japan
DTCC-DDRL	UK	[Australia], EU
DTCC Data Repository – Singapore	Singapore	Australia, Singapore
HKMA-TR	Hong Kong	[Australia], HK
ICE Trade Vault	US	Canada, (US)
ICE Trade Vault Europe	UK	EU
KDPW Trade Repository	Poland	EU
Korea Exchange (KRX)	Korea	Korea
CJSC National Settlement Depository (NSD)	Russia	Russia
REGIS-TR	Luxembourg	EU
OJSC “Saint-Petersburg Exchange” (SPBEX)	Russia	Russia
SAMA TR	Saudi Arabia	Saudi Arabia
UnaVista	UK	[Australia], EU
TR-like entities		
Argentina Clearing	Argentina	Argentina
Banco de México	Mexico	Mexico
Bank of Korea	Korea	Korea
Bank Indonesia	Indonesia	Indonesia
CFETS	China	China
China Securities Internet System	China	China
Financial Supervisory Service	Korea	Korea
Mercado de Valores de Buenos Aires	Argentina	Argentina
Mercado Abierto Electrónico	Argentina	Argentina
Mercado Argentino de Valores	Argentina	Argentina
Mercado a Término de Buenos Aires	Argentina	Argentina
Mercado a Término de Rosario	Argentina	Argentina
SIOGRANOS	Argentina	Argentina
Takasbank	Turkey	Turkey

Source: Thematic Review on OTC Derivatives Trade Reporting, Peer Review report, 4/11/2015: <http://www.fsb.org/wp-content/uploads/Peer-review-on-trade-reporting.pdf>

trade repositories in the United States, Europe and Asia. The model's success is attributable to the groups' ability to offer a comprehensive range of integrated post-market services (clearing, settlement and delivery, reporting to trade repositories, etc.). Advocates of this approach highlight the efficiency of integrating a range of services within the same group and the cost synergies that this can offer.

In other regions, trade repositories may be part of public organisations, the central bank or the local financial market authority. This is the case for Hong Kong's HKMA-TR,

for example, an offshoot of the national financial market authority.¹¹

In Mexico and South Korea, on the other hand, the central bank carries out the trade repository function.

The idea has also been mooted that trade repositories can perform a public service role, insofar as these infrastructures provide a general interest service. Indeed, international trade repositories are in a unique position to support financial stability and the integrity of financial markets, and to provide this public service.

¹¹ Hong Kong Monetary Authority

3.1. Worldwide

More than 30 trade repositories are currently known to exist worldwide, but as shown by the table below, they appear to be concentrated in certain jurisdictions.

The presence and number of trade repositories from country to country is linked on the one hand to the reporting obligations established by the various jurisdictions concerned and on the other hand to the segmentation of the various markets and the coexistence, depending on the market segments, of public and private trade repositories. A case in point is Brazil, where the reporting obligation is longstanding (end of the 1980s) and where BM&F Bovespa, a member of the stock market group of the same name, is the processing entity for derivative transactions listed on regulated platforms, while CETIP holds transaction data for OTC derivatives.

3.2. In Europe

Within the European Union, at the end of February 2018 there were eight EU-based trade repositories authorised by the ESMA, the authority designated to authorise and supervise these infrastructures at EU level:

- five in the United Kingdom:
 - DTCC Derivatives Repository Ltd, a subsidiary of the US group DTCC, a well established trade repository player;
 - UnaVista Ltd, a subsidiary of the LondonStock Exchange Group;
 - CME Trade Repository Ltd;
 - ICE Trade Vault Europe Ltd;
 - Bloomberg Trade Repository Ltd;
- one in Luxembourg:
 - Regis-TR S.A., a joint venture between the Spanish CSD Iberclear and Clearstream;
- one in Poland:
 - Krajowy Depozyt Papierów Wartosciowych S.A. (KDPW);

- one in Sweden:
 - NEX Abide Trade Repository AB.

Furthermore, under EMIR ESMA can also recognise the trade repositories of third countries, subject to compliance with a certain number of conditions (see below), in particular the application of an equivalent supervisory regime and the existence of cooperation agreements between the regulators in question.

4. The European Union's trade repository supervisory framework

As all financial market infrastructures, trade repositories are subject to the PFMI at the international level. In the European Union, and as in the case of other infrastructures (CCP, CSD, systemically important payment systems, etc.), a regulation has been introduced to make the PFMI binding for trade repositories. EMIR defines the EU's supervisory framework for both CCPs (see Chapter 11, Section 4.3) and trade repositories. Specifically, Title VI (Articles 55 to 77) thereof describes the trade repository authorisation procedure applicable by ESMA, the European financial market regulator that is also tasked with their direct supervision.

This direct supervision begins as soon as it has authorised trade repositories, and requires it to ensure that they constantly comply with EMIR requirements. ESMA can also impose sanctions or fines and carry out on-site inspections under the provisions of EMIR Title VI, which concern in particular:

- operational reliability (Article 79): in this respect, trade repositories must have reliable and secure control systems and resources. They must also put in place business continuity policies and recovery plans, insofar as they are particularly exposed to operational risks (see Chapter 17); it is essential that the data they hold are at all times available, reliable, accurate and up-to-date;

- data backup and recording (Article 80): trade repositories are required to ensure the confidentiality, integrity and protection of the information they receive. They are also required to retain data for at least ten years after the termination of the associated contracts;
- the transparency and availability of data for regulators (Article 81): for example, EMIR requires the data contained in the trade repositories to be rapidly available for a number of authorities, including ESMA, national financial market supervisory authorities, infrastructure supervisory authorities, relevant ESCB members, etc.

Meanwhile, EMIR Article 77 describes the applicable procedure for a trade repository located outside the European Union that wishes to provide services within the bloc. According to this procedure, the foreign trade repository applying for approval must, for example, be located in a country whose market infrastructure supervision legislation the European Commission has recognised as equivalent to that of the European Union. Pursuant to PFMI Responsibility E, which deals with cooperation between regulatory authorities, in such cases EMIR also requires the signing of cooperation agreements between the relevant European regulators and the authorities of the foreign country in question, in order to ensure regular exchange of information.

5. Quality, fragmentation and access to data: the challenges arising from changes in trade repositories

Transparency of transaction data is essential to enable i) regulators to determine where market risk lies and where the system's potential sources of financial instability are, and ii) trading entities to measure their overall exposure to the risk of counterparty default. Transparency makes it possible to identify and manage concentration and counterparty risks. But transparency is only

possible if the underlying data are accurate and comprehensive. Otherwise, they could mislead regulators and/or the public.

The authorities use data from trade repositories within their jurisdictions to improve transparency, reduce systemic risk and prevent market abuse.

5.1. Uses of data

The authorities use trade repository data primarily to help implement the various OTC derivative market reforms – in many cases to calculate the proportion of centrally cleared OTC derivatives, for example. They also analyse the characteristics of the various OTC derivatives to help determine whether they should be subject to mandatory clearing rules. Lastly, the data allow the authorities to assess the degree of product standardisation and so gauge market liquidity, as well as the number and types of participants in the various OTC derivative markets.

For the purpose of assessing financial stability and identifying systemic risk, data from trade repositories can be important for both simple analysis and complex modelling.

- For example, analysing the volumes and types of participants in different market segments can help the authorities better understand where risks could arise. More sophisticated analysis requires an understanding of the positions of market players and the network of exposures between them. This type of analysis remains difficult using trade repository data due to data quality problems, but, in cases where authorities have a more longstanding relationship with trade repositories, it is already possible;
- The analysis of data from trade repositories can be used to model market values and corresponding margin calls on all positions on a daily basis, based on multiple crisis

scenarios defined by the regulators. In a context of market stress, a single trade repository can identify the existence of potentially significant margin calls that the players concerned would have difficulty meeting;

- Moreover, trade repositories make it possible to identify potential payment default chain reactions between countries, the full scope of which would not be detectable by a given national or regional authority. For example, in the event of a monetary shock, a US bank may owe several billion dollars of margin call (in market value) to a European bank, which itself owes the same amount to a Japanese bank. In that scenario, the European bank's accounts may appear to be balanced, whereas in reality the bank in question is caught in the middle of a liquidity crisis between two countries.
- Lastly, a trade repository can enable the public and the authorities to know precisely, at any time, the overall amount of all derivative market open positions and the exposure of the various types of market participants holding those positions, while the relevant authorities will also be able to see those market participants' individual positions.

Regulatory access to these data, another crucial issue, was addressed in detail in a report published by the CPSS and the IOSCO in August 2013,¹² which sought to define the authorities' levels of access to trade repository data in terms of scope and granularity, in accordance with their mandates and responsibilities. Meanwhile, in November 2015, the Financial Stability Board published a peer review of transaction reporting to trade repositories,¹³ which constitutes an initial assessment of the implementation of the G20's recommendations in this area. In particular, this report analyses the ongoing legal and technical obstacles to transaction reporting and regulators' access to trade repository data.

5.2. Data issues: quality, aggregation, harmonisation and access

5.2.1. Quality

The obligation to report transactions to trade repositories and the increasing number of players in the TR market have made data quality and fragmentation risk key issues. Indeed, the main objective of the derivative market transparency reform undertaken by the G20 is to allow rapid access by regulators to detailed, accurate trade repository data on a daily basis, and enhanced access in a crisis situation.

5.2.2. Aggregation

It is therefore essential that supervisors have access to reliable data of various degrees of granularity, from individual transaction level to a positional or more aggregated level. The proliferation of trade repositories, and the resulting fragmentation of transaction records, pose a challenge to achieving this objective, insofar as recording formats and conventions can vary from one trade repository to the next. The definition of norms and standards for trade repository data is an essential first step to enable the authorities to aggregate said data and obtain a consolidated view of systemic risk in the markets they supervise. Once data standards have been established, a second step enabling consistent and relevant data pooling through the creation of a centralised trade repository data aggregation mechanism, accessible to regulators for data concerning them, can be implemented. A number of international initiatives have been launched in recent years with this aim.

In September 2014, for example, the Financial Stability Board published a feasibility study of an aggregation mechanism for trade repository OTC derivative data,¹⁴ proposing three types of model:

- a physically centralised model of aggregation: this model involves

¹² "Authorities' access to trade repository data", <http://www.bis.org/cpmi/publ/d110.htm>.

¹³ <http://www.financialstabilityboard.org/2015/11/thematic-review-of-otc-derivatives-trade-reporting/>

¹⁴ http://www.financialstabilityboard.org/2014/09/r_140919/

setting up a central hub to collect, store and distribute the data transmitted to the trade repositories;

- a logically centralised model of aggregation: under this model, the data would be stored in regional trade repositories, but there would be a logical indexation system enabling the aggregation of all the data; and
- a model for direct collection of data by the authorities from the regional trade repositories, similar to the existing system.

5.2.3. Harmonisation

The conclusions of the Financial Stability Board report referred to above emphasised the need for harmonisation of data formats and the implementation of international standards in this area, as well as the need to develop an overall related strategy, in order to help the authorities tackle problems related to the aggregation of trade repository data.

In response to this study's recommendations, in December 2014 the CPMI¹⁵ and IOSCO launched an international initiative to harmonise transaction data reported to trade repositories. One of this working group's objectives was to create a global standard for a unique transaction identifier (UTI) and for a unique product identifier (UPI). The technical standard relating to the UTI was published on 28 February 2017¹⁶ and that relating to the UPI on 28 September 2017.¹⁷

In addition to the aggregation of data, one of the main reasons for developing the UTI relates to issues of dual transaction reporting (see Section 2.2), insofar as the dual reporting of transactions within the European Union, combined with the fact that a transaction can be reported in two different trade repositories, can make it difficult to reconcile the two transaction reports. This can lead to the double counting of unreconciled transactions, which is obviously problematic from the point of view of data aggregation and for the data's user,

who needs an accurate view of the various parties' exposures. The implementation of a global UTI should resolve this problem by eliminating double counting. A transaction reported in two different trade repositories will have the same UTI in each report, and will thus be reconciled without risk of error.

There are numerous difficulties associated with developing these international standards.

Regarding the UTI, one of the major questions relates to the designation of the generating entity. This is because to produce a truly unique UTI that complies with the chosen data format and is promptly generated for reporting to the trade repositories, it is necessary to follow a complex iterative approach to designate the generating entity with no ambiguity. In practice, this generating entity can be the central counterparty, the clearing member, the market platform, the confirmation platform, one of the two counterparties to the transaction or a third-party entity.

Meanwhile, events in the transaction's life cycle¹⁸ also have an impact on the UTI's generation. It therefore has to be precisely determined which events will give rise to the generation of a new UTI and which events will simply change a transaction's existing data, without generating a new transaction.

Lastly, the UTI's structure and format are also the focus of much attention. In the solution ultimately adopted in the CPMI and the IOSCO's technical standard, the UTI is made up of a "mint," defined as the LEI¹⁹ of the UTI's generating entity, followed by an alphanumeric code, with the entire UTI restricted to 52 characters.

Regarding the UPI, the main difficulty is determining the exact degree of granularity that the product identifier has to integrate. The first step is to define in detail the concepts of asset class, product, instrument and transaction, in order to determine how much information is included at each level. It is also necessary to define a detailed

15 Committee on Payments and Market Infrastructure.

16 <http://www.bis.org/cpmi/publ/d158.htm>

17 <http://www.bis.org/cpmi/publ/d169.htm>

18 Such events could be a novation or a compression cycle.

19 The legal entity identifier (LEI) is a 20-character alphanumeric code based on the ISO 17442 standard developed by the International Organization for Standardization (ISO). It is based on key reference information enabling the clear and unique identification of legal entities involved in financial transactions: see <https://www.gleif.org/fr/about-lei/introducing-the-legal-entity-identifier-lei>

financial product classification system in which the various UPIs will be created. The Box 3 provides an example of the classification of financial instruments for the credit derivatives asset class.

Furthermore, this classification must be sufficiently flexible and adaptable to enable the maintenance of UPI codes, in other words the issuance of new codes and the removal of obsolete ones.

In addition to the UTI and the UPI, the CPMI and the IOSCO have developed a technical orientation covering more than 100 other data elements related to OTC derivative transactions (in particular elements relating to prices, quantities, collateral,

valuation, settlement, etc. as well as ones specific to certain financial instruments (in particular credit default swaps and options)). The harmonisation proposals – divided into three lots given the volume of data to be harmonised – were the subject of three consultative documents, published respectively in 2015, 2016 and 2017. The final technical orientation, comprising the three lots, was published on 9 April 2018.²⁰

Since these international norms and standards are not binding, it is up to the authorities to implement them in their jurisdiction; this implementation is crucial for the relevant aggregation of data. In the European Union, it could be done in the context of an EMIR revision.

²⁰ <https://www.bis.org/cpmi/publ/d175.htm>

Box 3: Credit derivatives classification

IPU suggéré ^{a)}	Données de référence de l'IPU suggéré		
Asset class	Credit		
Instrument type	Swap	Option	Forward
Option style	N/A ^{a)}	European, American, Bermudan etc	N/A
Option type	N/A	Put/receiver, Call/payer, Chooser etc.	N/A
Return, pricing method or payout trigger	Credit Default, Total Return, First to Default, Nth to Default, Contingent, Recovery etc.	Vanilla, Lookback, Other Path-Dependent etc.	Spread, Forward price of underlying instrument etc.
Delivery type	Cash, Physical etc		
Underlying asset/contract type	Single name (CDS), index (CDS), (CDS on) index tranche etc.		
Underlying asset/contract subtype	Sovereign, Municipal, Corporate, Loan pools etc.		
Seniority	Senior, Subordinate etc.		
Standard Contract Specification (if applicable)	Standard North American Corporate, Standard European Corporate, Standard Subordinated European Insurance Corporate, Standard Western European Sovereign, CDX EM Untranchéd Terms, iTraxx® Europe Tranchéd Transactions Standard Terms Supplement, iTraxx® Asia/Pacific Untranchéd Standard Terms Supplement etc.		
Underlier ID source	The origin, or publisher, of the associated underlier ID.		
Underlier ID	An identifier that can be used to determine the asset(s) or index (indices) underlying a contract.		
Underlying credit index series	eg 1, 2, 3, 4, ...		
Underlying credit index version	eg 1, 2, 3, 4, ...		

a) Throughout these tables, "N/A" denotes "not applicable".

Source: CPMI-IOSCO report on UPI harmonisation, September 2017 (<https://www.bis.org/cpmi/publ/d169.htm>).

5.2.4. Access to data by authorities

One of the major obstacles analysed by the 2014 Financial Stability Board report concerns authorities' cross-border access to data contained in trade repositories located outside their jurisdiction. While access to domestic trade repositories is generally not a problem, there are still many legal barriers to cross-border access. In the United States, for example, an indemnification clause rule adopted by the CFTC²⁰ required regulators wishing to have access to the data contained in US trade repositories to sign a clause pursuant to which they undertook to compensate

the trade repository in the event of any dispute arising due to the data's fraudulent use or a related breach of confidentiality. This provision was ultimately revoked in December 2015.

The report also makes several recommendations for removing these obstacles, including facilitating cross-border access to data, prohibiting the anonymisation of data and adopting global transaction or product identifiers to improve the quality of reported data. The Financial Stability Board regularly monitors jurisdictions' progress in implementing these recommendations.

²⁰ Commodity Futures Trading Commission.

CHAPTER 17

Preventing risks in financial market infrastructures

Updated on 30 September 2020

As described in Chapter 5, financial market infrastructures play a key role in the financial ecosystem and the financing of the real economy. Their effectiveness was demonstrated in particular during the 2008 crisis, when central counterparties (CCPs) contributed significantly to limiting contagion. Regulators have entrusted them with an increasingly wide remit, particularly with regard to implementing the obligation to centrally clear standardised derivatives. This development, combined with a natural concentration (which is due to these entities' high entry and structural costs), has resulted in a concentration of risks within these infrastructures.

This chapter focuses on identifying and illustrating the risks borne by financial market infrastructures, as set out in the CPMI IOSCO *'Principles for Financial Market Infrastructures'*, and also on these infrastructures' risk management role. It looks in detail at the concept of interdependency and the various forms that this can take, as well as systemic risk. Finally, it addresses the very specific risks associated with offshore infrastructures, in particular those that process one or more currencies other than that of their operating region's central bank of issue.

1. Risk types associated with financial market infrastructures

1.1. Financial market infrastructures: risk carriers

The global financial system has known very few financial market infrastructure failures, but the handful that have occurred have been noteworthy. The last quarter of the 20th century was punctuated by three central counterparties (CCPs) failures, two of them in Asia. In 1974, France's *Caisse de Liquidation des Affaires en Marchandises* (CLAM) collapsed following the default of a market participant, while in 1983 the Kuala Lumpur Clearing House went bankrupt after only three years of existence, following

multiple defaults of its members. Lastly, the Hong Kong Futures Exchange Clearing Corporation defaulted in 1987 following a stock market crash and the depletion of its default fund. These CCPs' failures resulted in extreme disruptions to the functioning of the markets that they served and drew attention to the risks contained in financial market infrastructures.

Financial market infrastructures are an essential link in the financial system, and play a very specific role. They streamline and simplify financial flows and – in the case of CCPs – even replace bilateral relations between market players. Beyond their operational processing of transactions and flows, most of them play a key role in managing and redistributing risks by limiting contagion from a defaulting participant to the financial system as a whole, thanks to default management and loss allocation mechanisms. Financial market infrastructures such as CCPs notably came into their own in the financial crisis that followed Lehman Brothers' collapse, when they prevented contagion to other financial players.

The corollary of this transformation or reallocation of risks, however, is the concentration of risks within the infrastructures themselves, some of which are considered 'systemic', or even 'supersystemic'.

This systemic characteristic is mainly due to the high number of links that these infrastructures are required to develop – both between each other and with market participants such as banks –, which create interdependencies. Consequently, the failure of an infrastructure could result in the failure of other entities and cause serious disruptions to the financial markets – what is known as 'systemic risk'.

The systemic nature of financial market infrastructures means that they are monitored by supervisory authorities, central banks and financial market regulators, because their proper functioning is essential for both financial stability and

market efficiency and security. To this end, the risks associated with financial market infrastructures must be identified, the main difficulty here being that the nature and extent of these risks are closely linked to these systems' architecture and operating method.

Financial market infrastructure related risk can be studied from two angles: the risks that participants pose to financial market infrastructures, and the risks to which infrastructures expose their participants. Several types of financial market infrastructure risk have been identified, the most comprehensive listing being in the CPMI IOSCO *Principles for Financial Market Infrastructures (PFMI)* report of April 2012.¹ This report tackles risk holistically, defining a market infrastructure as a system made up of both its participants and its operator (see Chapter 5), as these different players are exposed to potentially interlinked risks. It is these specific risks that the PFMI aim to control and mitigate.

1.2. The different types of financial market infrastructure risk

The main financial market infrastructure risks are legal, liquidity, credit, business, custody, investment and operational risk.

1.2.1. Legal risk (PFMI Principle 1)

Legal risk is the risk of ill planned or poorly defined implementation of legal or regulatory provisions, leading to a potential loss. It can notably occur in the case of the application of a legal regime that makes contracts illegal or unenforceable. Such would be the case, for example, if a procedure for dealing with a participant's insolvency contradicted an infrastructure's operating rules (in terms of payment terms, formalities for accepting obligations, protection of a bankrupt participant by freezing positions, etc.). For so called global infrastructures, which have significant cross border activity and multiple foreign members, it is vital that application of the rules of participants' jurisdictions does not create legal conflict with the systems'

rules; otherwise the infrastructure's functioning could be disrupted. Financial market infrastructures have to protect themselves against this legal risk by obtaining external legal opinions and analysing the legal and regulatory framework of the participants' jurisdictions, both before they allow participants to join the system and on a continuous basis, by carrying out legislative and regulatory monitoring.

For example, within the European Union, provisions relating to the irrevocability of payments in the systems, as laid down in the so called Settlement Finality Directive (SFD: see Chapter 5), and provisions covering a banking participant's failure, as set out in the BRRD Directive,² must be applied consistently between EU Member States; however, this does not apply to participants from third countries, which can have different rules. Consequently, operators must obtain legal opinions on the third country's rules, in particular to ensure that there is no conflict with the bankruptcy law of the participant's jurisdiction, which could run counter to the system's irrevocability rules. In this respect, it is absolutely crucial to avoid a situation in which a third country's bankruptcy court could have a participant's assets seized when the related procedures have reached the point of irrevocability and payments must be made.

Settlement risk, which is the risk that a settlement will not proceed as planned,³ is a major risk for financial market infrastructures. If such a risk materialises, it calls into question certain transfer orders and can create both credit and liquidity pressure for an infrastructure's participants. It can also lead to systemic risk.⁴ It is therefore essential for the smooth functioning of financial market infrastructures that any settlement, transfer (of securities or cash) or offsetting (between two obligations), or any other obligation that is settled in a system, is 'permanent'. To that end, the transfer of securities or cash must not be subject to any condition that could prevent its execution: the transfer must be 'irrevocable' and universally 'enforceable' for

1 English version: <https://www.bis.org/cpmi/publ/d101a.pdf>

French version: https://www.bis.org/cpmi/publ/d101_fr.pdf

2 Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014 establishing a framework for the recovery and resolution of credit institutions and investment firms.

3 <https://www.bis.org/cpmi/publ/d101a.pdf>, see Principle 8, p.64 et seq.

4 For example, in the case of net settlement systems, a participant with unsettled transactions to its credit could see its initial creditor position turn into a debtor position, leading to its inability to pay and in turn putting other financial players in difficulty.

it to be permanent. The objective is to establish a legal mechanism to protect against the default of a participant in a payment or securities settlement system. This question is considered in greater depth in Section 3.3 of Chapter 5.

1.2.2. Liquidity risk (PFMI Principle 7)

There are two types of liquidity risk: one linked to a system participant's default risk and the other linked to the system operator's activity and the state of the associated market. This risk differs depending on the type of infrastructure in question.

Liquidity risk in the event of a participant's default

This is the risk that a counterparty, whether an infrastructure participant or another entity,⁵ does not have sufficient funds to settle its financial obligations in a timely manner, regardless of whether it may be able to do so in the future. CCPs are subject to liquidity risk, as are, generally, deferred net settlement payment systems.

This risk arises, for example, when a participant in a payment system operating in deferred net settlement mode cannot settle its net debit balance at the required time, such as at the end of the day, despite doing so subsequently (the next day, for example). The participants expecting payment do not receive their funds when required, and may then have to borrow, for example on the interbank market, to meet their own obligations. At the end of the day, when the markets close, these participants could have difficulties obtaining sufficient liquidity and refinancing in the markets.

In the case of a sale of securities, this risk can arise when the seller of a financial asset who does not receive payment at term needs to borrow on the market or sell another asset to make other payments. It could also be the risk that the buyer of an asset that has not been delivered at maturity will be forced to borrow that asset (or even buy it again, after the initial transaction has

been cancelled) in order to comply with its own delivery obligation. Both parties to the financial transaction may therefore be exposed to liquidity risk at the settlement date.

For CCPs, this liquidity risk is particularly high for contracts such as repurchase agreements (repos), which are accompanied by significant cash flows. When the transaction is executed, cash is paid to the borrower providing the securities as collateral. If at maturity the borrower does not repay the borrowed cash, the lender can sell the securities in order to recover its funds. The CCP must at all times have enough liquid resources to ensure settlement, even if one of the members is unable to settle the repo. This exposes it to significant liquidity risk.

In extreme cases, liquidity risk can turn into credit risk (see below), i.e. a permanent loss if the defaulting participant cannot obtain the liquidity needed to meet its obligations. However, even in the absence of credit risk, liquidity risk can hamper the smooth functioning of financial markets. This was notably the case when Lehman Brothers collapsed in 2008. Before the central banks intervened, market liquidity dried up due to the lack of trust prevailing among banks and market players.

Liquidity risk and credit risk are therefore not necessarily linked: liquidity risk can materialise in a pressure situation without necessarily leading to credit risk (permanent loss). Nevertheless, distinguishing between liquidity risk and credit risk can be complex; sometimes the distinction can only be made after the event, i.e. when the loss has already occurred or the risk disappeared. By contrast, as regards securities transactions in settlement and delivery systems (securities settlement systems SSSs), liquidity risk is in fact a replacement risk (as defined above) and is completely disconnected from credit risk (see below).

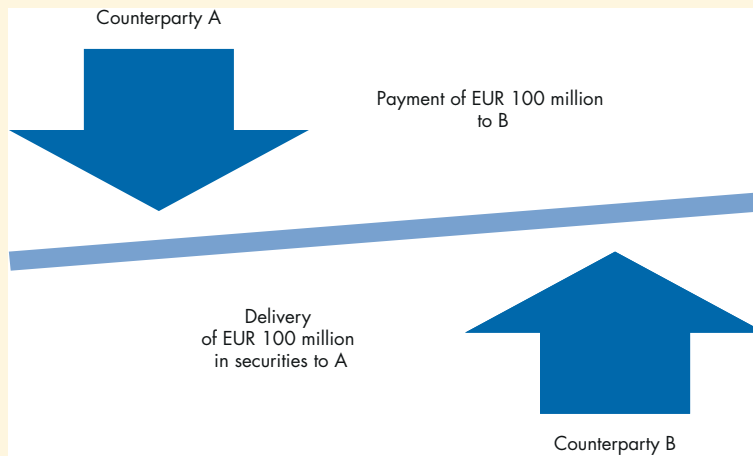
A counterparty's liquidity risk may also have other sources, such as the impossibility or inability of settlement banks,

⁵ For example, a system liquidity provider such as in the CLS multi-currency payment system (see Chapter 9).

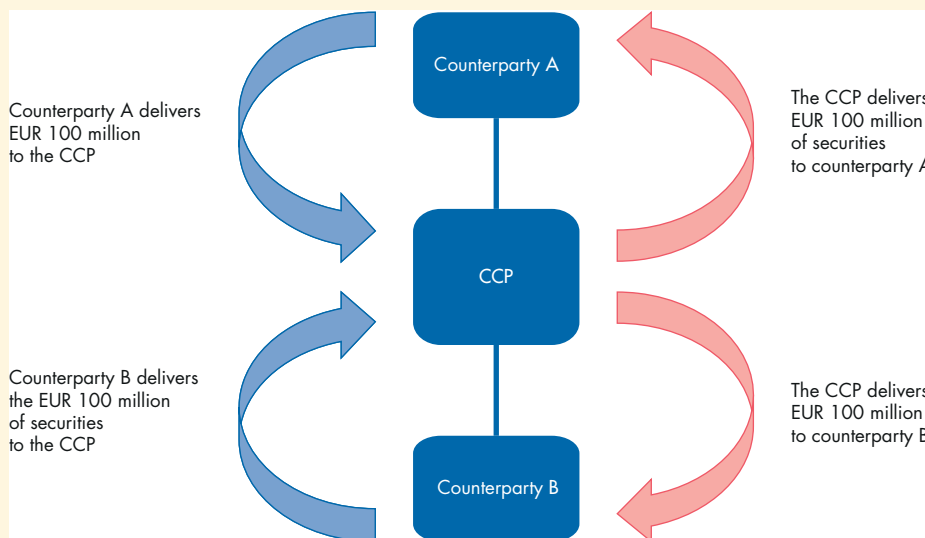
Box 1: Cleared repo liquidity risk compared with uncleared repo liquidity risk

Consider the example of a repo in respect of which counterparty A undertakes to pay EUR 100 million in cash to counterparty B, while counterparty B must deliver to A the equivalent of EUR 100 million in securities as collateral. In this case each counterparty's settlement will take place in delivery versus payment (DvP) mode, in which each counterparty is released from its obligation (e.g. cash payment) if and only if it simultaneously receives from the other counterparty the opposing leg that is the subject of the exchange (e.g. delivery of securities).

In a bilateral, uncleared transaction the flows linked to a repo can be summed up as follows:



In the case of a transaction cleared by a central counterparty (CCP), which replaces the initial counterparties, the flows can be summed up as follows:



.../...

The CCP Bears the liquidity risk. For example, if B does not provide it with the securities when the transaction is settled, the CCP will have to buy them on the market and thereby incur a replacement cost:

The CCP must at all times have enough liquidity in euros to ensure settlement, even if one of the members is unable to pay.

Another type of instrument that can typically generate significant liquidity needs for a CCP in the case of centralised clearing is a currency forward. For example, if counterparty C has to deliver EUR 100 million to counterparty D at term and counterparty D has to deliver USD 120 million to C in exchange, if D defaults the CCP is at risk of having to pay C the USD 120 million on D's behalf. The CCP may have to buy dollars in the market, which can be both costly and difficult – particularly at the end of the day, in crisis situations or at times of market stress. This risk is significant because it concerns the transaction's principal amount.

nostro agents, custodian banks, liquidity providers or related infrastructures to meet their commitments.

Liquidity risk not linked to a default

Liquidity risk can also materialise independently of a default, for example in a real time gross settlement (RTGS) system, which processes and settles payment instructions as they enter the system: if a participant makes a succession of large value payments without at the same time receiving credit amounts, it is likely to face liquidity pressure. Indeed, RTGS payment systems consume liquidity as they do not offset amounts payable against amounts receivable, unlike deferred net settlement payment systems. System participants therefore need to have quick and easy access to liquidity (via interbank refinancing or a central bank, for example). For a CCP, liquidity risk could arise in connection with collateral management, if for example the collateral received (as cash margin, for instance) has been invested in infrequently traded, illiquid securities. When the time comes for it to return the corresponding cash to the clearing member (for example as a result of a reduction in the latter's position vis à vis the CCP), the CCP may find itself unable to sell the securities on the market in order to return the cash.

Liquidity risk may also generate systemic risk, particularly if a participant's inability to meet its obligations due to liquidity problems materialises when markets are closed or illiquid, if asset prices are rapidly fluctuating or if the participant's situation raises concerns about its solvency.

1.2.3. Credit risk (PFMI Principle 4)

Credit risk is the risk that a counterparty, whether a system participant or another entity such as the settlement bank, will be unable to fully meet its financial obligations at term and subsequently. Like liquidity risk, this risk is specific, being determined by the infrastructure's type and *modus operandi*.

This risk may be borne by the infrastructure (such as the CCP in the event of the default of one of its participants). The counterparty(ies) that bear(s) this risk may then incur a principal risk and a replacement cost risk. Principal risk is the risk of losing the entire amount of a transaction, for example when the seller of a financial asset irrevocably delivers it without receiving payment (theoretical risk in a settlement and delivery system but actually eliminated by the settlement and delivery technique – see below). Replacement cost risk arises from a change in market value compared to the

transaction's initial terms likely to lead to a higher replacement transaction execution cost for the buyer.

Credit risk can, however, be reduced or even eliminated. For example, for payment systems, the real time gross settlement method eliminates any delay between the time when the instructions are entered into the system and the time they are settled; credit risk is nil in such systems. The deferred net settlement model, meanwhile, makes it possible to reduce credit risk by implementing a hedging mechanism (guarantee fund, individual guarantees, pre-funding, etc.: see Chapter 8). In the case of deferred net settlement systems, another possible protection mechanism is the implementation of bilateral limits between participants. This is notably the case with the EURO1 large value payment system (see Chapter 10). This system does not entirely eliminate credit risk but allows it to be reduced to a level deemed acceptable by system participants and supervisory authorities.

Credit risk can also be reduced or even eliminated in foreign exchange settlement systems and securities settlement and delivery systems. The main protection method is the implementation of a payment versus payment (PvP) mechanism⁶ (see Chapter 9) for foreign exchange transactions and a delivery versus payment (DvP) mechanism⁷ (see Chapter 13) for the settlement and delivery of securities. These mechanisms ensure the simultaneous settlement of the transaction's two 'legs'.

1.2.4. General business risk (PFMI Principle 15)

Like any company, an infrastructure is exposed to the risk of damage to its sustainability as a business. This risk arises from a variety of sources other than a participant's default: it can involve the loss of one or more major clients, depriving the infrastructure of a substantial source of income and resulting in an inability to

recover its costs, for example, or errors in the company's strategy resulting in ill suited or insufficient investments, or losses incurred in other business sectors by the infrastructure's parent company or that company's other subsidiaries.

Most financial market infrastructures, particularly CCPs, operate in a competitive environment, exposing their operating conditions to sudden change.

Certain risks dealt with in other PFMI principles – such as legal risk or operational risk – can generate business risk. For example, with regard to legal risk, if a payment system's rules were identified as conflicting with a country's legislation, all participants in that country would have to leave the system, leading to a loss of activity and income for the infrastructure. Similarly, the detection of a significant operational risk within a system, such as the impossibility of confirming participants' positions, complying with cut off times or accessing the backup site could result in participants leaving the system for that of a competitor, deemed more secure. Reputation risk can also result in business risk, for example in the event of negligence or an error resulting in the loss of clients.

To cover these risks, international standards require infrastructures to hold liquidity 'reserves' to deal with such events (see Chapter 18).

1.2.5. Custody risk and investment risk (PFMI Principle 16)

Custody risk is the risk of incurring losses on assets held in custody, as a result of the insolvency of a custodian (or sub custodian). Insofar as the securities that the custodian agent holds are not its own, and are therefore not part of the pool to be distributed among creditors in the event of said agent's default, this risk will materialise solely in connection with negligence, fraud, maladministration or inadequate account keeping.

6 The PFMI define PvP as a cash settlement mechanism under which final settlement of one leg in a currency can only be made if, and only if, final settlement in the other currency (or other currencies) has actually been made.

7 The PFMI define DvP as a settlement mechanism that links the transfer of a financial instrument to the corresponding transfer of cash intended to settle it, such that the delivery of the financial instrument can only be carried out if, and only if, the cash payment has actually been made.

Investment risk, meanwhile, is the risk of loss incurred by an infrastructure when it invests its own resources (for example its capital) or those of its participants (guarantee funds, deposits or margins paid) in assets that subsequently lose value.

As part of their activity, some financial market infrastructures hold financial instruments (e.g. securities provided as collateral or to guarantee transaction execution) or cash collateral entrusted to them by their participants. The recipient infrastructure is required to return said securities or cash at the transaction's term. These financial instruments are exposed to the risk of a loss of value in the event of market pressure or a deterioration in a counterparty's credit situation or even its default.

The loss of value of financial instruments or cash exposes the infrastructure to principal risk, i.e. the obligation to reconstitute the cash or financial instruments, at its own expense, by charging the related costs to its own funds or calling for contributions from its participants. For example, certain CCPs, considering that their clearing members are stakeholders in the CCP's investment decision making process, only bear part of the losses linked to these investments, and to that end have put in place a mechanism for sharing and allocating investment losses with their participants.

The return of assets to participants may also involve ancillary costs such as fees, commissions or an increase in the price of the securities concerned. Infrastructures that receive financial assets from their clients under an arrangement to return them at a later date are exposed to custody risk. This risk may arise in the event of fraud or negligence (lack of control or reconciliation, for example, between the amount of an issue and the amount of securities subject to centralised account keeping). Because of their role in the processing of financial operations, infrastructures have a key responsibility in this area. Custody risk is therefore particularly high at central securities depositories (CSDs) and CCPs.

This is because for their part, CSDs act as a securities centralised account keeper, guaranteeing that the total amount of securities held by investors is equal to the amount of securities issued (no undue creation or deletion of securities: see Chapter 12).

CCPs, meanwhile, receive margin payments (in securities or cash) from their clearing members, which they must be able to return to them as soon as the position decreases (partial return) or is closed (total return). As such, they must have in place a secure asset custody system. In the European Union, for example, CCPs must wherever possible deposit financial instruments received as margins, and default fund contributions, with settlement systems that provide full protection for these instruments; similarly, cash deposits must be made within a highly secure framework such as a central bank.

1.2.6. Operational risk (PFMI Principle 17)

All FMIs face operational risk, which is the risk that deficiencies in information systems or internal processes, human errors, management failures, or disruptions from external events will result in the reduction, deterioration, or breakdown of services that they provide. These operational failures may lead to delays, losses, liquidity problems, and in some cases systemic risks. Operational deficiencies also can reduce the effectiveness of measures that FMIs may take to manage risk, for example, by impairing their ability to complete settlement or to monitor and manage their credit exposures. In the case of trade repositories (TRs), operational deficiencies could limit the usefulness of the transaction data they hold (see Chapter 16).

Possible operational failures include errors or delays in processing, system outages, insufficient capacity, fraud, and data loss or corruption. Operational risk can stem from both internal and external sources. For example, participants can generate operational risk for FMIs and other participants, which could result in liquidity or operational problems within the broader financial system.

Cyber risk is also a source of operational risk that is receiving increasing attention from regulators given its potentially very debilitating consequences for FMIs. According to the CPMI report published in November 2014 on cyber resilience in financial market infrastructures, a cyber threat is a “circumstance or event with the potential to intentionally or unintentionally exploit one or more vulnerabilities in an FMI’s systems resulting in a loss of confidentiality, integrity or availability”⁸. Cyber attacks involving extreme risk such as data corruption or prevention of system access – known as distributed denial of service (DDoS) – can force the infrastructure to stop all activity and thus prevent it from performing its critical function. Cyber attacks of this kind present a real challenge for infrastructures, insofar as they make it difficult to achieve the objective of a two hour return to operations (RTO) – generally the time frame worked to in such cases – which in the case of data corruption, for example, takes into account the need to identify the attack point, restore sound data before this point and reprocess all affected transactions in the system.

Guidance on cyber-resilience of market infrastructures was published in 2016 by CPMI and IOSCO⁹ to provide greater detail on expectations in the field. It provides supplemental guidance on general expectations with regard to operational risk management (see the CPMI-IOSCO Principles for Financial Market Infrastructures (PFMI), published in 2012). The Eurosystem, which plays a major role in overseeing market infrastructures, published *Cyber resilience oversight expectations for financial market structure* (CROE)¹⁰ at the end of 2018, and defined three maturity levels by adopting and applying a more operational approach to all the expectations of the 2016 CPMI-IOSCO guidance. The more systemically important a market infrastructure is, the greater the level of maturity expected.

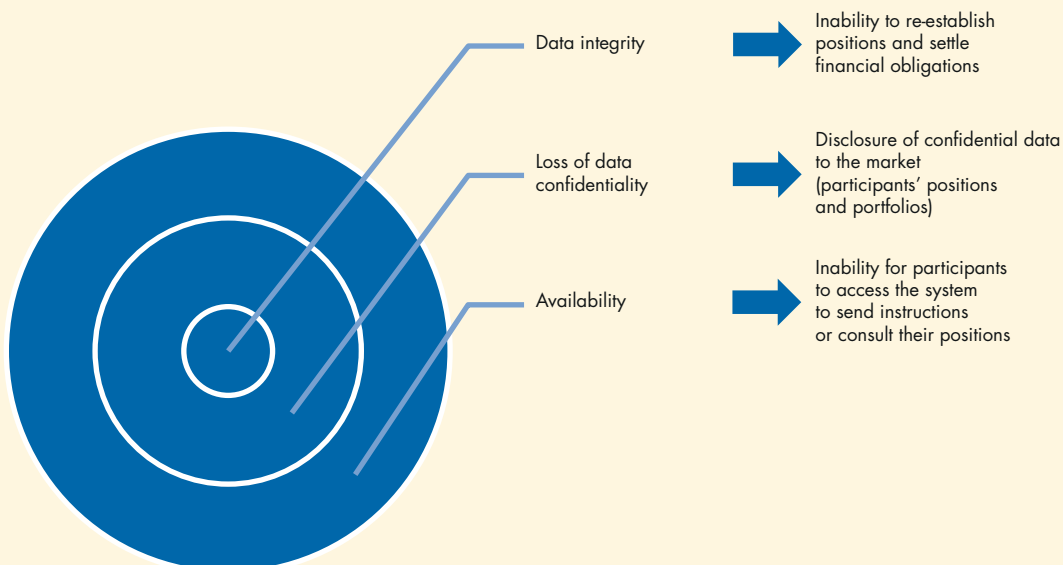
Another major source of operational risk is outsourcing. Like other business entities, financial market infrastructures may choose to partially subcontract management of their activities, chiefly for areas that are not part of their core business such as legal tasks, real estate management or human resources management, but in some

8 www.bis.org/cpmi/publ/d122.pdf

9 <https://www.bis.org/cpmi/publ/d146.pdf>

10 https://www.ecb.europa.eu/paym/pdf/cons/cyberresilience/Cyber_resilience_oversight_expectations_for_financial_market_infrastructures.pdf

Box 2: Cyber attacks: targets and consequences



cases for more core activities (hosting or operation of technical platform, software development and maintenance, IT management, website management, risk model and algorithm maintenance, etc.), so as to benefit from pooling related economies of scale. However, this outsourcing potentially exposes an infrastructure to additional risks, which costs may far exceed the savings expected from outsourcing. These risks include:

- the risk of default (contractual, operational or financial) by the service provider which, in the absence of a fall back solution, could prevent the infrastructure from being able to ensure business continuity and provide critical services (calculating net positions for a CCP, for example);
- the risk of not being able to meet the maximum two hour RTO deadline, a firm PFMI objective (see Chapter 18), which is likely to result in a very high risk of reputational damage and loss of clients;
- the risk of loss of ownership or control of the technology associated with outsourced services, particularly in the case of core business components such as netting algorithms for payment systems or margin calculation models for CCPs.

To combat these risks, the PFMI require infrastructures to monitor activities delegated to critical service providers (PFMI Annex F: see Chapter 18). For EU CCPs, EMIR imposes strict regulatory requirements for outsourcing. A EU CCP cannot, for example, outsource its main risk management related activities unless it obtains the explicit agreement of the competent national authority (or authorities if a Member State has designated several competent authorities under EMIR).

Financial market infrastructure risks are not only highly diverse but also interdependent. Investment risk may lead to liquidity risk, for example; operational risk may lead to custody or even liquidity risk

(particularly if it is technically impossible to make payments) and liquidity risk may develop into credit risk, for example if a CCP clearing member's one off non payment of a margin call is not subsequently regularised – which exposes the CCP not only to potential liquidity problems because it does not receive its expected margin but also to the risk of losing the principal of its receivable due from that member.

An infrastructure's degree of exposure to a given risk depends on its type and design. For example, CCPs are exposed to credit risk (see Chapter 11), but this risk does not affect securities settlement systems operating on a delivery versus payment (DvP) basis (see Chapter 13). SSSs are exposed to very specific risks. A payment system will be exposed to different risks depending on whether it operates in real time gross settlement or deferred net settlement (DNS) mode (see Chapters 7 and 8), but also on the rules it adopts with regard to participants. According to the PFMI, a system includes the central body, i.e. the infrastructure itself, and its participants. An infrastructure's risk profile therefore depends not only on the function it performs, but also on how it operates and the rules it sets for its members.

1.3. Financial market infrastructures' key risk management role

While carrying risks, financial market infrastructures are also a means of managing risks by mitigating or transforming them for their participants. They played a crucial role in managing the 2008 financial crisis, for example, when they acted as mitigators and 'circuit breakers', thus containing market contagion. CCPs typically play a key role in managing a participant's default, both through their loss allocation and default management mechanism and the calibration of their resources that in Europe, pursuant to EMIR 'Cover 2' requirements, is designed to enable them to cope with the failure of the two clearing members to which they have the highest exposure (see Chapter 11). When Lehman Brothers collapsed, for

example, the initial margins that the bank had deposited with the CCPs enabled them to absorb the losses arising from its default. Similarly, securities settlement and delivery systems operating in DvP mode make it possible to eliminate credit risk for their participants by ensuring the simultaneous payment of cash for securities and delivery of securities for cash.

2. Interdependencies and systemic risk

2.1. Types of interdependency

Market infrastructure related interdependencies must be considered from several angles. Firstly, financial market infrastructures are essential elements of the post market transaction processing chain (securities clearing, settlement and delivery, and cash leg settlement), which automatically creates operational interdependencies between them. In addition to these operational interdependencies, interactions between market participants and financial market infrastructures lead to the creation of other, system to system interdependencies.

Systemic risk has several dimensions.¹¹ France's High Council for Financial Stability (*Haut Conseil de stabilité financière*) defines it as "disruption to the provision of financial services caused by an impairment of all (or a large part) of the financial system, and which has the potential to have serious negative consequences for the real economy." In the context of interbank clearing systems, the Lamfalussy Report (1990)¹² defines it as "the risk that the illiquidity or default of an institution, resulting in the latter's inability to honour its obligations, leads to the illiquidity or default of other institutions." As such, infrastructures can also be vectors for the propagation of risks because they can very quickly transfer exposures from one participant to another, or even from one market to another, resulting in a contagion within the financial system. Certain market infrastructures are therefore considered 'systemically important' because of the

volume of financial flows that they settle and the possible chain reaction across the financial sector as a whole that could result from a financial or technical shock that is not properly controlled. While interdependencies have significantly improved the security and efficiency of infrastructures' activities and processes, for example through integrated flow transmission, they increase the likelihood of increased and widespread market disruption. Thus, if an infrastructure depends on the proper functioning of one or more other infrastructures for its payment, clearing, settlement and registration processes, a disruption in any one of these entities may have a simultaneous impact on the others. These interdependent relationships can therefore spread disruption beyond a single infrastructure and its participants to impact the economy as a whole. The objective of limiting and controlling systemic risk – a fundamental goal for central banks – must be taken into account in the design of financial market infrastructures and the establishment of their operating rules.

While they can propagate systemic risk, financial market infrastructures play a central role in mitigating this risk, and that is their ultimate purpose. The PFMI accordingly specify that certain infrastructures are critical for central banks' monetary policy management operations and financial stability roles. As we saw above, when Lehman Brothers collapsed in September 2008, the CCPs were able to settle that counterparty's transactions, under extreme market conditions, thanks to the initial margins¹³ that they had collected. This enabled them to play the role of circuit breaker, settling transactions with other counterparties without having to call for contributions from other clearing members. The liquidity of the other market players was thus preserved thanks to the CCPs' interposition.

FMI interdependencies were the subject of a CPMI working group report¹⁴ published in June 2008 (before the crisis, therefore). That report identified three types of interdependency: those arising from common

11 See Rocher-Tirole "Controlling risks in payment systems" in *Journal of Money, Credit and Banking* (1996).

12 http://www.bis.org/cpmi/publ/d04_fr.pdf

13 See Chapter 11 on CCPs.

14 <http://www.bis.org/cpmi/publ/d84.pdf>

participants, those between infrastructures and those linked to the environment, for example in the case of a service provider common to several infrastructures.

2.1.1. Interdependencies linked to common participants

Interdependencies linked to common participants result from the participation of the same market players, often the largest banks, in the transaction processing chain of various infrastructures: for example, bank A is a clearing member of CCP A and CCP B, but also a participant in the CSD and the payment system responsible for cash leg settlements. Bank A's default would therefore impact CCP A, CCP B, the CSD and the payment system. This example is illustrated in the box 3 below. These interdependencies create externalities. For example, the fact that participant C does not receive the expected settlement from participant D due to D's failure within the system has negative consequences for participant C, which will have to borrow in the interbank market for refinancing purposes, leading to costs or even stress situations in periods of market pressure and if interbank lending is tight. Interdependencies also arise when direct participants represent indirect participants in the systems. This happens when market players that do not meet the access criteria or do not have the operational capacity to be direct participants in infrastructures are represented by direct participants – in the case of CCPs this is the role of clearing members which offer client clearing services. As a result, in a CCP for example, the default or bankruptcy of a clearing member would have significant repercussions on that clearing member's clients or indirect participants.

In terms of risk management, interdependencies can result in an infrastructure participant or a major credit institution providing liquidity to the infrastructure. By way of illustration, as regards the functioning of the CLS foreign currency settlement system, if a participant cannot settle its debit position in a given currency such as

the euro, CLS may call on euro liquidity provider banks to settle the euros against another currency held by said participant (see Chapter 9) within the limit of the amount to which the liquidity provider is contractually committed. This link creates dependency between the system and the liquidity provider, insofar as settlement in the currency concerned will necessarily depend on the liquidity provider's capacity to supply this currency.

The organisation of relations between participants is also a risk factor. For example, an infrastructure with few direct participants but a large number of indirect participants, representing a significant volume of activity, presents risks: the default of a direct participant may cause difficulties for its indirect participating clients, who therefore no longer have access to the infrastructure and are forced to rapidly find an alternative access solution.

2.1.2. Interdependencies arising from links between infrastructures

The second type of interdependency arises from links between infrastructures that make one system's functioning closely correlated to another's. This is typical of links between CCPs, CSDs and large value payment systems (LVPS) for the settlement of the cash portion of transactions (see box 3). It also applies to retail payment system flows channelled into a large value payment system.

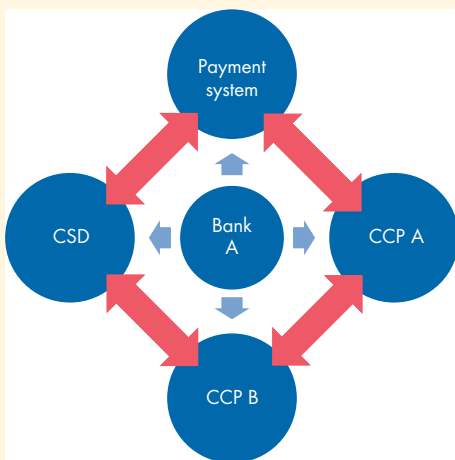
Interoperability links between infrastructures such as CCPs (see Chapter 11, Section 2.2) also create new interdependencies, which require appropriate risk management systems.

2.1.3. Environmental interdependencies

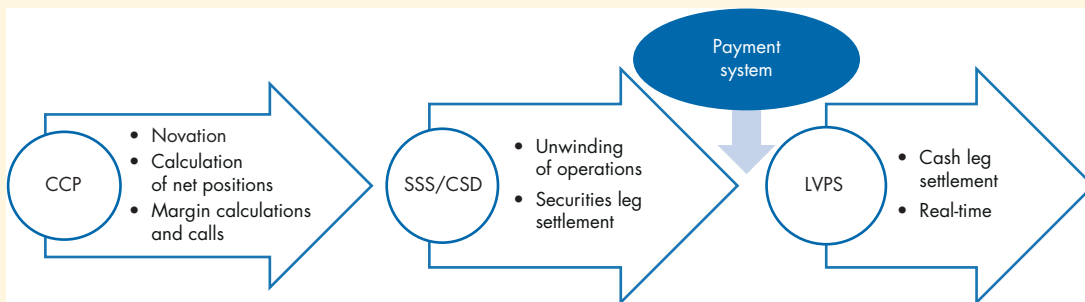
Several factors contribute to the creation or deepening of interdependencies. Market globalisation and regional integration naturally foster interdependencies. The consolidation of market players themselves

Box 3: Interdependencies

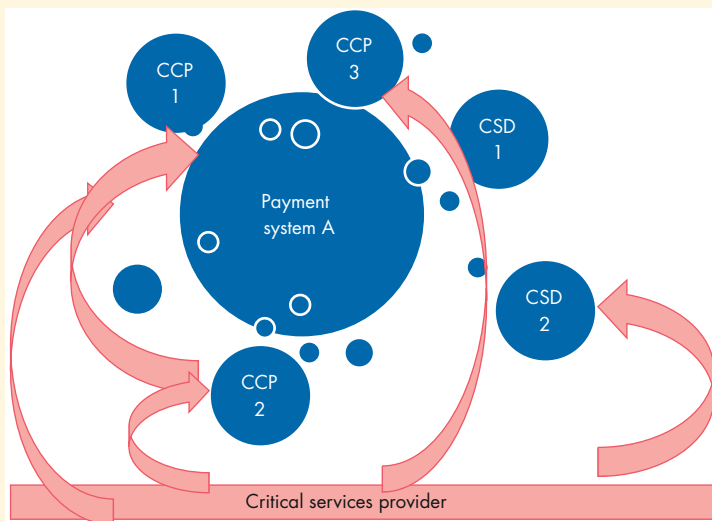
1. Interdependencies linked to common participation



2. Interdependencies between infrastructures



3. Interdependencies linked to a shared critical services provider



can deepen interdependencies, for example via a common shareholder structure, or the establishment of shared platforms to pool technical resources and thus reduce costs. Technological innovations can also lead to interdependencies, when identical technology such as financial messaging is used to facilitate exchanges and adopt common standards.

This is the third type of interdependency – environmental. It concerns indirect relationships arising from more general factors – several infrastructures’ use of the same service provider such as a network or messaging provider, for instance. Joint platform sharing schemes can also create interdependencies; for example, the use of SWIFT by most infrastructures creates interdependencies that contribute to the ‘systemic’ nature of SWIFT’s financial messaging service.

The box 3 illustrates how risk transmission takes place in the post market processing chain, with examples of interdependencies:

2.2. Systemic risk: ‘supersystemic’ CCPs

The network of interdependencies between clearing member banks and CCPs tends to create a major systemic risk by allowing very strong interconnections to develop between these players. This has been illustrated in particular by the work on interdependencies carried out by the Financial Stability Board (FSB).

For example, based on data on derivative positions in 26 CCPs worldwide collected in 2016 by the Financial Stability Board’s Study Group on Central Clearing Interdependencies, it was found that global systemically important banks (G SIBs) are very closely linked to each other, in particular through their participation in the same CCPs. In this study, interdependencies were measured notably based on the amount of the CCPs’ main G SIBs’ contributions to initial margins and default funds. It transpired that as

few as 20 or so clearing members out of more than 300 contribute more than 75% of the financial resources provided to these CCPs. The default of the two largest clearing members of any given CCP would have an impact in more than 20 other CCPs to which they participate. In addition, around ten CCPs account for nearly 88% of the resources contributed by these G SIBs. Some CCPs thus appear to be ‘supersystemic’, in that they represent a significant proportion of overall risks.

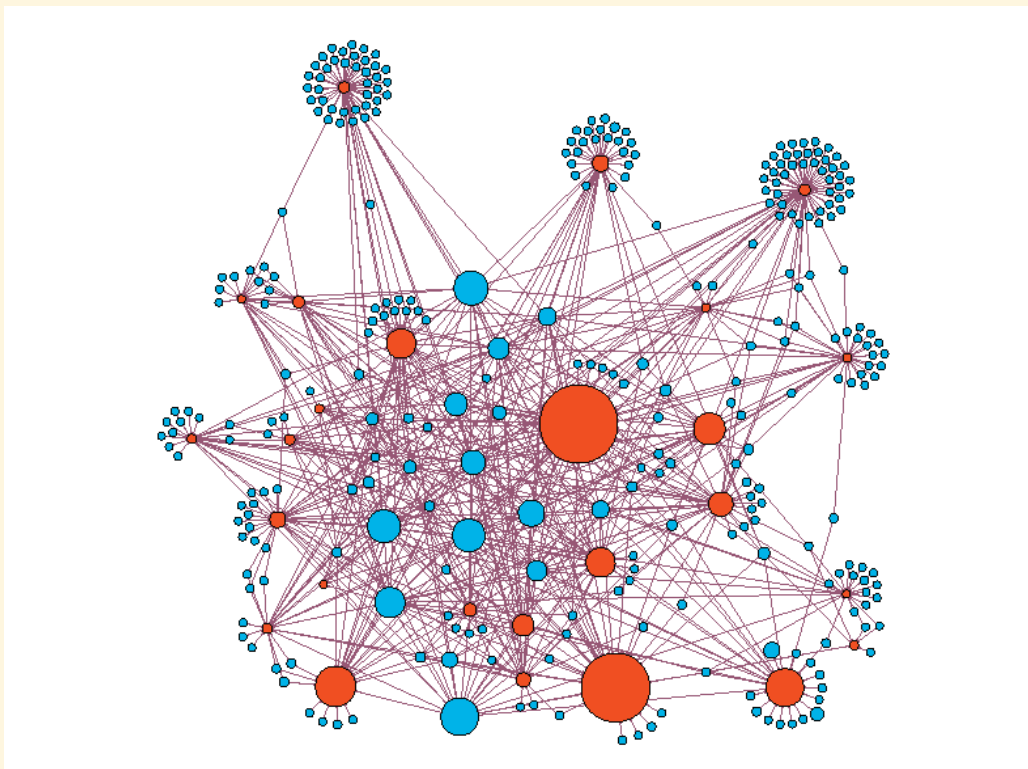
2.2.1 Risks associated with market structure

Risks in the systems may also be compounded by market structure issues. The high fixed costs and technical resources needed to set up an infrastructure naturally result in high concentration and specialisation among these players; many jurisdictions have just a single CCP and a single settlement and delivery system or a single large value payment system. This concentration makes the infrastructures difficult to replace and increases interdependencies.

For example, a market structure that includes multiple CCPs may have fewer vulnerabilities than an organisation with a global CCP, which would concentrate all exposures and thus become ‘super-systemic’ because its failure (to return securities or deliver cash, for example) could trigger the failure of its clearing members. A silo type, vertical integration of an infrastructure with other entities could further increase the risk that the default of one of the chain’s links (such as the trading platform) will cause the other infrastructures (the CCP and the settlement and delivery system) to default, by complicating or even making impossible such infrastructure’s resolution. The difficulty of replacing an infrastructure and its systemic nature can therefore lead its oversight bodies to impose additional requirements (coverage of financial risks, capital requirements, etc.) in order to reduce its risk of failing.

Box 4: Interdependencies linked to participants.**Illustration from the work of the Study Group on Central Clearing Interdependencies, 2018**

The chart below illustrates the network made up of 26 CCPs (in red) and each of their 25 largest clearing members (in blue), based on pre funded financial resources paid by clearing members to these CCPs. The size of each circle represents the total amount of pre funded financial resources that have been collected by a CCP or paid by a clearing member to all CCPs of which it is a member. The lines connecting the CCPs and the members show the relationships between the clearing members and CCPs that make up the network.



Source: Financial Stability Board and CPMI-IOSCO report: <https://www.bis.org/cpmi/publ/d181.pdf>

CCPs and members in the middle tend to be larger than those on the periphery. Meanwhile, outlying CCPs tend to have a large number of members that belong to only one CCP. This graph thus illustrates the high concentration within a few CCPs of pre funded resources paid by members.

3. Offshore infrastructure risks

3.1. Different types of offshore infrastructure

To properly understand the risks associated with these infrastructures, the concept of so called offshore infrastructures must be

defined, as it covers various scenarios. Offshore¹⁵ infrastructures are (i) infrastructures that allow their participants to connect indirectly – i.e. from a jurisdiction other than that of the central bank of issue – to an infrastructure in the issuing currency zone, and (ii) infrastructures that, in their territory, process instruments or payments

¹⁵ In the context of market infrastructures, the term 'offshore' is normal and in no way refers to prohibited activities.

Box 5: euroSIC, example of an indirect connection by the Swiss banking community to TARGET2

Despite Switzerland not being a member of the euro area, SIX Interbank Clearing (SIC) was instructed by the Swiss financial market to develop a real time gross settlement system for euro transactions, known as euroSIC and operated by a German settlement bank (SECB Swiss Euro Clearing Bank). This system has been used since January 1999 to enable Swiss banks to rapidly clear euro denominated payments between each other, without having to keep euro denominated accounts in TARGET2. In its capacity as a Frankfurt registered German universal bank and a participant in the Bundesbank's TARGET2 system, the SECB settlement bank has access via TARGET 2 to all euro area member countries, and processes euroSIC participants' payments from Switzerland to the euro area and vice versa in real time.

As regards the terms of participation, any institution subject to Swiss banking supervision can legally participate in euroSIC. Financial institutions, common institutions, clearing organisations and their members outside Switzerland also receive access, provided they are subject in their country of origin to banking supervision of at least equivalent legal and operational standards to those governing participants in Switzerland as regards banking oversight, anti money laundering and telecommunications infrastructures. SIX-SIS, the group's CSD, is directly connected to the European TARGET2 Securities (T2S) platform, enabling the settlement of system transactions with a cash leg denominated in euro.

denominated in a currency other than that of the central bank of issue of their operating jurisdiction,¹⁶ being typically multi currency CCPs, which clear financial instruments in multiple currencies (EUR, USD, GBP, CAD, etc.) or multi currency settlement systems such as CLS (see Chapter 9).

The first scenario, described in the box 5, gives the example of euroSIC, a payment system located in Switzerland that makes it possible to indirectly connect a banking community outside the euro area, in this case Switzerland, to the TARGET2 payment system via a German commercial bank acting as a settlement agent.

The second scenario concerns CCPs in the UK, which clear a substantial portion of transactions in euro denominated financial instruments (see Box 6).

¹⁶ See CPMI glossary: <https://www.bis.org/cpmi/publ>

Box 6: the case of UK CCPs

In Europe, certain CCPs located outside the euro area, in particular in the United Kingdom, process a very substantial portion of transactions in euro denominated financial instruments; this is the case, for example, of LCH Ltd, whose SwapClear euro interest rate derivative clearing service represented, in November 2020, EUR 80 trillion of open positions that is between 85% and 90% of the euro interest rate derivative clearing market.

T1: European CCP open interest – EUR OTC interest rate derivatives – October 2019

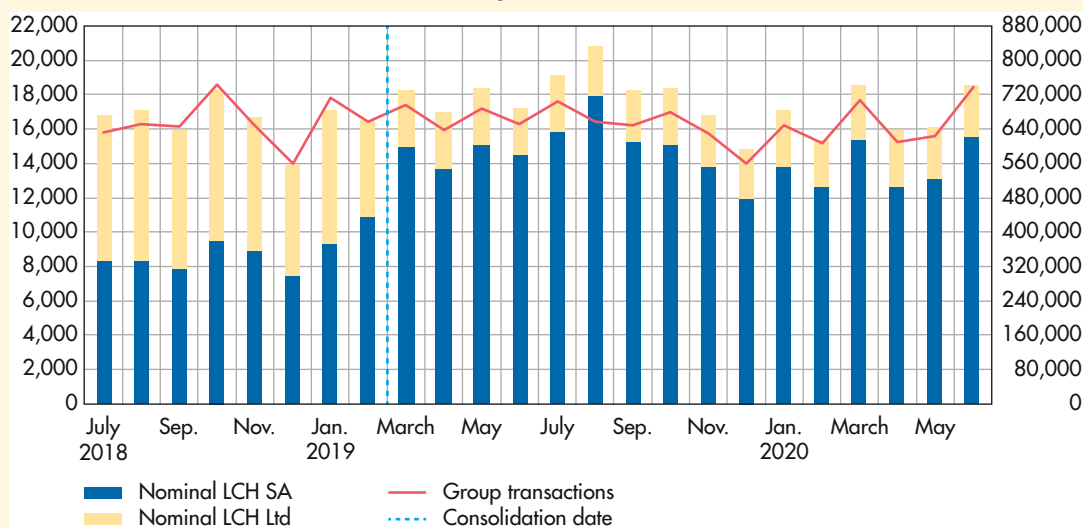
(EUR trillion; %)

CCP	Notional outstanding	% market share
LCH Ltd SwapClear	88	87
EurexOTC	13	13
BME Clearing	0.001	0

Source: public information, CCP websites.

C1 : LCH EUR repo clearing in the European Union

(Nominal amounts in EUR bn, left-hand scale; transactions in numbers, right-hand scale)



Source: public information, CCP websites

The European repo market is cleared almost exclusively by four CCPs. Prior to March 2019, in the United Kingdom, the RepoClear service of LCH Ltd cleared almost 25% of the euro-denominated repo market, mainly on euro-denominated German, Belgian, Austrian and Dutch sovereign debt. However, given the context of Brexit, LCH Group migrated its entire euro-denominated repo clearing activity to the French CCP, LCH SA, in March 2019 (see graph), making it the leading central counterparty for these products.

3.2. Advantages of offshore infrastructures

Offshore infrastructures are used to settle international transactions, and as such facilitate the development of international trade. These infrastructures are adapted to the settlement of regular rather than one off transactions, benefiting from significant volumes and generating economies of scale (by spreading development and structural costs over a large number of transactions and thus reducing the unit processing cost) and liquidity gains (through the offsetting of participants' opposing positions held in the same currency). This makes these offshore infrastructures more suitable for handling

the currencies commonly used in payment transactions, at a lower cost than that associated with the use of correspondent banks.

They thus contribute to improving systems' efficiency and effectiveness. Lastly, in certain cases, such as multi currency CCPs or multi currency payment systems, they allow the netting of positions between different currencies (see calculation of the Aggregate Short Position Limit for CLS, Chapter 9, Section 2.3). For the CCPs' clearing of financial instruments, this netting can reduce margin call related collateral requirements (see Chapter 11, Section 3).

3.3. Specific risks of offshore infrastructures

Offshore infrastructures, however, have their own specific risks, linked to their remoteness from the central bank of issue with which they deal.

An offshore infrastructure that processes a very large amount of foreign currency denominated transactions is a source of risk for the currency zone in question, particularly in terms of liquidity. For example, some participants in domestic payment systems may rely on euro liquidity from offshore

systems to settle their end of day debit positions in domestic systems. Similarly, because offshore infrastructures generally have no direct links with the central bank of issue, liquidity management could prove ineffective in the event of stress. The misalignment of interests between an offshore infrastructure and the central bank of issue is itself a source of risk: experience shows that, for example, a euro processing CCP established outside the euro area that is not regulated primarily by one or more euro area supervisors is likely to take measures contrary to the interests of and with a potentially systemic impact on the euro area, with no possibility of intervention by the euro area authorities. The euro area experienced this situation during the sovereign debt crisis that affected certain euro area countries between late 2011 and early 2012 through summer 2012, when a UK CCP took pro cyclical decisions to increase initial margins and collateral haircuts, that were potentially detrimental to the euro area's financial stability without first consulting the Eurosystem, the body responsible for said financial stability.

These financial stability issues are also crucial for market players, who need a secure framework for the processing and clearing of their transactions.

Offshore infrastructures must not threaten the financial stability of the markets or currencies of the central banks of issue concerned. As such, they must be governed by a risk control system. There are various ways of controlling the related risks, in particular (i) limiting volumes by implementing a location policy, and (ii) subjecting the infrastructures in question to enhanced oversight, with the central banks of issue playing the main role.

3.3.1. Example: the Eurosystem payment system location policy

Monetary authorities use location policies to help preserve financial stability and control their currencies, insofar as the implementation of monetary policy and

the processing of payments in the issuing currency are intrinsically linked.

The Eurosystem oversight framework, published in July 2011 and revised in July 2016,¹⁷ includes a policy for locating payment systems that handle euros. It is based on the principle that payment systems that handle a significant amount of euro denominated transactions must be legally domiciled in the euro area and settle these transactions in a central bank currency. In addition, operational control and responsibility for all these transactions' critical functions must be carried out in the euro area. According to the principles set out in this location policy, euro denominated transactions in offshore payment systems must be repatriated to the euro area if these systems settle more than EUR 5 billion daily or individually account for more than 0.2% of the total value of euro denominated transactions settled by euro area interbank payment systems.

Currently, there are very few payment systems handling euro denominated transactions outside the euro area. They are: euroSIC in Switzerland (see supra Box 5), CHATS EUR (HK) in Hong Kong (see Box 8 in Chapter 9), whose activity in euros remains very limited (beneath the location policy activation threshold) and CLS, which handles significant amounts far in excess of the specified ceilings but benefits from an exemption to the location policy, a concession that the Eurosystem can grant in very specific cases. The CLS exemption is currently the only one granted. CLS is a PvP multi currency settlement system (see Chapter 9), which by definition is an offshore system for all but one of the currencies it handles, the US dollar (since CLS Bank is located in the US). The Eurosystem granted an exemption to CLS, for PvP payments only, on the basis that it reduces settlement risk on foreign exchange transactions. In return, the Eurosystem is closely involved in monitoring CLS under a cooperative oversight arrangement between the G10's central banks (and those whose currencies the

17 <https://www.ecb.europa.eu/pub/pdf/other>

system handles), under the aegis of the US Federal Reserve (see Chapter 9, Section 3).

3.3.2. The case of offshore CCPs

CCPs that clear transactions in euros are critical to both financial stability and the implementation of monetary policy; in this regard, a CGFS report in 1994¹⁸ highlighted the importance of derivative mandate.

A CCP that handles transactions in a given currency and which, being located outside the central bank of issue's currency zone, is not primarily supervised by an authority in that zone, can take measures or have measures imposed on it by its national supervisor that conflict with the interests of the currency zone, without that zone's authorities being able to intervene (see above).

In this context, locating financial instrument clearing activities in the currency zone itself is the safest way of ensuring these infrastructures' security, as the central bank's proximity allows it to monitor the relevant CCP's liquidity management system. In cases of extreme market pressure, the central bank may, on a discretionary basis and within the limit of the eligible collateral that the CCP can provide, supply emergency liquidity.

For this reason, the revised version of the EMIR regulation (EMIR2), which was published on 12 December 2019 and entered into force on 1 January 2020, provides for the relocation of the most systemically important CCPs for the European Union (see Chapter 11, Section 4.3.3). Thus, CCPs that are deemed to be "of substantial systemic importance", such that their location outside the European Union poses excessive risks to the financial stability of the Union, will not be recognised and will therefore not be authorised to provide services in the EU. To do so, they will therefore have to relocate all or part of their activity in the EU, which will contribute to the reduction of systemic risk in Europe.

In this context, ESMA announced on 28 September 2020 that the UK CCPs LCH Limited and ICE Clear Europe would be subject to a comprehensive review of their potential substantially systemic importance, including a fully reasoned assessment according to Article 25(2c) of EMIR 2, before the end of the temporary equivalence granted to the UK law by the European Commission (i.e. by June 2022). This process could potentially lead to a relocation requirement for all or part of these CCPs' activities.

3.3.3. Enhanced oversight mechanisms involving central banks of issue

In addition to implementing a location policy, another way to preserve financial stability with regard to offshore infrastructures, although less effective than the location policy, is to put in place an oversight system in which the central banks of issue of the currencies of the processed financial instruments wield real power alongside the competent national authorities, with prior approval of any extension or change to the risk management framework, as well as a right of veto and the imposition of emergency measures in the event of a threat to the financial stability of the issuing zone in question. To date, such effective enhanced oversight systems do not exist; oversight authorities apply either a location policy or direct, so called extra territorial oversight (in the United States, for instance – see Chapter 18). Necessarily, only a location policy allows the central bank of issue to intervene quickly and effectively. Direct oversight and offshore CCP cooperation arrangements allow no such intervention, since they are not binding and based on the goodwill of the home country's authorities, both in terms of the transmission of information and the decision making needed to preserve financial stability.

It is thus perfectly conceivable that a CCP be subject to contradictory requirements from regulators of different jurisdictions, particularly in times of crisis, with each pursuing its own mandate to defend its currency zone's

18 <https://www.bis.org/publ/ecsc04.pdf>

financial and monetary stability or preserve its clearing members' financial solidity. If this tool was used on CCPs, it could make crisis management even more problematic.

Lastly, there is no mechanism for resolving conflicts between regulators, and the uncertainty resulting from this could further exacerbate financial destabilisation, especially in times of crisis.

Ultimately, the extraterritorial oversight method could prove ineffective in such situations, which suggests the need for direct supervision of third-country CCPs

that are systemically important for the EU, and for so-called substantially systemically important CCPs to relocate (see Chapter 11, Section 4.3.3).

The primary responsibility for risk management lies with financial market infrastructure operators. Given the risks they face and their key role in the financial sphere, financial market infrastructures must comply with security and risk management rules on the one hand, and be supervised by the authorities on the other. Central banks in particular have a crucial role to play in preventing systemic risk.

CHAPTER 18

Oversight of financial market infrastructures

Updated on 30 September 2020

Financial market infrastructures play a pivotal role in serving financial markets, supplying them with liquidity and ensuring payments and the settlement and delivery of financial instruments. In doing so they contribute directly to maintaining confidence in currencies and financial markets and, more generally, to financial stability. They also enable the smooth implementation of monetary policy by making it possible to raise and deliver securities as collateral against the delivery of cash. These infrastructures showed strong resilience in the 2008 crisis; the G20 assigned additional responsibility to some of them in 2009 (notably central counterparties and trade repositories) with a view to improving financial stability and transparency, which has led to enhanced oversight.

Operationally speaking, it is also in central banks' direct interest that infrastructures – primarily payment systems – function smoothly, as most central banks operate a national payment system themselves, while others are direct participants in such systems. Moreover, central banks themselves use financial market infrastructures for the operational implementation of monetary policy and delivery of collateral (see Chapter 12, Section 1.5; Chapter 13, Section 4.3 and Chapter 15, Section 5); this increases their interest in infrastructures' efficient functioning, as they cannot provide liquidity if the securities accepted as collateral are not delivered, for example.

As part of their mission of conducting monetary policy and ensuring financial stability, the challenge for central banks, as 'lenders of last resort', is to prevent generating moral hazard – which for market players consists in relying on central bank intervention in the event of failure of an infrastructure or a major participant.

Central banks therefore naturally started paying attention, in the early 1990s, to the systemic risks that their national payment systems could pose. It is in this context that the term 'oversight' – which at the

time had no legal or regulatory basis – first appeared. As a knock on effect, central banks' oversight scope was subsequently extended to securities settlement systems (SSS). To the extent that SSSs were required to perform settlements in the central bank's books (known as "settlement in central bank money") in order to ensure settlements' security, these systems could indeed jeopardise the proper functioning of national payment systems. Lastly, while offering greater financial security, central counterparties (CCP) have also led to risk concentration (see Chapter 11), as participant's default as well as a failure of the CCP itself can generate systemic risk. In this context, and in the interests of financial stability, the G10's central banks in particular began to work alongside financial market authorities – which were traditionally responsible for the regulation and supervision of central securities depositories and CCPs – to help oversee such entities. As a result, the financial market infrastructure ecosystem monitored by central banks has gradually expanded, and now covers not just payment systems but the entire financial instruments processing chain.

The importance of financial market infrastructures for the authorities, particularly central banks, is highlighted in the CPSS' May 2005 report *Central bank oversight of payment and settlement systems*.¹

The purpose of central bank oversight of financial market infrastructures is to ensure the effectiveness and security of existing systems (as well as the ones being developed), assess these systems against applicable standards and principles and encourage relevant adjustments where necessary.

1. Risk management standards for financial market infrastructures

The various standards applicable to financial market infrastructures originated in the financial crises of the late 1980s,

¹ <http://www.bis.org/cpmi/publ/d68.pdf>

but more importantly after the 2008 crisis. The body of standards was developed gradually, by infrastructure type, before being consolidated, in 2012, in the *CPMI/IOSCO Principles for Financial Market Infrastructures* (PFMI). These principles were subsequently transposed into binding regulations in European law.

1.1. Development of the various sets of principles

When, post the 1987 financial crisis, the importance of having strong financial market infrastructures had hit home, international standards began to emerge, beginning with those of the 1990 Lamfalussy Report² on interbank netting schemes. This report established 'minimum standards' for such systems, intended in particular to cover

legal, financial and operational risks. It also laid down founding principles for their cooperative oversight by central banks.

In line with the Lamfalussy standards and principles, several sets of standards were developed successively, initially by infrastructure type: first for systemically important payment systems (2001), then for securities settlement systems (2001) and finally for central counterparties (2004). After the 2008 financial crisis, which showed the crucial role played by financial market infrastructures and their resilience, and given the emergence of new infrastructures such as trade repositories (see Chapter 16), the authorities decided it was best to rethink these standards and incorporate them in a single document, the Principles for Financial Market Infrastructures (PFMI), published in April 2012.

² <http://www.bis.org/cpmi/publ/d04.pdf> (original version) <http://www.bis.org/cpmi/publ/d04fr.pdf> (French translation)

Box 1: Minimum standards for the design and operation of cross-border and multi-currency netting and settlement schemes ("Lamfalussy" standards)

The 1990 Lamfalussy Report recommended the following six 'minimum standards':

- (I) *Netting schemes should have a well-founded legal basis under all relevant jurisdictions;*
- (II) *Netting scheme participants should have a clear understanding of the impact of the particular scheme on each of the financial risks affected by the netting process;*
- (III) *Multilateral netting systems should have clearly-defined procedures for the management of credit risks and liquidity risks which specify the respective responsibilities of the netting provider and the participants. These procedures should also ensure that all parties have both the incentives and the capabilities to manage and contain each of the risks they bear and that limits are placed on the maximum level of credit exposure that can be produced by each participant;*
- (IV) *Multilateral netting systems should, at a minimum, be capable of ensuring the timely completion of daily settlements in the event of an inability to settle by the participant with the largest single net-debit position;*
- (V) *Multilateral netting systems should have objective and publicly-disclosed criteria for admission, which permit fair and open access;*
- (VI) *All netting schemes should ensure the operational reliability of technical systems and the availability of back-up facilities capable of completing daily processing requirements.*

1.1.1. Core Principles for Systemically Important Payment Systems (CPSS, January 2001)³

The authorities' aim was to develop general, globally acceptable principles that were adaptable to a wide variety of situations. They therefore had to be generic in nature. Accordingly, 23 national central banks, including the G10 central banks, participated in the CPSS working group together with the European Central Bank, the International Monetary Fund and the World Bank. Given the conclusion that risk was not solely the province of large value payment systems – retail payment systems that processed very large volumes of small transactions could generate risk too – a global approach integrating the two types of system was adopted. Ten core principles for systemically important payment systems were defined, supplemented by four 'responsibilities' assigned to central banks that implemented these principles.

1.1.2. Recommendations for securities settlement systems (CPSS IOSCO, November 2001)⁴

Securities settlement systems (see Chapter 13) are exposed to specific risks linked to the nature of their activity. Their main purpose is to ensure the fully secure execution of securities transactions. These systems are usually managed by central securities depositories (CSDs), and are themselves linked to a payment system, which in most cases settles cash in the books of a central bank before transferring the funds corresponding to the securities transfers. The conditionality of execution of each of the transaction's two legs is known as "delivery versus payment" (DvP), whereby the final transfer of securities is made if and only if the cash transfer takes place – and vice versa.

The first international standards for settlement and delivery were developed following the Group of Thirty's recommendations of 1988.⁵ These guidelines were updated by a working group established

under the aegis of the CPSS and IOSCO, whose November 2001 report set out 19 recommendations for securities settlement systems.

1.1.3. Recommendations for central counterparties (CPSS IOSCO, November 2004)⁶

Some of the recommendations for securities settlement systems were also intended for CCPs, in particular those related to governance, transparency and operational reliability. Given CCPs' very specific risk profile, the CPSS and IOSCO developed tailored recommendations for these entities. Published in 2004, the associated report sets out 15 recommendations for CCPs, accompanied by an evaluation methodology that uses key questions to assess the CCP's degree of compliance therewith.

1.2. Principles for Financial Market Infrastructures (CPSS IOSCO, April 2012)

International efforts to enhance the security and robustness of financial market infrastructures proved their effectiveness during the 2008 financial crisis, when these infrastructures successfully negotiated the surge in market instability, transaction volume spikes and the collapse of Lehman Brothers (one of their biggest users) without any major disruption. By absorbing the increase in the volume and volatility of trading activity, the smooth functioning of these infrastructures fostered market confidence and contributed significantly to limiting the financial and economic consequences of that crisis.⁷

In light of the important role assigned to financial market infrastructures by the G20 in the commitments made at the Pittsburgh Summit in September 2009, it was crucial to ensure the long term robustness of these entities; the CPMI and IOSCO accordingly carried out work to harmonise and revise the pre-existing principles relating to the various infrastructures. The juxtaposition of these various infrastructure specific principles and

3 <http://www.bis.org/cpmi/publ/d43.pdf> (original version) or <http://www.bis.org/cpmi/publ/d43fr.pdf> (French translation)

4 <http://www.bis.org/cpmi/publ/d46.pdf> (original version) <http://www.bis.org/cpmi/publ/d46fr.pdf> (French translation)

5 Clearance and Settlement Systems in the World's Securities Markets (Group of Thirty, 1988). <http://group30.org/images>

6 <http://www.bis.org/cpmi/publ/d64.pdf>

7 See "CPSS-IOSCO Principles for financial market infrastructures: vectors of international convergence" Russo D., Banque de France's Financial Stability Review, No. 17, (April 2013, pp. 79-88) : <https://publications.banque-france.fr/en/liste-chronologique/financial-stability-review?year=2013>

recommendations called for implementation of a global, coherent approach to the principles applicable to financial market infrastructures. The result was the Principles for Financial Market Infrastructures (PFMI), drafted by the CPSS (which became the CPMI in 2014) and IOSCO committees and published in April 2012.⁸

The PFMI divide financial market infrastructures into the following categories:

- payment systems (PS);
- central securities depositories (CSD);
- securities settlement systems (SSS);
- central counterparties (CCP); and
- trade repositories (TR).

The PFMI strengthened the requirements relating to credit and liquidity risk management and established new requirements for risk categories that were not covered by the former standards, such as the obligation to put in place a risk management framework that includes all risks (legal, financial, operational, etc.), the need for CCPs to make available to their users a

system that ensures the segregation and portability of members' and members' clients' positions and collateral, and requirements relating to general business risk and indirect, or 'tiered' participation risks.

They also tightened the risk management framework requirements for CCPs, stipulating that CCPs that are involved in activities with a more complex risk profile or that are systemically important in multiple jurisdictions should be able at all times to cover the exposure related to their two members with the largest positions, to cope with a scenario of two simultaneous and cumulative defaults (Cover 2, see Chapter 11). The PFMI also defined new coverage standards for business risk (capital financed liquid resources equivalent to six months of ongoing expenses required) and operational risk.

The PFMI are structured around nine main risks, which are then broken down into 24 principles, as shown in the Box 2 below.

⁸ <http://www.bis.org/cpmi/publ/d101a.pdf> (original version) or http://www.bis.org/cpmi/publ/d101_fr.pdf (French translation)

Box 2: PFMI breakdown

General organisation

- Legal basis
- Governance
- Framework for the comprehensive management of risks

Credit and liquidity risk management

- Credit risk
- Collateral
- Margin calls
- Liquidity risk

Settlement

- Settlement finality
- Money settlements
- Physical deliveries

Central securities depositories and exchange-of-value settlement systems

- Central securities depositories
- Exchange-of-value settlement systems

Default management

- Participant-default rules and procedures
- Segregation and portability

General business and operational risk management

- General business risk
- Custody and investment risks
- Operational risk

Access

- Access and participation requirements
- Tiered participation arrangements
- FMI link

Efficiency

- Efficiency and effectiveness
- Communication procedures and standards

Transparency

- Disclosure of rules, key procedures and market data
- Disclosure of market data by trade repositories

Box 3: general applicability of PFMI by infrastructure type *

	SP	CSD	SSS	CCP	TR
1. Legal basis	•	•	•	•	•
2. Governance	•	•	•	•	•
3. Framework for the comprehensive management of risks	•	•	•	•	•
4. Credit risk	•		•	•	
5. Collateral	•		•	•	
6. Margin calls				•	
7. Liquidity risk	•	(1)	•	•	
8. Settlement finality	•	•	•	•	
9. Money settlements	•		•	•	
10. Physical deliveries		•	•	•	
11. Central securities depositories		•			
12. Exchange of value settlement systems	•		•	•	
13. Participant default rules and procedures	•	•	•	•	
14. Segregation and portability				•	
15. General business risk	•	•	•	•	•
16. Custody and investment risks	•	•	•	•	
17. Operational risk	•	•	•	•	•
18. Access and participation requirements	•	•	•	•	•
19. Tiered participation arrangements	•	•	•	•	•
20. FMI links		•	•	•	•
21. Efficiency and effectiveness	•	•	•	•	•
22. Communication procedures and standards	•	•	•	•	•
23. Disclosure of rules, key procedures and market data	•	•	•	•	•
24. Disclosure of market data by trade repositories					•

* PS= payment system, CSD = central securities depository, SSS = securities settlement system, CCP = central counterparty, TR = trade repository

(1) Liquidity risk concerns only CSDs and ICSDs that have a banking licence.

Given that each type of financial market infrastructure has its own activity and risk profile, not all these principles are applicable to all infrastructures. For example, TR are not affected by liquidity risk or credit risk but are exposed to operational risk. CCPs, meanwhile, are particularly exposed to credit, market and liquidity risk in the event of a participant's default. Other risk factors may arise from links with other infrastructures. For example, securities settlement systems may be linked to one or more CCPs for the settlement and delivery of the securities leg, or – for the settlement of the cash leg – to one or more payment systems.

The table in Box 3, taken from the PFMI, shows the principles' applicability based on the infrastructure type.

Each infrastructure's risk profile varies too, depending on endogenous factors (organisation, governance, etc.) and exogenous factors (links, participants, etc.).

With regard to operational risk and in the context of rising cyber risk, in June 2016 the CPMI IOSCO also published a guidance document, *Guidance on cyber resilience for financial market infrastructures*,⁹ including recommendations to increase the resilience of financial market infrastructures and consisting of eight parts: (i) governance, (ii) risk identification, (iii) protection, (iv) detection, (v) response and recovery, (vi) testing, (vii) situational awareness and (viii) learning and evolving. The guidance aims to provide a methodological approach and tools to enable financial market

⁹ <https://www.bis.org/cpmi/publ/d146.pdf>. This guidance was followed by the publication of the Cyber resilience oversight expectations for financial market infrastructures report by the ECB in December 2018 (see Section 1.3.2 below),

infrastructures to strengthen their resilience to cyber threats.

These principles are supplemented in the PFMI by “five responsibilities of central banks, market regulators and other relevant authorities for FMIs” (Responsibilities A to E, see Section 2.4 below). These new standards were accompanied by an international CPMI IOSCO framework for the disclosure of qualitative information, including an analysis method with a framework for assessing infrastructures’ application of the principles (*Disclosure framework and Assessment methodology*), published in December 2012,¹⁰ which aims to increase financial market infrastructures’ transparency with regard to market players, so that they have all the information necessary to assess the risks to which they may be exposed by interacting with these infrastructures. This qualitative framework was supplemented by a quantitative framework designed to be applied by infrastructure type. In February 2015, the CPMI IOSCO published a report on the quantitative information to be disclosed by CCPs.¹¹

Another feature of the PFMI is Annex F, which deals with the oversight requirements applicable to critical service providers. The criticality of the services that these entities provide (such as the SWIFT financial messaging system) means that infrastructures rely heavily on their proper functioning. PFMI Annex F lists five oversight requirements applicable to critical service providers: (i) risk identification and management; (ii) information security; (iii) reliability and resilience; (iv) technology planning and (v) communication with users. In August 2017, the ECB’s Governing Council approved a Eurosystem policy to identify and oversee providers of critical services for financial market infrastructures, which gives operational form to the main principles laid down in this area by the Eurosystem’s oversight framework.¹² This policy applies to all payment systems within the Eurosystem’s remit (systemically important payment systems and retail

payment systems), the T2S platform and payment card systems. In this respect, financial market infrastructures have a responsibility to ensure that the critical service providers they use meet the oversight requirements applicable to them; in some cases, direct oversight of critical service providers may be carried out by the authorities.

The change in nature of these requirements and their transposition into binding regulations, in particular in the United States with the Dodd Frank Act and in the European Union with the EMIR (see Chapter 11) and the CSDR (see Chapters 12 and 13), constitute a paradigm shift for the infrastructure oversight framework. They result on the one hand in an obligation for infrastructures to comply with standards and on the other in possible sanctions for non compliance.

1.3. New European regulations for financial market infrastructures: the transition from soft to hard law

CPMI and IOSCO member countries have committed to implementing the PFMI in their respective jurisdictions. This is an important initiative, as the PFMI are not legally binding but rather principles and recommendations for sound risk management. The Implementation Monitoring Standing Group was put in place to monitor this implementation worldwide in the CPMI IOSCO jurisdictions. This monitoring is carried out at three levels:

- level 1: self assessments by jurisdictions on the implementation of PFMI legislation and procedures;
- level 2: peer reviews on the comprehensiveness and consistency with the PFMI of the implementing measures taken by the jurisdictions; and
- level 3: peer reviews on the consistency of the results of the infrastructures’ PFMI implementation.

¹⁰ <http://www.bis.org/cpmi/publ/d106.pdf>

¹¹ <http://www.bis.org/cpmi/publ/d125.pdf>

¹² <http://www.ecb.europa.eu/pub/pdf/>

The level 1 assessments, which are regularly updated on the BIS website,¹³ show that jurisdictions have reached an advanced stage of PFMI legal and regulatory transposition. So far, the level 2 assessments have concerned ten jurisdictions (the European Union, the United States, Japan, Australia, Hong Kong, Singapore, Switzerland, Canada, Brazil and Turkey), while the level 3 assessments have resulted in the publication of three reports, covering the financial risk management and

recovery practices of ten derivative clearing CCPs (August 2016¹⁴ and May 2018¹⁵) and the evaluation and review of the authorities' application of the five responsibilities (November 2015¹⁶).

The PFMI have also gained increasing traction worldwide under the impetus of the International Monetary Fund and the World Bank, in connection with these institutions' country evaluation programmes.

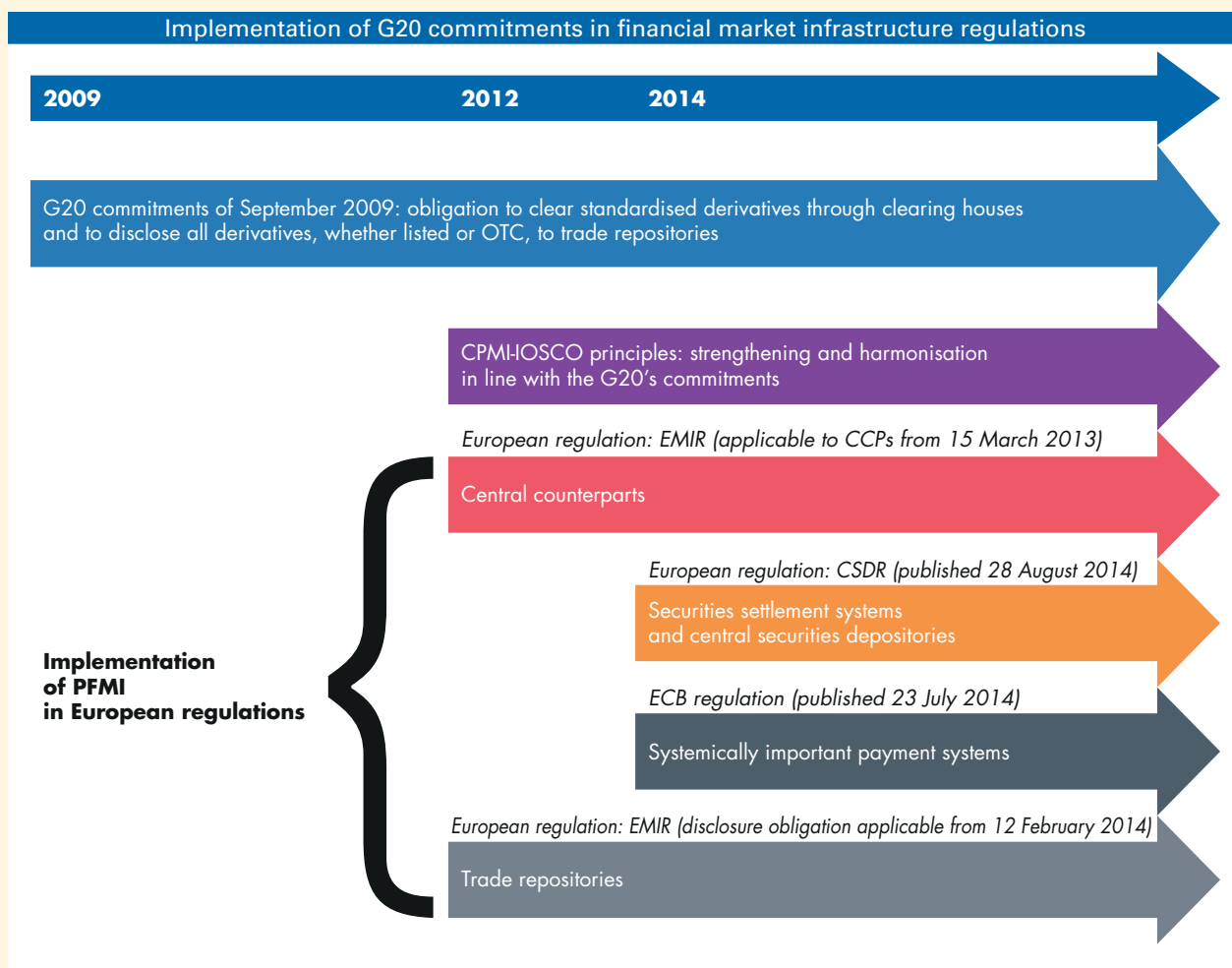
13 https://www.bis.org/cpmi/level1_status_report.htm

14 <https://www.bis.org/cpmi/publ/d148.pdf>

15 <https://www.bis.org/cpmi/publ/d177.pdf>

16 <https://www.bis.org/cpmi/publ/d139.pdf>

Box 4: Implementation of PFMI in European regulations



Source: Banque de France.

With regard to France, this implementation is carried out at the European and Eurosystem levels. The PFMI are broken down by infrastructure type, with specific regulations for each. In this regard:

- on 4 July 2012, European Regulation 648/2012 on OTC derivatives, central counterparties and trade repositories came into force (European Market Infrastructure Regulation, or EMIR), transposing into European law the PFMI applicable to CCPs and trade repositories;
- on 3 June 2013, the European Central Bank announced that the Governing Council had adopted the PFMI for Eurosystem oversight of all types of financial market infrastructure;
- on 11 August 2014, European Central Bank Regulation 2014/28 on oversight requirements for systemically important payment systems, which implements the PFMI for systemically important payment systems within the euro area, came into force. This Regulation was revised in 2017 (see below);
- and lastly, on 18 September 2014, European Regulation 909/2014 concerning the improvement of securities settlement in the European Union and central securities depositories came into force (so called CSDR, or Central Securities Depositories Regulation, transposing into European law the PFMI applicable to SSSs and CSDs.

1.3.1. EMIR for central counterparties and trade repositories

The European regulation EMIR, which was revised in 2019 (see below), establishes harmonised requirements for CCPs across the European Union (see Chapter 11, Section 4.2) based on the PFMI, and defines a common authorisation and supervision framework. Monitoring of the CCPs' compliance with EMIR requirements is

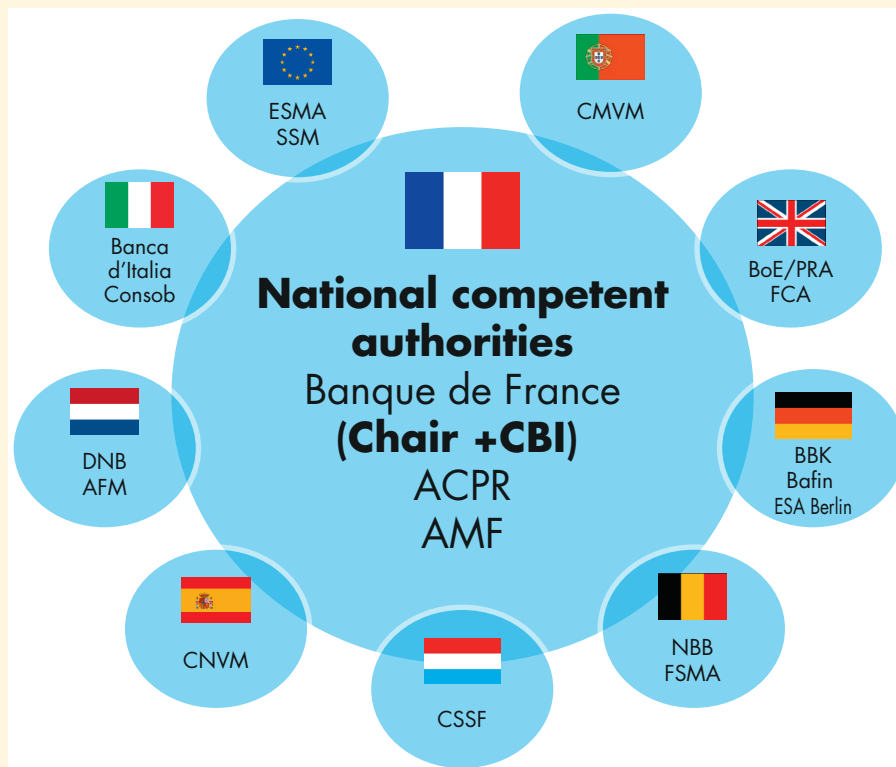
carried out by both national authorities and European level public authority colleges. These colleges, set up for each CCP, bring together the various public authorities of European Union Member States that have an interest in the CCPs' proper functioning (EMIR Article 18). The European Securities and Markets Authority (ESMA) also participates in each college, which is chaired by a national competent authority (NCA). The aim of this system is to promote both a homogeneous approach to the implementation of EMIR requirements in the European Union and appropriate assessment of a CCP's risks by taking into account its risk profile and the different market segments it serves, while involving the main relevant authorities of the other EU Member States.

The purpose of having authorities from different countries participate and using additional, college based mandates is to take into account the different perspectives that are key to the proper functioning of an infrastructure as systemic as a CCP: this makes CCP oversight as comprehensive as possible, reflecting the CCPs' increasingly important contribution to the stability of the financial system and the importance of the interdependencies at the core of these infrastructures' activity, which an authority acting alone would be unable to satisfactorily take into account.

EMIR Articles 14, 15, 17 and 49-1 provides that the EMIR colleges reaches a joint opinion on a CCP's initial authorization under EMIR, extensions of activities and services, and any significant change. The EMIR2 Regulation (EU 2019/2099), which was published on 12 December 2019 and entered into force on 1 January 2020, extends this responsibility to decisions related to Articles 30, 31, 32 (shareholders and qualifying holdings) and 35 (outsourcing). In addition, the college can now issue recommendations to the competent authorities, which must expressly justify any departure from said recommendations (comply or explain).

Box 5: Composition of the EMIR College of the French CCP LCH SA

The diagram below illustrates the composition, in early 2019, of the EMIR College of the French CCP LCH SA (the participation of the UK authorities will come to a close at the end of the transition period).



The French CCP's EMIR College comprises 19 authorities, including the three national competent authorities: the Autorité de contrôle prudentiel et de résolution (Prudential Supervision and Resolution Authority - ACPR), the Autorité des marchés financiers (Financial Markets Authority - AMF) and the Banque de France. The Banque de France chairs the College and also represents the Eurosystem, as the central bank of issue. ESMA is a non-voting member of the College, in application of EMIR provisions.

In the CCP assessment and voting exercise, each authority is expected to vote in accordance with the mandate entrusted to it and under which it participates in the college. Colleges were created to facilitate the cooperative oversight of a CCP. Participation in the college entails no extension of an individual authority's mandate or competence beyond the responsibility assigned to it under its internal legal rules, but does allow it to better fulfil its mandate, by being involved in the main

decisions taken by the national competent authorities concerning the CCPs whose proper functioning is important to the exercise of its mandate.

Regarding third country CCPs, as mentioned in chapter 11, EMIR 2 establishes direct supervisory powers for ESMA on systemic infrastructures. ESMA's decision of 28 September 2020 confirms that the UK CCPs LCH Limited and ICE Clear Europe will be subject to such supervision, without

prejudice to the potential ulterior application of a relocation requirement of their activities as per Article–25(2c) EMIR 2 if they are considered as “substantially systemic” for the European Union as a conclusion of the assessment foreseen in the course of 2021 (see chapter 17).

1.3.2. ECB Regulation for systemically important payment systems

The payment systems regulatory environment also underwent a major change with the entry into force on 11 August 2014 of ECB Regulation ECB 2014/28 on systemically important payment systems (SIPS). The ECB Regulation transposes the PFMI applicable to SIPS and also lays down a set of criteria (concerning in particular volumes, market shares, cross border activity and links with other infrastructures) aimed at identifying SIPS, the list of which must be reviewed annually.

Regulation 2014/28 was revised in November 2017 by Regulation 2017/2094. This revision was the first since the original Regulation was published; since then revision has in principle been made mandatory every two years. The 2017 revision drew on lessons learned from the Eurosystem’s oversight work since the Regulation’s adoption in 2014 and from the consultation of the four systemically important payment systems (TARGET2, EURO1, STEP2-T and CORE(FR)) held between December 2016 and February 2017. The revised regulation was published on 16 November 2017.¹⁷ It clarifies existing obligations, incorporates new risk management requirements and extends authorities’ powers.

Operators must comply with this new regulatory framework within 18 months for provisions relating to financial obligations (credit risk and liquidity risk) and 12 months for all other provisions.

While the competent authorities have been given powers to impose corrective measures, the ECB is the only authority with the power to impose sanctions on SIPS. The revised

Regulation was also accompanied by a methodological note detailing the methods for calculating financial sanctions, as well as an amendment to ECB Regulation 2157/1999 on sanctions.

In a decision of 12 August 2014, the Governing Council named four SIPS in accordance with the criteria of ECB Regulation 2014/28: two large value payment systems, TARGET2 and EURO1, and two retail payment systems, STEP2 T and the French CORE(FR) system.

While TARGET2, EURO1 and STEP2 T are pan European, cross border systems subject to a cooperative oversight mechanism under the aegis of the ECB (see below), CORE(FR) is the only SIPS with offices in France; it is therefore overseen by the Banque de France on behalf of the Eurosystem.

The Eurosystem’s payment systems oversight framework uses a risk based approach. Payment systems that are classified as systemically important, for example, are subject to the most restrictive oversight framework, which includes sanctions for non compliance.

Large value payment systems that do not qualify as systemically important systems must comply with the PFMI. Retail payment systems that do not meet the SIPS criteria, meanwhile, are subject to a more or less comprehensive subset of the PFMI, depending on whether they are prominently important retail payment systems (PIRPS) or other retail payment systems (ORPS).¹⁸ The Box 6 shows this graduated approach.

In terms of cyber resilience, the Eurosystem’s oversight framework also uses a methodology (*Cyber Resilience Oversight Expectations for Financial Market Infrastructures*) that sets out overseers’ expectations with a view to applying the June 2016 CPMI IOSCO guidance on cyber resilience (see Section 1.2). To that end, the Eurosystem conducted a public consultation¹⁹ which ended in summer 2018. The final version of Cyber Resilience Oversight expectations (CROE) was published by the ECB in December 2018.²⁰

17 http://www.ecb.europa.eu/ecb/legal/pdf/celex_32017r2094_fr_txt.pdf

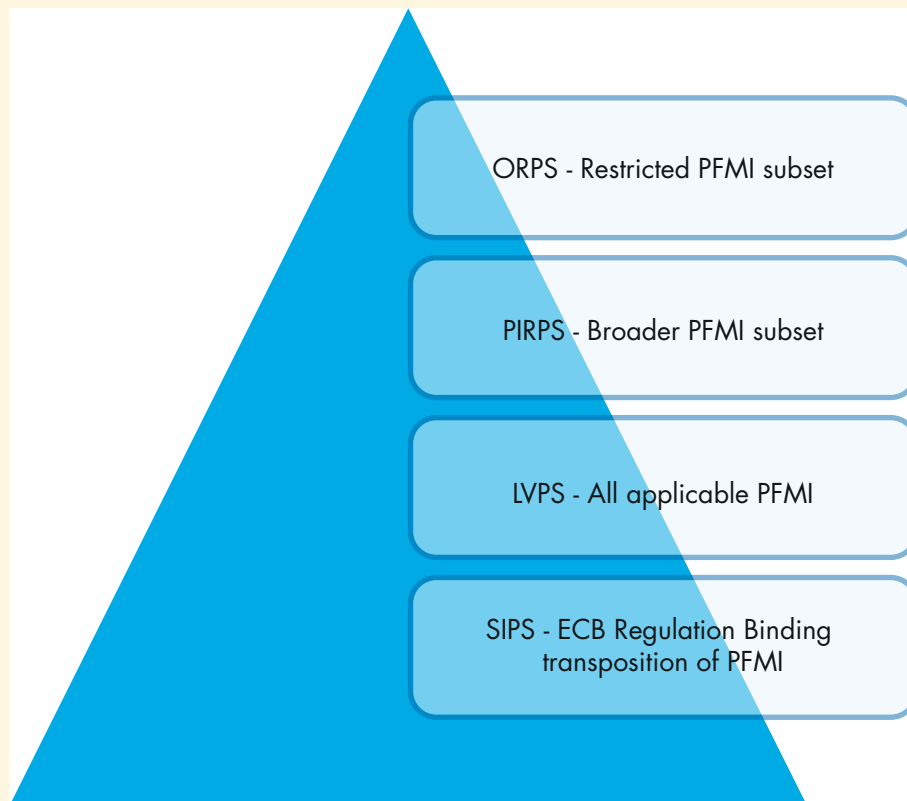
18 Cf. section 2 du chapitre 10.

19 https://www.ecb.europa.eu/paym/cons/html/cyber_resilience_oversight_expectations_en.html

20 https://www.ecb.europa.eu/paym/pdf/cons/cyberresilience/Cyber_resilience_oversight_expectations_for_financial_market_infrastructures.pdf. The CROE were adopted by the World Bank at the start of 2020 for use in emerging economies

Box 6: The Eurosystem payment systems oversight framework¹

The Eurosystem payment systems oversight framework uses a risk-based approach, under which the more critical the systems' malfunctioning risk is to financial stability, the more extensive and binding the rules those systems must comply with are.



¹ https://www.ecb.europa.eu/pub/pdf/other/Revised_oversight_framework_for_retail_payment_systems.pdf

1.3.3. CSDR for securities settlement systems and central securities depositories

Similarly, the regulatory framework applicable to CSDs and SSSs is changing significantly under the impact of European Regulation 909/2014, the Central Securities Depositories Regulation (CSDR), published on 28 August 2014 and transposing the PFMI applicable to CSDs. It came into force at the end of September 2017. In particular, in France this new regulation applies to Euroclear France and to the new CSD, ID2S, and, as far as it is relevant, the TARGET2 Securities (T2S) common settlement and delivery platform to which

Euroclear France and ID2S migrated in September 2016 and October 2018, respectively (see Chapters 12 and 13).

1.4. International evaluations

The PFMI are not applied solely by the member jurisdictions of the CPMI and IOSCO Committees. The CPMI Committee organises regional conferences to involve a wider group of central banks. International reviews ensure that these principles are followed in all countries, with financial market infrastructures subject to external evaluations by the World Bank or the International Monetary Fund, via Financial Sector Assessment Programs (FSAP).

The latter, which are based on the PFMI, aim to assess a country's entire financial sector, including in particular its banks and infrastructures. The IMF's latest assessment of France was conducted in December 2012.²¹

2. Oversight: definition, objectives and methods

The 1990 Lamfalussy Report highlighted the importance for banks of monitoring financial market infrastructures (see above). Specifically, the report justified central bank oversight of clearing systems on the grounds that these systems' use of inadequate risk management procedures could contribute to systemic risk or lead to financial weaknesses that could prevent the proper transmission of monetary policy. For example, a payment system's failure could prevent the central bank from carrying out liquidity transfers as part of its refinancing operations, or that of a securities settlement system in a securities purchase programme could prevent the central bank from purchasing the related securities.

The Lamfalussy Report also laid the foundations for the cooperative oversight of central banks. As payment system operators and lenders of last resort, it is particularly important for central banks that the various systems function properly. The oversight function is specific and unique to central banks. Oversight of payment systems is a traditional central bank responsibility that has developed based on the 'lead overseer' concept, the overseer being the central bank of the country in which the system operator has its registered office. This oversight allows coordination of both the central bank's various functions and capabilities and the responsibilities of the market and prudential supervisory authorities, with the central bank at the heart of the system. The Lamfalussy Report acknowledged that by their nature, due to their impact on the functioning and liquidity of financial markets, particularly the foreign exchange and interbank markets, cross border and/or

multi currency clearing and settlement systems also require an international cooperative arrangement involving the relevant authorities.

The central banks' oversight scope naturally depends on the institutional and regulatory framework in force in the jurisdictions in question. In France, the Banque de France is responsible for the oversight of central counterparties, securities settlement systems, central securities depositories and payment systems.

While oversight methods also depend on the institutional and regulatory framework, the PFMI provide a common basis in terms of the principles and rules of security and sound infrastructure management.

2.1. The Eurosystem's oversight framework and the role of the Banque de France

The Eurosystem's financial market infrastructure oversight framework is known as the "Eurosystem oversight policy framework"²² It is based on the Eurosystem's mission, set out in Article 127(2) of the Treaty on the Functioning of the European Union, to promote the smooth operation of payment systems.

Within this Eurosystem framework, Article L.141 4 of the French Monetary and Financial Code enshrines the Banque de France's competence to oversee financial market infrastructures: the bank ensures the proper functioning and security of payment systems and the security of central counterparties and financial instrument settlement and delivery systems.

The Banque de France has the necessary powers for this task, insofar as the same article grants it the right to obtain the relevant information and documents from central counterparties and managers of payment systems and financial instrument settlement and delivery systems, to carry out inspections both on documents and on site, and to issue recommendations.

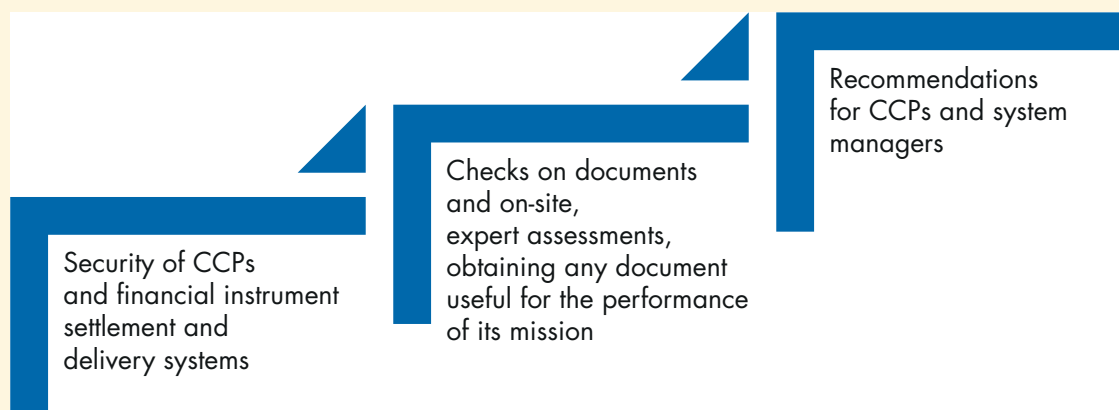
²¹ <https://www.imf.org/external/pubs/cat/longres.aspx?sk=401870>

²² <https://www.ecb.europa.eu/pub/pdf/other/eurosystemoversightpolicyframework201607en.pdf>

Box 7: Provisions of Article L. 141-4 (paragraphs II and III of the French Monetary and Financial Code)

French law clearly establishes the powers of the Banque de France to oversee financial market infrastructures. As such, the French Monetary and Financial Code confers upon the Banque de France the task of “ensuring the proper functioning and security of payment systems within the framework of the mission of the European System of Central Banks relating to the promotion of the proper functioning of payment systems provided for in Article 105(2) of the Treaty establishing the European Community”. In addition, “in the context of the missions of the European System of Central Banks, and without prejudice to the powers of the Autorité des marchés financiers (AMF) and the Autorité de contrôle prudentiel et de résolution (ACPR), the Banque de France ensures the security of clearing houses defined in Article L.440-1 and financial instrument settlement and delivery systems”

This mission breaks down as follows:



The power to carry out on-site inspections was conferred on the Banque de France in 2013, thus strengthening its remit in this area.

These assignments are carried out without prejudice to the powers conferred on the other competent national authorities, namely the Financial Markets Authority (AMF) and the Autorité de contrôle prudentiel et de résolution (ACPR). The three French authorities have therefore coordinated their responsibilities in a collegial and collaborative manner by dividing up oversight of the French CCP LCH SA and of the central securities depository Euroclear France (between the Banque de France and the Financial Markets Authority in the latter case).

2.2. Oversight and supervision

A distinction is traditionally made between the concepts of ‘oversight’ and ‘supervision’. Oversight is defined on an institutional basis in the CPSS report of 2005 related to central banking activity, being based on soft law (i.e. without the power of sanction) and more qualitative in nature (use of persuasion, or moral suasion), whereas supervision is of a regulatory nature and does include the power of sanction. Oversight activities are therefore conducted in principle under the aegis of central banks, while

supervision is more a matter for prudential authorities. However, this distinction has faded somewhat in recent years with the narrowing of the gap between oversight objectives and methods and supervisory objectives and methods.

2.3. Cooperation between relevant authorities and international cooperation

For payment systems, which are overseen by central banks, the concepts still in force today are firstly the ‘lead overseer’ in cross

border payment systems for which a cooperative framework has been established. For example, the US Federal Reserve (Fed) is the lead overseer of the CLS foreign exchange settlement system.

Another important concept in the oversight of financial market infrastructures such as CCPs and CSDs is that of ‘competent’ authorities and ‘relevant’ authorities. Competent authorities are ones upon which regulations or legislation confer direct power to oversee the infrastructure, usually legitimised by their physical location in the jurisdiction in question. Relevant authorities are those that have an interest in the infrastructure’s proper functioning and which, if necessary, participate in the oversight system, the main responsibility for which lies with the competent authorities. Relevant authorities can include supervisory authorities of CCP clearing or non clearing members (as EMIR provides for CCPs, for example), overseers of the platforms on which instruments are traded or of the SSSs that settle and deliver traded financial instruments, overseers of infrastructures with which interoperability links have been established, central banks of issue of the main currencies processed by the infrastructure, etc.

Competent authorities are responsible for the infrastructure’s approval and authorisation with regard to the regulations applicable to it, and for its ongoing oversight. They have a duty to keep informed the various stakeholders, including the public, on the infrastructure’s security and operation as well as changes in its risk profile, and to consult the relevant authorities with regard to matters of interest to them.

For example, CSDR Article 12 provides that several relevant authorities be involved in a CSD’s oversight, in particular the authority responsible for oversight of the securities settlement system that the CSD operates, the central banks of issue of the currencies in which settlements takes place and the central bank that settles the cash part of the settlement and delivery system that the CSD operates.

2.4. Responsibilities assigned to the authorities under the PFMI

The PFMI assign five ‘responsibilities’ to the authorities (central banks, market regulators and other competent authorities) for the oversight of financial market infrastructures. These recommendations aim to provide guidance to the authorities for coherent and effective regulation and oversight through domestic and international cooperation, so as to avoid unnecessary duplication of work while strengthening control.

The five responsibilities are as follows:

Responsibility A: Regulation, supervision and oversight of financial market infrastructures. Under this responsibility, infrastructures must be subject to an appropriate and effective system of regulation, supervision and oversight by a central bank, a market regulator or another competent authority. The criteria determining the infrastructures subject to controls must be publicly available. The three types of authorities are required to supervise the infrastructures, while the legislative and regulatory framework defines their respective roles. Under the Eurosystem’s oversight framework, for example, systemically important payment systems located outside the country of the markets that they serve are supervised in principle by the national central bank of the country in which the infrastructure’s registered office is located, unless the Governing Council decides to entrust their main supervisory responsibility to the European Central Bank. Pursuant to a Governing Council decision of 13 August 2014, for example, the ECB was named the competent authority for the three pan European systemically important systems TARGET2, EURO1 and STEP2 T. Systemically important payment systems located within the country of the markets that they serve are overseen by the central bank of the country in which the infrastructure’s registered office is situated; such is the case for the CORE(FR) French retail payment system, for which the Banque de France has been named the competent authority.

Responsibility B: Regulatory, supervisory, and oversight powers and resources. Central banks, market authorities and other competent authorities must have the necessary powers and resources to effectively exercise their responsibilities to regulate, supervise and oversee financial market infrastructures.

The legal basis for the powers of public authorities is generally laid down by national law. In France, for example, the legal basis of the Banque de France's mandate is laid down in Article L. 141 4 of the French Monetary and Financial Code (see above). This mandate allows authorities not only to have access to information, but also to request changes and enforce corrective measures. Regulators must also be given appropriate human and technical resources (IT, statistics, legal, knowledge of market mechanisms and financial instruments, etc.).

Responsibility C: Disclosure of policies with respect to financial market infrastructures. Central banks, market authorities and other competent authorities must clearly define and disclose their policies for regulating, supervising and overseeing financial market infrastructures.

For example, the Banque de France regularly publishes on its website²³ its financial market infrastructure and means of payment oversight report, to disclose to the public its oversight policy and report on its oversight actions and the results achieved.

Responsibility D: Application of the principles for financial market infrastructures. Central banks, market regulators and other competent authorities must adopt and systematically apply the PFMI.

As regards the Eurosystem, for example, on 3 June 2013 the ECB's Governing Council adopted the PFMI as the oversight standards for that system's infrastructures. The PFMI have also been transposed into binding regulations for CCPs, trade repositories, CSDs and SSSs, as well as systemically important payment systems.

Responsibility E: Cooperation with other authorities. This responsibility is key in view of the cross border nature of globalised financial market infrastructure oversight. It is reviewed in the box 8.

²³ <https://publications.banque-france.fr/en/liste-chronologique/report-oversight-payment-instruments-and-financial-market-infrastructures>

Box 8: Authorities' responsibility E under the PFMI: cooperation with other authorities

Central banks, market regulators, and other relevant authorities should cooperate with each other, both domestically and internationally, as appropriate, in promoting the safety and efficiency of FMIs.

The purpose of Responsibility E is to enable any authority with a direct interest in an infrastructure's proper functioning to participate in the cooperative oversight system that the competent authorities are required to put in place. In addition, if an authority identifies the exercise (actual or planned) of a cross-border or multi-currency service by an infrastructure within its jurisdiction, it must, as soon as possible, inform the other competent authorities (for example the relevant central banks of issue).

Fulfilling this responsibility is crucial in several respects:

- prudential supervision of participants: financial market infrastructure participants are generally entities subject to prudential supervision by their regulators. It is therefore important that prudential supervisors have access to relevant information on the infrastructures that handle these entities' transactions. Consider a case in which CCP C replaces counterparty B vis-à-vis bank A through the novation mechanism (see Chapter 11). This exposes Bank A to the CCP's credit risk. It is therefore logical for A's prudential supervisor to be aware of the level of collateral provided by CCP C;

.../...

- the financial stability of the currency zone associated with the currency of issue in which the financial instruments processed by the infrastructure are denominated. For example, an infrastructure located outside the euro area but processing a significant proportion of financial instruments denominated in euro could be required to make management decisions that are not aligned with the interests of the central bank of issue; this would be the case, for example, if the infrastructure suddenly decided to no longer clear certain instruments denominated in the currency of the central bank of issue that represented a significant share of the currency zone's market. It would no longer be possible to trade these instruments on a cleared basis, bilateral transactions remaining the only option. If the instruments in question were government-issued securities, the lower appetite for them could lead to their loss of value or even a loss of confidence on the part of market participants, with potentially very negative long-term consequences for the economy concerned. Infrastructures that handle a currency that is not that of the central bank of issue of their country of establishment may thus pose a risk to the financial stability of the currency zone concerned. The central banks of issue of the relevant currencies must therefore be involved in the cooperative oversight system. In some cases, a location policy is the only way to prevent this type of risk (see Chapter 17, Section 3.3.1);
- management of an infrastructure's failure: the failure of a major participant that carries out cross-border transactions is likely to have repercussions on several infrastructures. An infrastructure's failure necessitates close collaboration between authorities at both the domestic and international levels to either re-establish the institution (maintenance of contracts, etc.), wind it down in an orderly manner (notably through transfer to a relay infrastructure) or provide for its resolution.

There are a number of different means of implementing Responsibility E:

- memoranda of understanding for the exchange of information;
- the colleges of regulators set up by the European legislator (EMIR for CCPs, which makes colleges mandatory; or CDSR for CSDs, under which colleges are optional) within a given jurisdiction;
- 'global' colleges such as the Oversight Committee set up by the US Federal Reserve Bank for CLS (see Chapter 9, Section 3), which concerns authorities with several jurisdictional powers, or the cooperative oversight of SWIFT, under the aegis of the Banque nationale de Belgique, in which the G10 central banks participate (see box 9 below).

With the exception of EMIR-type legislative measures, these forms of cooperation are usually established on the basis of written agreements signed by the participating authorities, and include confidentiality commitments.

Box 9: SWIFT cooperative oversight

The Society for Worldwide Interbank Financial Telecommunication (SWIFT) is a Belgium-registered limited liability cooperative company that provides messaging and connectivity services to financial institutions and infrastructures. SWIFT is thus a critical provider of services for the global financial industry, particularly for financial market infrastructures.

SWIFT's oversight is conducted under the aegis of the Banque nationale de Belgique by the central banks of the other G10 countries (Germany, Canada, US, France, Italy, Japan, the Netherlands, the UK, Sweden and Switzerland) and the ECB, in two bodies that bring together all the members: a technical body, the SWIFT Technical Oversight Group (TG), and a senior body, the SWIFT Cooperative Oversight Group (OG). The TG, composed of experts, meets SWIFT's Management and Internal Audit Department regularly and reports to the OG, which focuses on SWIFT's strategy and oversight policy. The Executive Group (EG), meanwhile, brings together the central banks of Belgium, the US, the UK and Japan, as well as the ECB, and represents the OG in high-level discussions with SWIFT. Finally, the SWIFT Oversight Forum (SOF), made up of OG members and high-level central bank representatives from ten other countries (South Africa, Saudi Arabia, Australia, China, South Korea, Hong Kong, India, Russia, Singapore and Turkey), is an exchange forum that contributes in particular to discussions on the SWIFT oversight policy, the definition of SWIFT's oversight priorities, and disclosures about interdependencies between systems generated by the common use of SWIFT.

The Banque de France directly oversees a number of systemic infrastructures located in France and also participates in cooperative oversight systems in the European Union and internationally (see Box 10).

Box 10: Oversight by the Banque de France**Direct oversight**

The Banque de France directly oversees four systemic market infrastructures: the French CCP LCH SA (see Chapter 11), the CSDs Euroclear France and ID2S (see Chapters 12 and 13) and the retail payment system CORE(FR) (see Chapter 10). The Banque de France is also the overseer of the retail payment system SEPA(EU), launched in November 2016. In addition to processing SEPA Direct Debit and SEPA Credit Transfer payment instruments, this scheme is intended to become a pan-European payment system (see Chapter 10). The Banque de France is one of the three national authorities entrusted with oversight of the French CCP LCH SA, alongside the Autorité des marchés financiers (AMF) and the Autorité de contrôle prudentiel et de résolution (ACPR). It chairs, manages and organises the exchange of information within the CCP EMIR College, drawing on past experience to ensure that it runs smoothly. To set up and manage the LCH SA EMIR College, the Banque de France benefited from its CCP cooperative oversight experience going back more than 13 years, including (i) the establishment in 2001 of a cooperative oversight agreement between market authorities and Euronext platform overseers, (ii) the signing in 2004 of an MoU with the Italian authorities for the oversight of the interoperability link between LCH SA and the Italian clearing house Cassa di Compensazione e Garanzia and (iii) the signing in 2005 of an MoU for the oversight and supervision of the CCPs of LCH Group Ltd.

.../...

Cooperative oversight

In addition to overseeing the infrastructures located in France, the Banque de France participates in the oversight of several infrastructures operating at a European or international level whose activities have implications for the French financial system. The European infrastructures concerned are the Italian CCP Cassa di Compensazione e Garanzia, the Dutch CCP EuroCCP, the German CCP Eurex Clearing AG and the UK CCP LCH Ltd (in respect of which the Banque de France acts as the ECB's alternate); the TARGET2, EURO1 and STEP2-T payment systems and the TARGET2-Securities settlement and delivery platform, under the framework defined by the Eurosystem. The Banque de France participates in the oversight of TARGET 2 under the aegis of the ECB as the lead overseer. Given the critical nature of the services that the T2S platform provides to European CSDs, the related oversight framework is the subject of an agreement between (i) the Eurosystem, responsible for oversight of T2S' operational services, (ii) the supervisory authorities of the CSDs that have signed the participation agreement, (iii) the central banks of issue of T2S-eligible non-euro currencies and (iv) ESMA. This agreement allows the exchange of information necessary for the fulfilment, for each participating authority, of its missions with regard to the CSDs participating in T2S, as well as the platform's joint evaluation.

In regards to non-Eurosystem international infrastructures whose cooperative oversight is based on MoUs, the CLS international foreign currency settlement system is subject to cooperative oversight by the lead overseer, the US Federal Reserve, the G10 central banks (including the Banque de France) and the central banks of issue of currencies handled by the system (see Chapter 9).

In addition to financial market infrastructures, certain providers of critical services are subject to oversight. A case in point is SWIFT, which offers financial messaging services that are extensively used by banking communities throughout the world and by numerous financial market infrastructures (see Box 9 above).

Infrastructure overseen	Lead overseer
Eurosystem oversight framework	
T2	ECB
T2S	ECB
EURO1	ECB
STEP2-T	ECB
Participation in EMIR colleges	
LCH Ltd	Bank of England
EUREX Clearing AG	Bafin
CC&G	Banca d'Italia
EuroCCP	De Nederlandsche Bank
International cooperative oversight framework	
SWIFT	Banque nationale de Belgique
CLS	US Federal Reserve Bank

CHAPTER 19

The economics of financial market infrastructures

Updated on 17 December 2018

In the economic sense, “infrastructures” generally refers to institutions used to exchange goods, information or rights between agents. As the previous chapters have shown, financial market infrastructures (hereinafter FMI) specifically serving the functioning of financial markets are the subject of particular attention by legislators and regulators because they generally have characteristics that influence how smoothly those markets function. FMIs’ economic characteristics make them an archetype for market failure situations, in which market price formation mechanisms alone are unable to fully capture the costs and benefits of the activities under consideration and to lead to an optimal allocation of resources.

Economic analysis of FMIs’ functioning can largely be done using the tools developed in the field of network economics (particularly communication). According to Nicholas Economides,¹ networks can be formally defined as a set of “links” connecting “nodes”, whose different components function in a complementary manner.² This definition can be applied to FMIs, all of which are designed to establish links between participants (nodes), via their connection to the same technical system, and thereby provide the desired service. A payment system, for example, connects participants, and the complementarity between the different components comes from the fact that participants need to be connected to the system for the payment service to be provided. Generally speaking, networks can be understood through two different prisms:³ a technical prism, where they consist in an interconnection of components that ‘cooperate’ in order to transport flows such as assets or information, and an economic prism, where essentially they act as a physical medium for economic intermediation (transactional view).

This chapter describes the impact of FMIs’ economic characteristics (I) on market organisation and dynamics (II) and investigates pricing-related issues (III).

1. The economic nature of FMIs

The economic nature of FMIs is notable for its significant externalities – in particular network externalities, as well as a cost structure that enables economies of scale and scope.

1.1. The presence of major, particularly network, externalities

The externality concept refers to situations where one agent’s production or consumption affects another’s usefulness, externally to the market. If the effect is positive,⁴ the externality is said to be positive; otherwise, it is said to be negative.⁵ This phenomenon implies that the price mechanisms at play do not make it possible to satisfactorily capture all the costs and/or benefits associated with the production or consumption in question. This discordance between social costs and private costs leads in most cases to a divergence between social and individual optimal levels of consumption or production and complicates measurement of social benefits generated by the activities concerned.

Financial market infrastructures have two main categories of externalities: either negative or positive externalities linked to their potential impact on financial stability, or so-called network (or ‘club’) externalities.

Positive financial stability-related externalities pertain to the contribution that FMIs can make to financial stability due to their systemic nature,⁶ which justifies the intervention of public authorities to impose their use in certain markets. Take EMIR, for example.⁷ This regulation imposes, among other things, an obligation to report derivative transactions to trade repositories. This is with good reason, because the reporting of transactions in a given market to a trade repository enhances that market’s transparency, which makes it possible to more appropriately assess the risks that its activity may pose to financial

1 Economides N., “The economics of networks”, *International journal of industrial organization*, 1996.

2 This implies that all the components are necessary for the provision of a service.

3 Curien N., *Economie des réseaux*, La Découverte, 2005.

4 A classic example is when a beekeeper and a farmer operate adjacently and the beekeeper’s bees pollinate the farmer’s fields at no cost to the farmer.

5 An example of this is when pollution by industrial activities generates disease and economic costs for nearby inhabitants.

6 This systemic nature, which is described in more detail in Chapter 18, results in the efforts that FMIs undertake individually benefiting the financial system as a whole.

7 For further details, see Chapter 16 (trade repositories) and Chapter 11 (CCPs).

stability and enables public authorities to promptly contain those risks for the benefit of all participants. Also in order to ensure financial stability, EMIR imposes, via CCPs, a multilateral clearing obligation on counterparties to certain categories of OTC derivative transaction⁸ (the main role of CCPs being to provide their participants with a risk management mechanism).

Negative financial stability-related externalities, by contrast, pertain to the potential systemic risks that financial market infrastructures can pose to financial stability due to their systemic nature.⁹ This explains why FMIs are subject to strict regulation aimed at ensuring that their operators take into account the risks they can generate for the ecosystem as a whole. This is reflected, for example, in the PFMI's provisions on governance, which stipulate that *"An FMI should have governance arrangements that are clear and transparent, promote the safety and efficiency of the FMI, and support the stability of the broader financial system, other relevant public interest considerations, and the objectives of relevant stakeholders."*

With regard to FMIs, on the one hand all ecosystem players benefit equally from a stable and resilient financial system, without the fact of one of them benefiting from it preventing the others from doing the same, and on the other hand it is impossible to exclude any player whatsoever from the system. Consequently, FMI-generated financial stability-related externalities fall under the specific economic category of public goods, which introduces the risk of possible free-rider behaviour¹⁰ by market players that can, at the level of the industry as a whole, lead to a sub-optimal level of financial risk management. This problem is accentuated by the risks of moral hazard¹¹ induced by participants' confidence that the public authorities will, whatever the circumstances, rescue entities of systemic importance (i.e., because they are too big, or too interconnected, to fail).

Network externalities arise from the fact that an individual participant's utility is positively correlated to the (current and future) number of a network's participants:¹² a user's decision to join a network thus corresponds to another type of positive externality. This effect can be both direct and indirect;¹³ direct in that the connection of new users directly affects the utility of others by allowing them to be connected to a larger number of counterparties, and indirect in that an increase in the number of network users leads to an improvement in the characteristics of the network's offering (i.e. in the quality of its services) or the supply of complementary goods and services (greater variety), which makes the network more attractive to service providers.¹⁴

As a result of these network effects, adoption decisions by users are linked to the FMI's current and expected number of users. However, users naturally do not decide whether or not to join a network based on that decision's potential impact on other users' usefulness, and that is where the externality lies. For FMIs, therefore, there is a risk that the network's size at equilibrium may be smaller than its socially optimal size.

In the case of stock exchanges, for example, from the investors' point of view network externalities originate in the search for the trading platform offering the greatest liquidity for a given type of security. This leads directly to even greater liquidity for the type of security in question and therefore an increase in the chosen platform's attractiveness for other investors.¹⁵ From an issuer's point of view, they stem from the fact that the bigger the investor network, the more easily it will absorb the issuer's capital requirements.¹⁶

At the clearing and settlement stage, network externalities come mainly from transaction processing time savings, while the establishment of netting mechanisms reduces the opportunity costs associated with regulatory capital requirements.

8 See Chapter 11 (CCPs) for further details.

9 For further details, see Chapter 17.

10 While it may be in everyone's interest to have a more stable financial system, certain participants may make others bear the cost of making it more secure.

11 The possibility that a party insured against a risk behaves differently than if he or she were fully exposed to it.

12 In economic terms, therefore, the usefulness of the various parties is interdependent and the parties' consumption of the network's goods or services complementary.

13 Katz M., Shapiro C., "Network Externalities, Competition and Compatibility," *American Economic Review*, 1985; Katz M., Shapiro C., "Systems Competition and Network Effects," *The Journal of Economic Perspectives*, 1994. See also footnote 509.

14 Familiar phenomenon in the field of programming with the hardware/software paradigm, for example, where an increase in demand for hardware can lead to an increase in the development or quality of compatible software (and vice versa). As regards credit cards, meanwhile, it reflects the fact that the more credit card users there are, the more merchants with a terminal enabling the use of credit cards there will be (complementarity), which in turn increases the credit cards' usefulness for their owners (see Chapter 4).

15 For a review of literature on liquidity as an externality, see: Serval T., "Lorsque les réseaux d'information deviendront des bourses," *Presses de Sciences Po*, 2001.

16 See footnote 3.

1.2. A cost structure favouring economies of scale and scope

1.2.1 FMI's generate economies of scale

One of FMI's chief roles is to enable financial players to outsource to a single point processing that was previously done in different locations. By doing this, they generate economies of scale.

This is because the fixed costs to set up an FMI are considerable, insofar as they are largely independent of transaction volumes. The costs in question are those associated with physical infrastructures (servers and server buildings), IT developments (program-writing, tests, error correction, etc.) and the implementation of a governance system (legal documentation, etc.). To some extent, they may also include costs to maintain and monitor the system and train staff – although these items are not entirely independent of the number of transactions. Lastly, users also incur fixed costs when they first connect to the infrastructure. However, the variable costs related to the operation of the networks are generally quite low.

The high fixed costs and low variable costs mean that average costs per user generally decrease as the number of users increases, resulting in economies of scale, or increasing returns, which are also linked to learning effects¹⁷ (increased process mastery).

Empirical studies on the subject have found the economies of scale in payment systems (retail or wholesale) to be significant, with fixed costs as a share of total costs ranging from 50% to 80%.¹⁸ The possibility of economies of scale was also an important argument put forward when TARGET2 was set up.¹⁹

Stock exchanges also offer economies of scale at the trading stage linked to the combination of high trading venue set-up fixed costs and low incremental costs per transaction thereafter. Thus, at comparable fixed costs, the platform with the largest

volume of transactions will be able to benefit from the lowest average transaction costs.

Lastly, these economies of scale can also be seen at the clearing and settlement and delivery stages. The marginal cost of clearing, for example, is close to zero, while through its activity a clearing house makes savings in terms of collecting and analysing information about its members. Indeed, monitoring credit and liquidity risks involves the implementation of sophisticated risk monitoring techniques, which requires costly investments (IT, modelling, organisational, etc.). It is more rational to pool such investments in a single entity – the CCP. In addition, a CCP's central position gives it a greater capacity to monitor and manage these risks than that deployable by individual players acting alone. Insofar as margin calls are made on the basis of participants' net positions, this system enables them to save liquidity. It also reduces settlement and delivery volumes as a proportion of cleared transaction volumes, especially as the larger the volume of transactions on a given instrument, the greater the likelihood that some of these transactions will be in the opposite direction.

1.2.2 FMI's generate economies of scope

Moreover, the FMI's can generate economies of scope, i.e. situations where it is more cost-effective to jointly produce several types of goods or services through a single firm than it is to use separate operators. It should be noted, however, that the realisation of such savings may have an impact on other forms of efficiency – in particular systemic; see Chapter 17 on FMI-related risks.

With regard to central banks' operation of large-value settlement systems, it has been suggested that this offers economies of scope thanks to i) their management, on behalf of credit institutions, of a system of accounts for reserves and interbank settlements and ii) their operation of the system that makes settlements between these accounts.²⁰ In addition, these systems enable central banks to provide services to governments²¹ and private

17 These effects correspond to the increasing return from the labour factor through the repetition of certain tasks over time.

18 Khiaonarong T., "Payment systems efficiency, policy approaches, and the role of the central bank", *Bank of Finland Discussion Papers*, 2003.

19 Bolt W. and Beijnen C., "Size matters: economies of scale in European processing", *DNB Working Paper*, 2007; Bolt W. and Humphrey D., "Payment Network Scale Economies, SEPA, and Cash Replacement", *Review of Network Economics*, 2007; Bolt W. and Humphrey D., "Public good issues in TARGET", *ECB Working Paper Series*, 2005.

20 Millard S., Haldane A. and Saporta V., *The Future of Payment Systems*, Routledge, 2008; or Green E.J. and Todd R.M., "Thoughts on the Fed's Role in the Payments System", *Federal Reserve Bank of Minneapolis Quarterly Review*, 2001; or Green E. J. "The Role of the Central Bank in Payment Systems", 2005.

21 Reflecting the historical role of central banks as an intermediary between governments and their lenders.

banking institutions, thus enabling them to benefit from synergies linked to the joint provision of these services.²²

With regard to securities trading venues, economies of scope can result from the possibility of trading in several types of securities on the same platform. Once the infrastructure has been set up, the

extension of the trading services to an additional type of security can be offered at a modest incremental cost, especially if a network of active buyers and sellers is already in place. It is also economically optimal for users to group their activities on different types of securities onto as few trading platforms as possible – notably to achieve back-office savings.

22 Bolt W. and Humphrey D., "Public good issues in TARGET", *ECB Working Paper Series*, 2005.

Box 1: Economies of scale and scope expected from T2S' implementation

Implementation of the T2S project provides a good example of the cost savings that can be achieved by consolidating activities in the area of settlement and delivery (for further details on how T2S works, see Chapter 14).

The gains expected from T2S in terms of exploiting economies of scale and scope and network externalities were detailed in a study carried out in 2007 by the ECB.¹ The provision of this common platform has generated economies of scale through the consolidation of both investment and operating costs linked to the maintenance of platforms (specific, prior to migration, to each of the euro area countries' 24 CSDs).

With regard to the CSDs' users, T2S' implementation enables them to centralise their securities accounts with a single central depository of their choice (provided that they have established the necessary relationships) or their cash account at the level of a single central bank, thereby reducing account dispersion-related costs. This should enable them to benefit in particular from opportunities to streamline their cross-border activities and make back-office savings, notably by having a guaranteed single entry point to several markets, harmonising their internal procedures, using their guarantees jointly for their cash and securities activities (creation of a single collateral pool that reduces cross-border guarantee mobilisation costs) and having to rely on fewer intermediaries (CSDs, but also asset management-related). The use of a single platform and standardised communication protocols allows issuers to reach more investors and so increase investor demand, while enabling investors to reduce the cost of managing an international securities portfolio – and thus increase the return on that portfolio.

By opening up domestic markets, the project should increase competition between CSDs in the single market and lead to systems consolidation in Europe, which could in turn generate additional economies of scale and scope. Still in the medium term, the benefits linked to the use of a single technical platform will also materialise when it is upgraded or, if necessary, overhauled, when there will then be only one project to manage instead of 23.

Lastly, the current work to consolidate TARGET2 and T2S aims to exploit synergies between the two platforms² (examples of economies of scope) in the areas of the use of IT resources and architecture, possibilities for reuse of existing communications technologies, and organisation of support and operational functions. The exploitation of these synergies could even result in the future merger of the two platforms (see Chapter 7, Section 6.3).

1 ECB, 2007, TARGET2-Securities – Economic Feasibility.

2 As detailed in this document, for example: <https://www.ecb.europa.eu/pub/pdf/other/t2seconomicfeasibility0703en.pdf?8e36385d37d399eaf9a3615292b80c08>

At the post-market stage, clearing several categories of financial instruments makes it possible, subject to the framework for managing risks – which remain specific to each category regardless – to pool certain resources (risk or legal teams for example, or technological infrastructures, which represent a significant cost centre). Clearing a wide range of financial instruments can also, thanks to a lower correlation between the various instruments' risk factors, enable the CCP to reduce exposure variance and, consequently, the amount of the collateral it sets aside against these risks. This argument also applies for participants who choose to have their transactions cleared through a single rather than multiple CCPs: since the risk associated with each participant's portfolio is smaller than the sum of the risks per instrument, a single CCP can accept a margin calculated on the basis of a lower net exposure (portfolio management models). In Europe, for example, LCH Ltd recently launched the Spider offer, which makes it possible to jointly clear listed interest rate futures and OTC interest rate swaps by calculating a net margin on all positions. This allows LCH Ltd to grow in the listed market by taking advantage of its strong position in interest rate swaps; conversely, Eurex has launched an initiative to enter the swap market based on its position in futures.

Finally, economies of scope can also come from a single group's provision of securities trading, clearing and settlement services, which are highly complementary.²³ This enables straight-through transaction processing within the same group, leading to reduced communication costs between the various activities, can promote the implementation of common standards for data transmission between the various stages, and improves the process of disseminating innovations along the length of the chain by reducing coordination needs. The establishment of a vertical 'silo' of FMIs covering the whole securities processing chain, from trading and clearing to settlement and delivery, shows that this type of saving is possible.

However, it poses challenges in terms of managing risks (particularly systemic), as described in Chapter 17 (Section 2.2.1), and competition.

2. The impact of FMIs' economic characteristics on market organisation and dynamics

The existence of economies of scale on the supply side and network externalities on the demand side can hamper competition in network industries and encourage operator consolidation, on the one hand due to a tendency towards horizontal and vertical concentration, and on the other hand due to the fact that these two characteristics reinforce each other and create feedback effects. Such a concentration trend raises key financial stability issues. For example, concentration of a clearing or settlement and delivery activity on a very small number of players, or even on a single player by category of activity, results in the creation of systemic players whose failure would have extremely destabilising consequences; such players would be considered 'too big to fail'. The creation of such monopolistic players leads to a significant moral hazard, insofar as it requires the authorities to intervene to prevent their failure (see Chapter 17 on FMI-related risks). Public authorities therefore face an industrial and competition policy challenge relating to FMIs, to encourage the most efficient market organisation possible by avoiding the creation of excessively systemic, monopolistic players.

2.1. A tendency towards horizontal and vertical concentration

As a result of the network externalities and economies of scale and scope that their activities generate, FMIs are natural monopolies in the sense that it can be optimal for a single entity to be responsible for meeting all market demand.

²³ In the sense that demand for each service is not independent of the other services' price.

Box 2: T2S and the delimitation of 'pure' infrastructure provision activities

As described in Chapter 14, T2S is not considered as a securities settlement system or CSD, but DvP rather a technical platform providing harmonised IT infrastructures that enables CSDs to develop their services on an identical basis. The establishment of T2S can be likened to choices made in other network industries (telecommunications, rail, electricity, etc.) historically organised as monopolies to break down these monopolies into the supply of 'pure' network infrastructure provision activities, in which service by a single player is the most efficient form of market organisation. By contrast, the part of the network corresponding to commercial service provision activities based on this infrastructure would be open to competition, due in particular to its lower fixed costs.

In the case of T2S, the economic rationale for separating the infrastructure layer from the service layer is similar, but the historical direction is the opposite, with the public sector taking over a pure infrastructure provision activity (the technical platform) for efficiency reasons, while the CSDs remain in control of the commercial services provided to their clients (the 'service' layer).

FMI's fundamental economic characteristics therefore constitute a barrier to entry for newcomers, insofar as they must be able to replicate the significant fixed costs of existing operators, most of whose fixed costs are generally very specific and thus sunk in the event of an exit from the market, and who as pre-established players will always benefit from lower average costs per user. This situation increases the importance for a new operator of being able to rapidly reach a critical mass of clients that allows it to exploit economies of scale and network effects; uncertainty about a potential entrant's ability to reach such a critical mass can also hinder its entry into the market. These characteristics show the productive efficiency of the FMI concentration trend, both horizontally and vertically.

In practice, the large-value payments segment therefore often operates as a duopoly at the domestic level, as we have seen in Chapters 6 to 8 (TARGET2 and EURO1 in Europe, FEDwire and CHIPS in the United States, etc.). Similarly, the retail payments market (see Chapter 10) is often dominated at the domestic level

by a single player (for example CORE(FR) in France, operated by STET). European domestic financial markets are also generally organised around a single national CSD and a single CCP, although T2S' recent commissioning could lead to changes in this set-up.

Securities' post-market landscape is logically more integrated in the United States than in Europe, the United States being a single domestic market in this respect. In the US, settlement and delivery and clearing are organised mainly around the Depository Trust and Clearing Corporation (DTCC),²⁴ which also acts as a central depository, while in Europe the compartmentalisation of domestic systems (for historical, technical, institutional, legal or tax reasons) leads to relatively high costs for cross-border transactions²⁵ (due to the complexity and number of intermediaries potentially involved in these transactions).

This fragmentation prevents networks' positive externalities and possible economies of scale from being fully exploited. However, in recent years there has been a consolidation movement in

²⁴ Created in 1999 to consolidate and integrate the operations of the Depository Trust Company (DTC) and the National Securities Clearing Corporation (NSCC).

Europe, both horizontally (concentration of entities providing similar services at the same point in the post-market value chain) and vertically (entities providing different services that integrate the whole post-market value chain offering).

Horizontal concentration movements have notably been observed in mergers between trading venues: creation of the Euronext group in 2000 through the merger of the Amsterdam, Brussels and Paris stock exchanges, followed by its merger with the Lisbon and Porto stock exchanges in 2002, and with the Dublin stock exchange in 2017. They have also been observed at the clearing level (consolidation of LCH and Clearnet into a single group in 2003), and at the custody and settlement and delivery level, with in particular Euroclear's strategy of merging with several national CSDs and the establishment of the Euroclear Settlement of Euronext-zone Securities (ESES) platform in 2009 for all transactions carried out on the Euronext markets.²⁶ The trio formed between Euronext for trading, the LCH SA central counterparty (controlled since 2013 by the London Stock Exchange) for clearing and the Euroclear central depository illustrates, at the level of each part of the securities processing value chain, the horizontal integration model. In these examples, FMIs' with a specific business focus (trading, clearing, and settlement and delivery) seek to serve several geographic markets. The horizontal model can benefit participants and other users in that it makes it possible to generate strong commercial synergies: openness and positioning in different segments of the infrastructure's core business; diversification possibilities; innovation; and, because the infrastructure's activity is not reliant exclusively on a single market, greater independence.

Vertical silo integration is also seen in other markets. Under this organisation, the entire securities transaction chain (trading venue, clearing house and central securities depository managing a settlement and delivery settlement system) is handled on a straight-through basis by

a single-capital group's infrastructures and proprietary systems. Such is the case with the German model, for example (where the Deutsche Börse Group controls the Eurex platform, the Eurex Clearing CCP and the Clearstream Banking Frankfurt CSD) and the Italian model (with the Borsa Italiana Group, in which the company Borsa Italiana – itself controlled by the LSE – controls the MTS trading venue, the Cassa di Compensazione e Garanzia clearing house and the Monte Titoli national CSD). Gains are made possible through an alignment of strategic interests that can result in increased innovation (reduction in coordination costs or insourcing of R&D-related externalities) or integration of tools and processes enabling better coordination and dissemination of learning benefits. However, this model could lead to quasi-exclusive relations between these players, which would raise competitiveness risks, currently an area of keen regulatory focus (see below). Furthermore, such vertical integration of different infrastructures with different risk profiles and regulatory constraints can pose a problem when it comes to preserving each infrastructure's necessary independence.

2.2. Consequences weighing on innovation dynamics

Because of the network externalities and economies of scale and scope described above, supply and demand generally interact in network industries on a so-called feedback basis:²⁷ the more a network service is distributed, the more increasing adoption yields will fuel growth in demand and thus increase its dissemination at the expense of competing services (an increase in supply leads to an increase in demand, which leads to an increase in supply, and so on), and vice versa.

These effects firstly strengthen the trend towards a natural monopoly, leading to market polarisation around a limited number of network operators and service providers, in which firms with a significant base strengthen their position. This makes

25 The cost differential between a domestic transaction and a cross-border transaction was estimated in 2011 as ranging from 1 to 10 – "Settling Without Borders", European Central Bank, 2011.

26 With the exception of Portugal.

27 See footnote 511. Also: Foray D. "Innovation et concurrence dans les industries de réseau", *Revue française de gestion*; Katz M. and Shapiro C., "Technology adoption in the presence of network externalities", *Journal of Political Economy*, 1986; Shapiro C. and Varian R., "Information Rules", *Harvard Business School Press*, 1999.

them a ‘growth amplifier’ and creates a ‘winner takes all’ logic where even a small advantage can shift the market in favour of its beneficiary, while it will be very difficult for dominated firms to survive (also known as a ‘market tipping’ phenomenon).

A classic consequence of such effects is that the dominant technology will not necessarily be the most efficient: efficient technology can be excluded because it takes too long for it to reach the market, and a standard may come to dominance due to early selection (the ‘first mover advantage’) rather than because it offers the best quality.

Secondly, feedback effects result in innovation dynamics being beset by excessive inertia linked to coordination failures.²⁸ This results from both the potential lack of incentives for users to adopt new technologies, and a lack of incentives for suppliers to invest in new technologies.

Adoption inertia is primarily attributable to the fact that network technologies are generally characterised by significant migration costs. This can make consumers captive and be an additional barrier to entry for alternative suppliers or technologies. Migration costs can be defined²⁹ as the sum of the cost borne by the consumer (learning and specific investments) to change technology and the cost borne by the new supplier to replicate the consumer’s position with its previous supplier. Thus, in the case of FMI’s underlying information technologies, the participant has generally had to make long-term investments in additional resources³⁰ specific to the technology in question. A change in the main technology therefore necessitates replacing or at least adapting these additional resources, which may also have a different lifespan, meaning that it will never make sense to start over entirely, which reinforces the inertia effect. An example of migration costs as regards FMI’s are the investments that CSDs had to make in order to be able to use T2S, including in particular architectural changes in the systems they operate (for example, modification of the

IT architecture of the ESES platform for Euroclear). These migration costs support the argument that technological inertia can sometimes be economically efficient, even if the replacement technology is better. This is particularly the case if the migration cost is higher than the benefits generated by the new technology.

Adoption inertia can also arise from the fact that, even though it may be in all participants’ interests to adopt a new technology, the risk of finding themselves isolated in a new network may result in each of them deciding to postpone their decision to switch until the new network’s user base is big enough. If all users follow the same logic, the change stalls. This impasse can also be seen as a form of prisoner’s dilemma, the result of which would be more favourable if the actors cooperated by agreeing on the decision for a technological change, but where in the absence of cooperation, and in a situation of uncertainty about the choices that others will make, the best course is for each participant not to change technology (sub-optimal Nash equilibrium scenario).³¹

When the market is left unfettered, therefore, its dynamics do not always lead to economically efficient results – hence government intervention in the markets and, particularly as regards FMI’s, the catalyst role that central banks can play.

2.3. Public authorities’ responses to competitiveness issues

2.3.1. FMI’s and competition policy: the issue of access to FMI’s

In addition to the link between FMI’s size and the systemic risks they can pose to the financial system, specifically dealt with in Chapter 17 on FMI-related risks, the sector’s natural concentration tendency also poses a problem due to the pricing practices that operators can implement – at the expense of consumers and economic exchange – thanks to their market power.³² As such, European competition policy³³ strives to

28 Katz M. and Shapiro C., “Systems Competition and Network Effects”, *Journal of Economic Perspectives*, 1994; Farrell J. and Saloner G., “Standardization, compatibility and innovation”, *Rand Journal of Economics*, 1985; Milne A., “What is in it for us? Network effects and bank payment innovation”, *Journal of Banking and Finance*, 2005.

29 Shapiro and Varian (1999).

30 In the sense that they are necessary for access to the service provided by the infrastructure.

31 In game theory, this refers to a situation in which each player adopts the best strategy possible given the strategy adopted by the other player.

32 See theoretical economic literature on the deadweight loss of the monopoly.

33 This refers to all mechanisms, in particular legal, aimed at organising and controlling markets in such a way as to encourage the maintenance of sufficiently competitive functioning for maximum economic efficiency.

combat the possibility that operators use their market power to carry out restrictive competition practices aimed at creating or strengthening barriers to entry.

In their role as catalyst, the European authorities have thus chosen to build the single market on a model based on competition between the various providers of financial services, be that between the institutions themselves or between FMIs, particularly at the cross-border level. This commitment has been reflected in particular in efforts to remove the barriers identified in the Giovannini reports, MiFID,³⁴ of which this approach was the mainstay, and the development of the post-trading code of conduct carried out under the aegis of the European Commission. It should be stressed that this approach does not contradict the recognition of concentration's potential for productive efficiency, insofar as the objective pursued is to put in place a single European financial market: the de-fragmentation of the various geographical markets makes it possible to introduce competition between players (by moving markets' geographical borders), and concentration movements can, in the longer term, be a consequence of this competition (see Box 2 on T2S).

Legislators and regulators pay particular attention to the conditions of access to FMIs, as such access may be a prerequisite for participating in certain markets. This makes FMIs an essential infrastructure³⁵ that operators can use, for markets with an essential need of infrastructure access, as a bottleneck³⁶ facility. Certain FMIs' essential infrastructure status can also be based on regulatory requirements: the Dodd-Frank Act in the United States (Title VII) and Europe's EMIR, for example, impose a clearing obligation on counterparties to certain derivative transactions. It is therefore important for market participants subject to this obligation to have access to the infrastructures that offer these services. Essential infrastructure theory advocates the access obligations imposed under sectoral regulations, which for FMIs are

contained in PFMI principle 18, which states that *"An FMI should have objective, risk-based, and publicly disclosed criteria for participation, which permit fair and open access"* in order to promote competition between market participants.

Furthermore, operators' market power can allow them to apply a leverage strategy³⁷ – or even direct crowding-out strategies³⁸ – in upstream, downstream or ancillary markets to the ones that they serve – these risks being particularly significant in vertically integrated infrastructures. For example, CCPs are generally owned by operators that also have post-trading activities (e.g. the Deutsche Börse Group), and the choice of CCP is often made by the trading venue's operator, which can decide to use a single CCP and thereby exclude the others.

The principle of fair and open access as regards relations between market infrastructures is tackled in various regulations (EMIR,³⁹ CSDR, MiFID II/MiFIR) that have been introduced since the financial crisis.

For example, the open access principle allows a trading venue to have its transactions cleared by the clearing house of its choice, and a clearing house to have access to the transaction flows of any trading venue. If an operator on the downstream market is denied access to a clearing house or has less favourable access conditions imposed than other infrastructure members, its costs may rise or it may even be squeezed out of the market in question. At the same time, in the absence of regulations there is a risk that a trading venue may refuse a CCP the right to clear transactions traded on its platform, which would cut off transaction flows to the CCP. Sectoral regulations advocate the open access principle to mitigate this type of risk and encourage the opening of vertical silos. In the other direction, this principle allows a CSD to have access to transactions cleared by any clearing house and a clearing house to have access to the transaction flows of any trading venue.

34 Directive 2004/39/EC of the European Parliament and of the Council of 21 April 2004 on markets in financial instruments.

35 Originally the creation of the US courts in their application of the Sherman Act's provisions prohibiting monopolies, this theory was incorporated into Community and French law as part of the fight against the abuse of a dominant position and the opening up to competition of markets previously run by public monopolies, before being expanded. For more information, see Supreme Court of the United States, *United States v. Terminal Railroad Association*, 224 US 383, 1912; 2005 annual report of the *Cour de Cassation* highlighting a ruling of 12 July 2005 of the French Chamber of Commerce (no. 04-12388); Chang F.B., "Financial Market Bottlenecks and the "Openness" Mandate"; *University of Cincinnati*, 2015; Sealink affair, European Commission, 94/19/EC, 1993, where the Commission explicitly uses the expression "essential facility"; and, lastly, CJEU ruling nos. C-241/91, C-07/97 and C-418-01.

36 See footnote 509.

37 A company's ability to increase its sales in a market – the 'linked market' – by exploiting its dominant position in an adjacent market, making it more difficult to access these markets.

38 The effectiveness of such strategies has been a subject of debate in economic literature, and in particular disputed by the University of Chicago; for a presentation on how the control of an essential infrastructure can make it possible to increase competitors' costs, see for example Patrick Rey and Jean Tirole's *Handbook of Industrial Organization*.

39 Articles 7 and 8.

Box 3: Case law examples of FMI access issues

In certain cases FMIs have had to revise their access policy to comply with legal requirements. For example, it was only after such access rules were enacted that LCH Clearnet's SwapClear platform removed a clause requiring its members to maintain a \$1,000bn interest rate swap portfolio balance, seen as a potential means of reserving the market for major institutional sellers.¹

In Europe, in a decision of 2 June 2004² (confirmed on 9 September 2009 by a decision of the CJEU³) the Commission ruled that by refusing to provide cross-border clearing services (within the meaning of establishing reciprocal contractual obligations between buyer and seller) and settlement services for registered shares issued under German law, and by adopting discriminatory pricing practices, at the expense of Euroclear Bank, Clearstream Banking AG and its parent company Clearstream International SA had abused their dominant position in the markets concerned. In this case, the Commission emphasised the fact that, including for the settlement and delivery market, while competition law recognised the "freedom of companies to choose their trading partners", companies in a dominant position had a "special responsibility". It considered that, in this case, Clearstream was the only depository of German securities held in collective custody and that a new market entry was not a realistic assumption, which made it an unavoidable trading partner, that Euroclear Bank could not duplicate the services that it was requesting and that Clearstream's behaviour had the effect of impairing Euroclear Bank's ability to provide cross-border clearing and settlement services to clients in the single market between 1997 and 2002.

1 Felix B. Chang, "Financial Market Bottlenecks and the "Openness" Mandate", *University of Cincinnati*, 2015. Core Principle C (v) of the Dodd Frank Act explicitly prohibits derivatives clearing institutions from requiring their members to maintain a particular value or volume of outstanding swap positions.

2 Press releases: http://europa.eu/rapid/press-release_IP-04-705_fr.htm.

3 <http://eur-lex.europa.eu/legal-content/FR/TXT/HTML/?uri=CELEX:62004TJ0301&from=EN>

2.3.2. FMI interconnection and compatibility strategies

Interconnection, or interoperability, means the connectivity between the various networks that enables the users of one network to communicate with those of another or to access services provided by different operators.⁴⁰ This compatibility makes it possible to realise the positive externalities resulting from the complementarities between the network components.⁴¹ This possibility of 'dialogue' between systems may be imposed by the regulations or reflect a choice on the part of the service providers.

As regards FMIs, an example of a lack of interoperability in Europe was the situation prior to the migration of T2S, characterised by fragmentation of the settlement and delivery market between the EU's various Member

States. Concerning work to implement the SEPA for means of payment, according to the Eurosystem's interpretation of the SEPA regulation the interoperability concept implied that once payment service providers participated in a given retail payment system they would be able to reach all counterparties in the SEPA, whether or not they belonged to a different system. This required putting in place interoperability links.

Interoperability is based in particular on the implementation of compatible technical, operational and legal standards (e.g. messaging system flows or compatibility between hardware, software and operating systems). The use of open, transparent and non-proprietary standards facilitates interoperability and thereby stimulates competition in the market by opening up the possibility of transactions between users of the various infrastructures without users

40 One definition of this concept, for example, appears in Article L.32 of the French Postal and Telecommunications Code.

41 See footnote 509: "Links on a network are potentially complementary, but it is compatibility that makes complementarity actual!"

having to belong to all of them. It facilitates the simultaneous activity of several infrastructures, making it possible to avoid the excessive concentration phenomenon described above and thereby potentially leading to an improvement in the quality of the services offered to consumers and reducing the risks that a player in a dominant position abuses that position. Common standards can make it possible to avoid coordination problems in firms' technological choices and anchor users' expectations about the chances of a given technology's adoption. This reduction in consumer uncertainty itself makes it possible to mitigate their risk of being locked in to technologies that end up not being accepted by the market as a whole, and therefore to limit wait-and-see, non-adoptive behaviour. When an industry agrees on a standard it generally leads to an increase in the pace of adoption and evens out competition.

Standardisation⁴² does however pose the risk of being in thrall to bad technologies, in particular due to the feedback mechanisms described above, and may increase the costs of transition to new technologies. Furthermore, its costs can vary depending on the market players concerned – i.e. how big they are or whether they are already in place and have incurred sunk development and compliance costs relating to a set of standards that may be more or less different from that targeted by the process. Finally, the requirement of full compatibility poses a risk of encouraging free-rider behaviour at the R&D and innovation stages, ultimately leading to reduced incentives to invest in the network's operational improvement.

From an individual operator's viewpoint,⁴³ the choice to use the same standards as its competitors may be driven by the prospect of being able to access their clients, in which case, thanks to the network effect described above, it could increase the usefulness for these clients of access to their network and/or services (and therefore, notably, their willingness to pay) and accelerate their ability to reach a critical mass of consumers. In principle,

the larger an operator's existing client base, the less useful having an interconnection strategy will be, because its existing participants and potential new entrants will be in divergent situations.⁴⁴ Conversely, an operator may refuse to interconnect on economic grounds, in that it wishes to offer differentiated services from its competitors (the competition effect, reflecting the fact that compatibility between services offered by two suppliers makes those services more substitutable) or sometimes even squeeze its rivals out of the market. Such a strategy could, for example, be adopted by a new entrant with better technology than the existing players that seeks to impose it based on a rapid uptake effect (positive feedback spiral). In this sense, the establishment of standards can constitute a renewed form of monopoly enabling players that win the 'standards wars' to enjoy an economic premium. For this reason, FMI-related legislation, notably MiFID, MiFIR and EMIR, requires FMIs to interconnect if another FMI so requests. Risk considerations are the only acceptable reason for an FMI to refuse interconnection under these regulations – if it can prove that such interconnection would pose a risk to its security and operational efficiency, for example.

This leads to the question of whether standards' compatibility is a natural market equilibrium – i.e. whether or not the participants have a vested interest in promoting it to maximise the externalities that can be produced by expanding the network. Without sufficient incentives, this is not necessarily the case.

The remedy for this market failure and the impetus for common standards for the industry's full interoperability can come from action by the public authorities, international bodies or committees from the industry itself, or even from individual market participants' initiatives. As regards securities settlement and delivery, for example, the 2003 Giovannini report conferred upon SWIFT and the Securities Market Practice Group⁴⁵ a facilitating role for a project to harmonise messaging and interoperability

42 See Milne A., "Standards setting and competition in securities settlement", *Bank of Finland Research Discussion Papers*, 2005. The author stresses the fact that proprietary standards could encourage more innovation and be promoted more aggressively by the companies that develop them, and therefore stand a greater chance of wide acceptance in the industry, and that, moreover, companies using incompatible standards could compete more intensely on prices.

43 See footnote 3, as well as Kemppainen K. and Salo S., "Promoting Integration of European Retail Payment Systems: Role of competition, Cooperation and Regulation", Bank of Finland, 2006.

44 See footnote 3.

45 Working group of practitioners aimed at promoting the harmonisation of securities industry market practices. It relies on the National Market Practice Group, which operates in more than 30 countries.

standards at industry level, in order to remove one of the barriers to completion of the single market that it had identified. In the area of payments, meanwhile, the European Automated Clearing Houses Association (EACHA) has worked to develop an interoperability framework between the various retail payment systems handling instant payment transactions.

With regard to the public authorities, part of the Eurosystem’s mandate is to encourage dialogue with and between the various stakeholders as well as the pursuit of solutions promoting interoperability. This catalyst role was illustrated by the SEPA project and, more recently, the Target Instant Payments Settlement (TIPS) project, which is part of the Eurosystem’s Vision 2020 strategy (see Chapter 7, Section 6). T2S’ implementation was also an opportunity for the Eurosystem to play the role of catalyst in harmonising the functioning of the various national markets, by providing the impetus for an alignment of legislative, operational and technical frameworks (harmonisation of settlement cycle timings, message and data format etc.), which was necessary for T2S’ smooth functioning. This work was carried out based on close collaboration with and strong involvement from the industry, with the consultation forums validating all standards choices and exerting peer pressure to move these harmonisation efforts forward.

3. The issue of pricing for FMI operators

The consequences of the market’s functioning on possible pricing constraints and strategies call for public intervention, whether in terms of regulating the players themselves or acting directly as operator. In reality, the main pricing obligation imposed by FMI overseers is a requirement for transparency.

The Chart 1⁴⁶ illustrates the pricing issues associated with a single product monopoly. A number of price levels

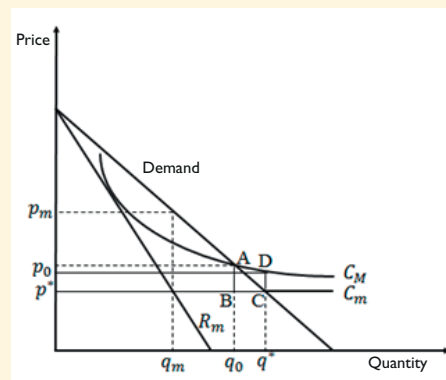
warrant observations. Pricing at marginal cost (price set at p^*) in theory represents a ‘first-rate’ solution, showing efficient allocation in the Pareto sense, as it maximises the collective surplus, thereby enabling all gains from the transaction to be consumed.⁴⁷ In practice, such pricing is unlikely to occur in the case of FMIs, not only because of the operators’ market power described above, but also because in an industry characterised by high fixed costs and low variable costs (natural monopoly characteristics), it does not allow the operator that implements it to recover its costs (given that if it operates in the average cost zone, its average costs are by definition higher than its marginal costs). In the graph, income is equal to $p^* q^*$ and lower than costs $C_M q^*$, and losses are equal to the rectangle $p^* p_0 DC$, which corresponds to the fixed costs.

Pricing below the average cost can be a temporary way of encouraging consumers to join the network in the short term to enable it to fully realise the associated positive network externalities. More specifically, a possible pricing policy could be to set prices at the lowest expected transaction processing unit cost once economies of

46 Taken from *Economie de la réglementation*, Lévêque F., La Découverte, 2004, which deals very lucidly with this subject.

47 This is the definition of a Pareto optimality.

C1: Pricing of a single product monopoly



Note: R_m is the monopoly’s marginal income, and the cost function is determined on the basis of $C(q)=F+C_m$, where F corresponds to fixed costs and C_m the marginal cost, which are assumed to be constant and always lower than the average cost, C_M , which decreases as fixed costs are amortised (this corresponds to the cost structure described in Section 1). p^* , p_0 and p_m are respectively the prices set as the marginal cost, the average cost and the monopoly cost (the price that leads to a maximisation of profits), with the corresponding quantities q^* , q_0 and q_m .

scale have been fully achieved.⁴⁸ Where a central bank operates the infrastructure, this pricing equates to a public subsidy, which, in the event of contention about the service provided, is likely to discourage potential private operators from entering the market as they cannot recover their costs. Where a private player operates the infrastructure, such a policy can, as in the case of a public operator, also be designed to achieve the critical mass above which network externalities become positive. However, it may also be the result of a predatory strategy aimed at preventing an incoming or potential competitor from being profitable, in order to subsequently exploit market power and generate competition-free profits.⁴⁹

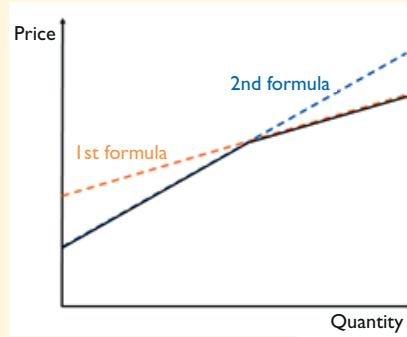
A complex issue for FMIs operators is therefore, in this context, determining the optimal price structure to enable recovery of their costs.

First, assuming network effects, uniform pricing at the average cost (which on the graph corresponds to the fixed price p_0), and which in principle allows the operator to recover its costs but not to turn a profit, could discourage some users from joining the network (those whose willingness to pay is situated between the average cost and the marginal cost), with the result that the positive network externalities are not fully realised – which is also a problem from the point of view of allocative efficiency. Allocative inefficiency is represented in the graph by triangle ABC.

Second, in theory a natural monopoly will automatically choose to sell quantity q_m at the monopoly price p_m that maximises its profit and corresponds to where its marginal income equals its marginal cost. This price level is not Pareto-efficient insofar as the monopoly could profitably serve all consumers whose willingness to pay was situated between p_m and p_0 .

Finally, the pricing of the infrastructure's use can also be set in a non-uniform manner, with different prices for the same service⁵⁰ or depending on the volumes

C2: Double pricing of a single product monopoly



Note: The intercepts correspond to each formula's fixed cost and the lines' slopes to the constant marginal costs.

processed. The dominant pricing choice as far as FMIs are concerned is a non-linear pricing policy, in which the price per transaction processed by the infrastructure depends on the number of transactions that a participant initiates.

One variation on this pricing consists in determining a non-linear, two-part pricing structure $t(q)=F+cq$, including a fixed lump-sum part F (the objective of which is to recover fixed costs and reflects the resulting economies of scale), and a variable part proportional to the number of transactions (the objective of which is to recover the average variable costs). This is the type of pricing applied by the Bank of England in its CHAPS private large-value payment systems service,⁵¹ with the aim of recovering long-term costs, at neither profit nor loss, and without cross-subsidisation between the various service lines.

A second alternative consists in two-part double pricing, based on the same principle, where individual participants choose the best-suited pricing method for them.

These two formulae are shown in the Chart 2. The graph shows that for small quantities it is more profitable to apply formula 1 (first part of the solid line) and for larger quantities formula 2 (second part of the solid line): an operator applying

48 Bolt W. and Humphrey D., "Public Good Aspects of TARGET: Natural Monopoly, Scale Economies, and Cost Allocation", DNB Working Paper, 2005.

49 When pursued by a dominant operator, such a practice is likely to infringe competition rules. However, the competition authorities consider the proof of such an infringement to be conclusive only if particularly stringent criteria have been met.

50 The simplest scenario is to charge an amount on top of the marginal production cost that increases as the demand price elasticity decreases. However, in practice an adjustable pricing like this requires measuring demand price elasticity. It can lead, in a multi-product scenario, to the implementation of a cross-subsidy policy in which the services for which demand is most elastic are subsidised by those for which it is less elastic. Such a policy contravenes the objectives of certain central banks (e.g. the Fed) of recovering costs by service line, and (correspondingly) can enable certain players to pursue a 'cream skimming' policy by only serving market segments with low demand price elasticity and covering their related costs while benefiting from a comparative advantage over an operator implementing a cross-subsidy policy, which ultimately makes such a policy ineffective.

51 Annual membership price of £15,000 for both CHAPS and the DvP service; per item fee of £0.155 for CHAPS and £1.90 for DvP.

adjustable pricing will take into account the fact that each type of participant will choose the most profitable formula for them, and will set the pricing scales accordingly. In this case, the distinction is between participants carrying out a large number of transactions via the systems, and others.

This is the pricing method for the core services chosen for TARGET2, where participants can choose between two options. The first, in which there is a single price consisting of a monthly fee of EUR 150 and a transaction price of EUR 0.80,

is intended for institutions with low transaction volumes. The second, consisting of a monthly fee of EUR 1,875 and sliding tariffs by transaction volume threshold, is intended for large institutions.

In both cases, the average price decreases as volumes processed increase, which has the same effect as a volume discount policy and limits cross-subsidisation between the different types of participants. Such a structure is generally considered to be efficient,⁵² and encourages large-volume participants' use of the infrastructure.

52 For its application to payment systems, see: Holthausen C. and Rochet J.-C., "Efficient Pricing of Large Value Interbank Payment Systems", *Ohio State University Press*, 2006.

Box 4: Recovery of costs by central banks for the provision of RTGS services

Most central banks operating RTGS have a partial or total cost recovery policy. Some (the Bank of Japan, for example) suggest that RTGS should be subsidised given the benefits it can offer the community as a whole in terms of economic stability. The more contestable the nature of the services that they provide, in that they could to some extent be provided by the private sector, the more sensitive central banks are to the need to recover their costs. By contrast, if they seek only to partially recover their costs it can be assumed that there is nothing contestable about the service provided (for example, because payments in central bank money can only be made in RTGS operated by the central bank), or that it is feared that a total recovery policy will lead to pricing that discourages the use of RTGS for riskier payment systems.

In some cases this objective is a legal one. In the United States, the Monetary Control Act of 1980¹ imposes on the Federal Reserve a general long-term objective of recovering its direct and indirect costs. The objective pursued by Congress was both to stimulate competition (fair competition concept) and so provide services at the lowest possible cost for society, and to ensure that those services were adequate (role of prices as a signal with the aim of allocative efficiency). This principle is interpreted in a restrictive manner by the Fed, which sets itself an objective of total recovery of costs (production, investment and operational (including maintenance and operation), adjusted for those that would have been incurred by the private sector)² by service line.

In the Eurosystem, Article 2 of the Statute of the ESCB and of the ECB requires the ESCB to "*act in accordance with the principle of an open market economy with free competition, favouring an efficient allocation of resources*", which suggests that the pricing of the services it provides should seek as often as possible to meet a cost recovery objective if a subsidy would be likely to hinder private-sector competition. The stated objective of TARGET2 is to recover "significant" costs³ in order to avoid unfair competition with private payment systems.

.../...

1 https://www.federalreserve.gov/paymentsystems/pfs_pricingpol.htm.

2 Defined as "an allowance for the taxes that would have been paid and the return on capital that would have been provided had the Federal Reserve's priced services been furnished by a private-sector firm."

3 https://www.ecb.europa.eu/paym/t2/shared/pdf/professionals/TARGET2_pricing_guide_v4_updated.pdf?67e41c1f1858a8e9af59c9667e3660cf, p.4.

In contrast, TARGET2 is not intended to fully recover its costs due to the contribution of a public good factor corresponding to the positive externalities generated by its use, in particular in terms of reducing systemic risk. This public good factor can be viewed and measured as the subsidy that would be needed for the private sector to 'insource' the costs related to taking into account systemic risks in the way it operates the payment system.⁴ A number of economic studies conducted prior to the launch of TARGET2 estimated this public good factor at 20% of total costs. It reflects the fact that, in addition to its large-value payment settlement services for directly executed transactions, TARGET2 also provides:

- reserve account-keeping services for the final settlement in central bank money of net positions in transactions carried out in other FMI (a core activity for central banks that only they can provide);
- intraday credit facilities, an extension of overnight credit systems, (by its nature, unquestionably a central bank activity); and
- fund transfer services for commercial banks' reserve accounts.

Given all these functions performed in addition to simple settlement, imposing a total cost recovery objective could lead to dissuasive pricing compared to private systems that do not fulfil the same roles and do not have the same constraints, which could prove to be less than socially optimal. In practice, when measuring the public good factor, the cost of producing services equivalent to commercial services is nevertheless more easily determined than that relating to externalities concerned with strengthening the economy's overall security.

As regards T2S, however, whereas the objective is one of full cost recovery, the platform does not seek to operate for profit. This objective was notably decided on for competitive reasons, insofar as it was a question of 'insourcing' activities (operation of the technical platform providing the settlement and delivery service) that were previously CSDs' responsibility, and which therefore was by definition partially questionable.⁵

4 For further details, see: Holthausen C. and Rochet J.-C., "Incorporating a "public good factor" into pricing of large-value payment systems", European Central Bank Working Paper, July 2005.

5 "Partially" because, whatever the model, the central bank remains the only player to be able to provide a central bank money wholesale payment service.

CHAPTER 20

The role and contribution of innovation for payment instruments and market infrastructures

Updated on 17 December 2018

Technical innovation is salient to market infrastructures and most non-cash payment instruments (the direct result of technological innovation), enabling them to meet market requirements in terms of transaction reliability, execution speed and service diversification.

The 1960s to 1980s saw exponential advances in information technology and are a prime example of financial technological innovation, specifically in the field of market infrastructures. Until then, financial market infrastructures' (FMIs) role had been to physically centralise transaction-related documents in order, as far as possible, to clear the transactions in question (by calculating net balances from their gross amounts) and then exchange the physical documents needed to complete them. Securities were thus physically transferred, in paper form, from seller to buyer as proof of ownership. Computing power and the concomitant development of information technologies then made it possible to replace the physical holding of securities in the form of paper certificates by computer records. This paperless technology enabled market infrastructures to evolve towards the *modus operandi* with which we are familiar today.

Thus, while these infrastructures have existed since the early 1950s, technological developments have enabled considerable progress in the way they process transactions, making it possible for example to switch to so-called real-time processing, which in the early 1990s was still difficult to imagine in this industry. Thanks to computerised processing, market infrastructures have thus been able to accelerate, expand and systematise their traditional centralisation services, and round them out with new, post-market processing services.¹

Indeed, this development of real-time processing has been spectacular in the case of payment systems, which have evolved from deferred net settlement (DNS) to real-time gross settlement (RTGS

– see Chapters 6 and 7). The same is true for settlement and delivery systems, which have gone from having a single settlement session a day to real-time settlement.

Developed in the 1990s in G10 countries, RTGS systems offer the advantage of finalising payments in real time, reducing settlement risk. Until now, they were reserved for urgent, large-value payments. However, thanks to the maturity of the associated technologies, retail payments can now also be made in real time and at low cost; the key lies in the instantaneous nature of transfers, as illustrated in the European Payments Council (EPC) scheme that has been in force since November 2017 and in the instant payment settlement service TIPS, operational since November 2018 (see Chapter 2, Section 3 and Chapter 7, Section 6).

In another area, today's most widely used non-cash payment instruments (payment cards, credit transfers and direct debits) are based on electronic features that have evolved constantly in recent decades, from the development of chip card and PIN code functionality to that of instant credit transfer processing capabilities, including for retail banking, and the use of artificial intelligence for credit scoring. Cash-based payment instruments have also evolved as a result of cutting edge innovations, aimed particularly at combating counterfeiting. Banknotes, for example, are designed using highly sophisticated anti-counterfeiting techniques such as watermarks and holograms.

In the space of a few decades, therefore, market infrastructures and payment instruments have undergone profound change, combining compliance with stringent risk management requirements with exponential IT performance. In this chapter we look at recent initiatives in this field, which are marked by the dynamism of the current wave of new technologies such as blockchain and big data and the arrival of new players. In this context, and in constantly changing markets, central banks play an important role in terms of the

1 Norman P, *Plumbers and Visionaries, Securities Settlement and Europe's Financial Market*, Wiley, 2007.

financial system's stability and the security and efficiency of payment instruments and market infrastructures.

1. Payment instruments and innovation

The surge of innovation in payment instruments is the result of two concomitant phenomena:

- on the one hand, the arrival in the payments field of technological players, from small start-ups to internet giants (GAFA, large telephone operators, etc.) seeking to assert themselves as innovators and commonly referred to as 'fintechs', derived from 'finance' and 'technology';
- on the other hand, the emergence of innovative technologies, within a framework extending beyond the financial sphere and with potentially promising prospects for application in the area of payments. Specific examples here are blockchain and technologies combining big data and artificial intelligence.

1.1. Fintechs and payment services

In the area of payment services, the term 'fintech' currently covers three main categories of activities.

The first of these essentially concerns client relations. It is illustrated in particular by the provision of mobile applications or websites offering enhanced interfaces for viewing accounts and managing payments, for example making it possible to aggregate information from different banks, automatically manage the rebalancing of funds between accounts or even offer users value-added services based on an analysis of their account activity, such as a different banking package or payment instrument, or access to an overdraft facility or a loan based on future expenditure, etc..

This category of players notably covers account information aggregators, which fall within the payment services provision scope defined by the second European Payment Services Directive (PSD 2: see Chapter 3).

A second category of fintechs focuses on developing solutions aimed at facilitating exchange by providing additional services, in support of the banking system but without seeking to change it structurally. These innovations include new payment initiation methods, for example mobile phone or web-based, such as Paylib, Apple Pay and Paypal, which in themselves are not new payment instruments but an innovative way to initiate payments based on existing instruments (card, transfer, electronic money, etc.). Depending on their nature, the services offered by these fintechs may fall within either the PSD 2 payment services provision regulatory framework, which requires fintechs to be authorised, in France, by the *Autorité de contrôle prudentiel et de résolution* (ACPR – French Prudential Supervision and Resolution Authority - see Chapter 3), or that governing the provision of technical services to authorised payment service providers such as banks.

Finally, a third category of fintechs, sometimes referred to as 'neobanks', offers account-keeping and payment services equivalent to those of traditional banks but sold differently, for example on the basis of lower service costs, the limitation of risk by exclusion of authorised overdrafts and the provision of payment instruments with systematic authorisation (which can only be used after checking the balance in the account), a digital interface designed for mobile application use, ease of access and use, etc.. As these activities are governed by European regulations (see Chapter 2), this type of service provider must be authorised as a payment institution or an electronic money institution.

1.2. The emergence of crypto-assets

Crypto-assets such as bitcoin and ether emerged in the early 2010s following the global

Box 1: Crypto-assets: the example of bitcoin

Bitcoin is a virtual asset stored on an electronic medium which allows a community of users that accept it as payment to carry out transactions without having to use legal currency.

Bitcoin was created by a community of internet users, also called ‘miners’, each of whom has installed free software on their online device or computer that uses an algorithm to generate bitcoins, which the miners then receive in recognition of their contribution to the system’s operation.

Once created, bitcoins are stored directly in an electronic safe on the user’s computer, tablet or laptop, or remotely (on the cloud, for example). They can then be transferred online, anonymously, between members of the community.

While bitcoin is the most widely known and highly valued crypto-asset, at the beginning of 2018 there were over 1,300 such assets worldwide. Other crypto-assets such as ether and ripple are also experiencing strong growth and function based on concepts similar to those underlying bitcoin.

- 2 See Chapter 1.
- 3 The tulip mania of the 17th century, which originated in the flower’s use for decorative and artistic purposes, led to a sudden increase in tulip bulb prices in the north of the United Provinces (now the Netherlands), amplified by a surge of speculation. At the height of the speculative bubble, in February 1637, pan-European demand inflated the price of a forward tulip bulb sale contract to 15 times the annual salary of a specialist craftsman, or the equivalent value of five hectares of land. The sudden collapse of prices in the spring of 1637 bankrupted a large number of investors and shook the Dutch economy – the result of what is now considered to be one of history’s first speculative bubbles.

development of so-called virtual communities, which bring together internet users through digital interaction tools such as chat apps and forums. Often incorrectly referred to as ‘virtual currencies’ or ‘crypto-currencies’,² these assets do not fulfil or only very partially fulfil the three functions assigned to currency (unit of account, means of exchange and store of value), are not recognised as legal tender or payment instruments and offer holders no guarantee of security, convertibility or value. That is why it is preferable to refer to them as ‘crypto-assets’.

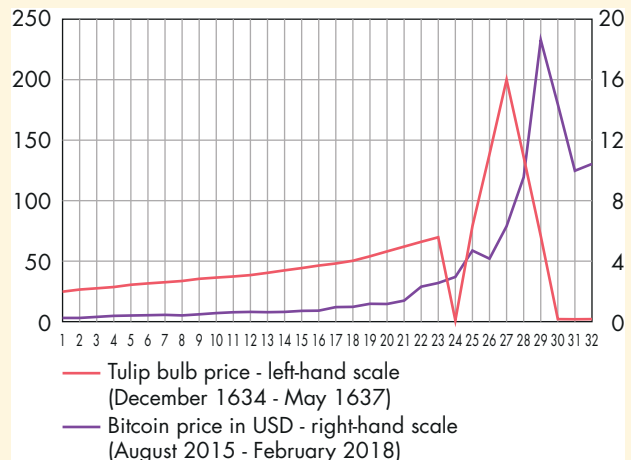
electronic computing power – is time-capped. This limitation fuels a shortage phenomenon which, given the strong demand for bitcoin resulting mainly from speculation, leads to very sharp price fluctuations. Bitcoin’s historical price movement is reminiscent of that of tulip bulbs³ between 1634 and 1637, as shown by the graph below.

1.2.1. Crypto-assets are highly speculative

No centralised body guarantees the convertibility of crypto-assets into different currencies. Investors can therefore only recover their funds in currency if other users wish to acquire the same crypto-assets. As a result, the price of a crypto-asset can collapse at any time if investors wishing to unwind their positions find no buyers and end up holding illiquid assets.

In the particular case of bitcoin, the process of issuing units – which is dependent entirely on

Chart 1 – Bitcoin price compared with tulip bulb price



Sources: Earl Thompson (tulip bulb price), bitcoin.com (bitcoin price).

1.2.2. Crypto-asset stock remains limited compared with the stock of currency in circulation

The outstanding amount of crypto-assets in circulation came to around EUR 220 billion at end-December 2018, and comprised mainly bitcoin (35%), ether (20%) and ripple (10%). This sum needs to be considered, however, against the stock of currency in circulation: at end-2017, the M1 aggregate, which corresponds to the sum of banknotes and coins in circulation and sight deposits of non-financial agents, stood at more than EUR 7,500 billion in the euro area and nearly USD 3,500 billion in the United States.

1.2.3. Use of crypto-assets is broadening

Crypto-assets are raising the public's interest outside their original communities, i.e. from users and merchants, or non-crypto-asset miners, with no operational role in the asset management and issuance network. This is leading to the development of multiple services, organised along the lines of existing, traditional financial services.

In the area of market infrastructures, for example, trading platforms have been created to buy and sell crypto-assets for currency such as EUR and USD. These platforms thus enable users who have not participated in the creation process to acquire crypto-assets, or to convert crypto-assets received as payment into legal tender currency. Increasing numbers of crypto-asset custody services – akin to depository activities – are also emerging on the heels of this trading activity.

Linked to this exchange activity, services in financial information and data supply, investment advice and trading are being developed. These activities encourage the creation of investment instruments backed by crypto-assets, such as funds or derivatives, with initiatives launched by the Chicago Board Options Exchange and the Chicago Mercantile Exchange, for example.

The financing business has also benefited from the development of crypto-assets, in the form of initial coin offerings (ICOs). ICOs are in some respects the transposition into crypto-assets of the crowdfunding concept: in this type of arrangement, internet users who make a financial contribution to a project (in crypto-assets or currencies) receive digital assets (or tokens) in exchange. In practice, these tokens represent a form of economic interest in the project. They give their holders certain rights, such as to first use of the financed platform or application (as in traditional crowdfunding), receipt of part of the profits generated by the company or the exercise of voting rights (as with shares). Management of the tokens issued in ICOs is itself assured through the blockchain used for the ICO, and based on exchange mechanisms similar in all respects to those of crypto-assets. ICO tokens can therefore be seen as another type of crypto-asset, enhanced by the specific rights referred to above. The limitations and risks of crypto-assets described in this chapter also apply to the exchange and custody procedures for tokens.

1.2.4. Crypto-assets are a vector for money laundering and terrorist financing, cyber attack, and also have an environmental cost

Crypto-assets' anonymous nature facilitates the financing of terrorism and criminal activities and the circumvention of anti-money laundering rules.

The anonymity that characterises the issuance and transfer mechanisms of most crypto-assets increases above all the risk of these assets being used for criminal purposes (online sale of illegal goods or services, payment of ransoms, etc.), including money laundering and terrorist financing.

The French agency combating illegal financial circuits, Tracfin (*Traitement du Renseignement et Action contre les Circuits FINANCIERS clandestins*), identifies

the use of crypto-assets, particularly bitcoin, as being the source of a specific risk in terms of money laundering and terrorist financing.

Custody of crypto-assets is subject to significant cyber risks and offers no security or protection for these assets.

There have been a number of cases of hacking of electronic wallets used to store crypto-assets. In case of theft of assets, wallet holders have no recourse against the hackers. Repeated, large-scale incidences of fraud (the USD 534 million hacking of Coincheck in January 2018 and the high-profile bankruptcy in 2015 of MtGox, the world's first bitcoin trading platform⁴) illustrate the vulnerability of the crypto-asset ecosystem and – in the absence of guarantee mechanisms – the high level of associated risks.

The use of crypto-assets is also associated with an environmental cost.

The computerised validation of crypto-asset transactions has also a considerable environmental impact linked to the energy it uses: in December 2017, the validation of a single bitcoin transaction was estimated at 215 kWh of electricity, being the equivalent of six months of uninterrupted PC use. This energy consumption increases constantly due to the important competition associated with the expansion of the transaction validation (mining) network. However, it should be noted that certain crypto-assets rely on less energy-intensive procedures, depending on the issuance and validation procedures of the associated transactions.

1.2.5. To control the identified risks, the public authorities are exploring crypto-asset-specific regulatory solutions

Regulation of crypto-asset-related activities is desirable for four main reasons: the high-priority fight against money laundering

and terrorist financing, investor protection, the preservation of market integrity, including against cyber risk, and, lastly, if these activities continue to grow strongly, financial stability concerns.

At national level, the Banque de France and the Autorité de contrôle prudentiel et de résolution (ACPR) partially supervise crypto-asset-related services as part of their payment service provider-related remit, and plan to extend this framework to the various types of crypto-asset intermediation platforms.

The activity of the platforms that offer conversion into legal currency, which act as an intermediary between buyers and sellers, is considered a payment service requiring authorisation as a payment service provider. However, this requirement arises from the management on behalf of third parties of accounts held and denominated in a legal currency, and not from the crypto-asset-related service.

In addition to this approach, the Banque de France and the ACPR advocate an extension of the regulatory framework applicable to services associated with crypto-assets, through the introduction of a crypto-asset service provider status.

This regulatory change could follow on from the revision of the fourth anti-money laundering and terrorist financing directive currently being adopted by the European Union (the so-called fifth AML-CFT Directive). This directive's provisions are applicable to players offering (i) services to convert crypto-assets into legal currencies, and (ii) custody, on behalf of their clients, of private cryptographic keys that make it possible to hold, store and transfer crypto-assets.

As well as contributing to the fight against money laundering and terrorist financing, which is a priority, a crypto-asset service provider status would submit its holder submit to rules relating in particular to

⁴ Following an internal fraud leading to the misappropriation of 650,000 bitcoins with a monetary value of around USD 360 million.

transaction security and client protection. This status could also cover services concerning transactions between different categories of crypto-asset.

The regulatory framework for crypto-asset service providers could be supplemented by a limitation of the possibility for certain regulated companies (banks, insurance companies, management companies, etc.) to work with crypto-assets.

The first step would be to ban crypto-asset deposit taking and loan granting. With regard to savings products, the question of banning all related marketing through retail collective investment vehicles should be considered, with the aim of reserving these instruments for the most experienced investors. These products should also be made subject to stringent client protection rules. Lastly, as regards the proprietary investments of regulated entities, in the absence of a complete ban on investments in crypto-assets, strict control of these investments, for example by deducting them completely from capital, should be considered. These provisions presuppose changes to national and European legislation.

European and international coordination would be desirable in order to ensure more effective regulation in this area.

Given the paperless nature of crypto-assets and the use of internet-related technologies that facilitate the provision of cross-border services, the heterogeneity of national regulations could prevent full control of the resulting risks.⁵

With this in mind, on 7 February 2018, France and Germany's economics and finance ministers and central bankers placed the subject on the G20 agenda. The meeting of G20 ministers and governors held in Buenos Aires in March 2018 gave accordingly impetus to a common international commitment to reflect in depth on the subject, as recorded in the summit's official communiqué.⁶

1.3. Big data and artificial intelligence technologies

The development of real-time data analysis technologies is a key driver of innovation in the payments sector, which by definition conveys large volumes of flows on a continuous and permanent basis.

The main application of these technologies to payment services relates to the identification of risky transactions, for the purposes of combating fraud or terrorist financing and money laundering, by using transaction and/or user profiling techniques and the capacity to simultaneously process data relating to all ongoing transactions.

In addition to the strong authentication solutions deployed by issuers of payment instruments (see Chapter 3), transaction risk-scoring techniques are used to determine whether the transaction should be blocked, suspended or executed. Scoring tools generally use rules based on known fraud scenarios. In a credit transfer context, for example, rules may take into account the transfer data (type of account to be debited, amount, new account to be credited or not, etc.), the account holder's profile and the data that the institution has collected on the account holder's habits (frequent or non-frequent use of the communication channel in question, previous transfer amounts, intensity of use of the payment instrument, etc.).

The regulatory technical standards associated with the second European Payment Services Directive (PSD 2: see Chapter 3) notably stipulate the following criteria as being usable for risk analysis purposes:⁷

- the identification of abnormal behaviour or expenditure;
- the detection of unusual information about the device or software used;
- the identification of a virus during a session that required client authentication;

5 See Beau D.: <https://www.banque-france.fr/intervention/conference-de-la-banque-de-france-liae-de-rouen-le-31-octobre-2017>

6 "We acknowledge that technological innovation, including that underlying crypto-assets, has the potential to improve the efficiency and inclusiveness of the financial system and the economy more broadly. Crypto-assets do, however, raise issues with respect to consumer and investor protection, market integrity, tax evasion, money laundering and terrorist financing. Crypto-assets lack the key attributes of sovereign currencies. At some point they could have financial stability implications. We commit to implement the FATF standards as they apply to crypto-assets, look forward to the FATF review of those standards, and call on the FATF to advance global implementation. We call on international standard-setting bodies (SSBs) to continue their monitoring of crypto-assets and their risks, according to their mandates, and assess multilateral responses as needed."

7 These data are also listed in the sole authorisation system defined in France by the French data protection agency (CNIL) to provide a framework for data processing aimed at combating external fraud in the banking and financial sector (<https://www.cnil.fr/fr/declaration/au-054-lutte-contre-la-fraude-externe-dans-le-secteur-bancaire-et-financier>).

- the identification of a fraud scenario;
- the account holder being in an abnormal or a high-risk location.

In addition to the analysis of individual flows, account-holding institutions can use information concerning the aggregate flows observed on all their clients (rejection rate for direct debits, unusual beneficiaries or destinations for credit transfers, etc.). As well as facilitating the detection of fraud attempts, where appropriate this cross-referencing of information allows institutions to notify certain clients of the occurrence of transactions identified as suspicious.

The tool parameters allow the rules to be refined by modifying the influence of the input data. Once the scoring rules have been established, the system can determine, based on the 'calculated score', whether it is necessary to implement an additional authentication level or to alert the account holder for additional validation, for example by making a return call.

These technologies are also used for personal or business support purposes, to pre-identify user or client needs

Another fast-growing application of these technologies is marketing value-added account-keeping advisory applications, generally associated with account information aggregation and payment initiation services (see above), which analyse the client's behaviour with a view to suggesting rebalancing transactions and banking offers (card, overdraft, credit, investment, etc.) adapted to their profile.

As regards merchants, meanwhile, similar solutions make it possible to analyse client behaviours with a view to offering pathway optimisation (for example, by preselecting a payment method based on intended purchases), or to improve the targeting quality of promotional campaigns and loyalty programmes.

2. New technologies, a potential source of transformation of market infrastructures

Market infrastructures' activities necessarily involve a large amount of data collection, making them fertile ground for the development of new technologies.

In addition to already proven and widely implemented changes, further transformation of market infrastructures is expected with the advent of certain technological innovations. Advances in predictive analysis and artificial intelligence, for example, could not only help further improve risk models but also prevent and detect fraud attempts. They have also already been used to streamline settlement in RTGS systems.

Among recent technological innovations, blockchain is currently the focus of much attention. While market infrastructure activities seem a particularly suitable field of application for this technology, a lack of large-scale implementation has prevented it from really proving its worth. This state of transition makes it difficult to assess the changes it could bring about in the area of market infrastructures, but the subject certainly deserves consideration.

Blockchain became popular with the emergence of bitcoin in 2009. This 'chain of blocks' technology for storing and transmitting information arose from a desire to revolutionise payments and emancipate users from the centralised trusted third party system. It is libertarian in nature and introduces an organisation in which the issuance of exchange media and the management of transactions are carried out not through an intermediary (banking, legal, etc.) but directly through the user network. The blockchain's content is thus distributed in real time to all members of the network, and referred to as the 'distributed ledger' (hence DLT, an acronym of 'distributed ledger technology').

Potential blockchain applications abound, and are far from confined to the banking

and financial sector, being useable for insurance automation, diploma registration, land register security, recording of property rights for works of art, etc.

While the financial sector took an early experimental interest in this distributed ledger technology, there are as yet few cases of it being rolled out on an industrial scale.

2.1. Blockchain operation: the algorithm is key to building trust between contracting parties

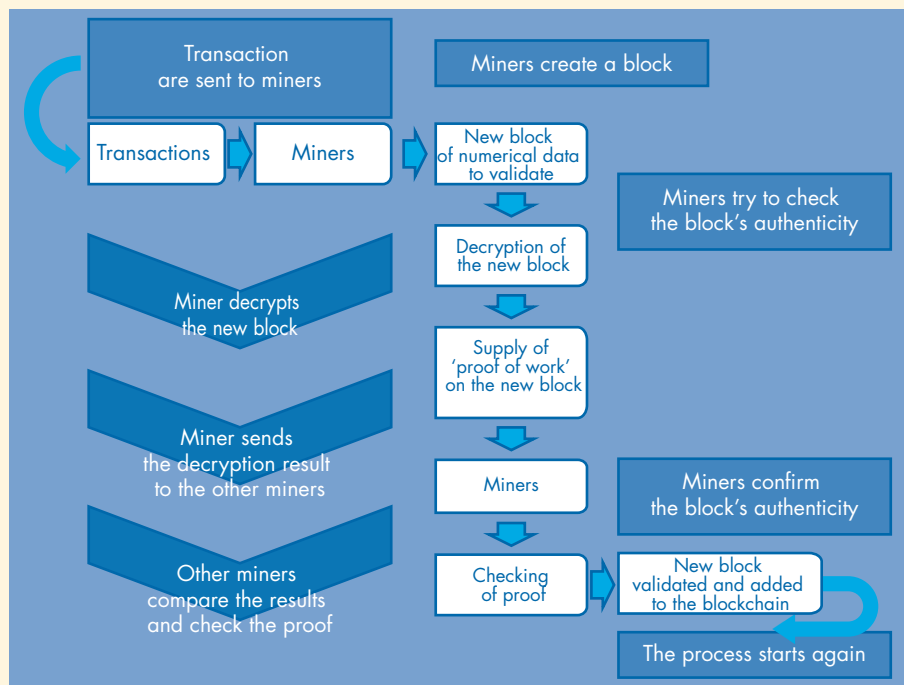
Blockchain technology is based on open source software, i.e. it is a computer program the source code of which is distributed under a royalty-free licence allowing anyone to read, modify or redistribute the software completely freely and legally.

Each of a blockchain's blocks contains data (sender, recipient, amount, etc.) relating

to one or more transactions that has been encrypted, i.e. secured by computer algorithms. There are various processes for validating new blocks to add them to the chain. The one used for the bitcoin blockchain, however, is particularly representative: in this case, to add a new block of transactions to an existing chain of blocks, the new block must first be validated. To do this, certain chain participants (miners) have to solve an algorithmic problem. The first miner to find the solution validates the new block and adds it to the chain, subsequently receiving a certain amount of bitcoin in exchange (see also Section 1.2 above).

Whatever the validation mechanism used, it allows each block to be linked to the previous block and thereby ensures the data's immutability for all participants in the chain. In addition, when a transaction is validated, it is sent to a network of computers known as a 'storage node'. Each

Description of the mechanism for validating a new block:



Source: Banque de France website, <https://abc-economie.banque-france.fr/mot-de-lactu/blockchain>

'node' contains a copy of the database in which the history of the transactions carried out is recorded. All stakeholders can access it simultaneously. This decentralisation of security management aims to prevent the falsification of transactions. **Blockchain's inviolable nature is not beyond dispute, however, as it would still be possible for a coordinated majority of validators to take control of the transactions (so-called 51% attack). This is all the more significant in that there has been a trend among miners of converging on places where the cost of electricity is at its lowest.**

2.2. Blockchain, an original response to post-market issues?

Blockchain technology's decentralisation and secure ledger characteristics make it a seemingly promising technology for post-market activities. Its advocates accordingly argue that it should make it possible to organise the functioning of market infrastructures, in particular their centralised dimension, differently, the assumption being that the technology can theoretically eliminate the need for central trusted third parties and so reduce infrastructures' operating costs and further improve their efficiency.

However, market infrastructures have already, for several decades, been highly streamlined and efficient: the IT boom has meant that they have already benefited greatly from technological innovation. While admittedly they are based on more traditional technologies, blockchain technology cannot necessarily offer them significant added value. In particular, analysis suggests that the possibility of operating in a decentralised manner is not a more efficient, economical and secure solution than their current, centralised and sophisticated way of functioning. In addition, the decentralised management of financial transaction processing activities raises numerous issues related to the responsibility of the various players involved in the processing chain.

2.3. Public blockchain vs. private blockchain

Blockchain technology's dissemination beyond its original use for bitcoin has led to a substantial change in its founding principles. Elimination of the trusted third party (neutral central entity), anonymity and the open nature of the chain have given way, for example, to so-called closed or private blockchain systems, reserved for a limited number of players and controlled by a central authority playing the role of blockchain manager. Thus, instead of using a blockchain that is open to all and over which the players involved have no control, financial market initiatives are based on blockchains that are not universally accessible. Their access is limited to certain players who have to meet predefined participation criteria in terms of risk profile, activity and status. Such an organisation requires defining and verifying compliance with these criteria, which is carried out by an entity playing the specific role of 'blockchain keeper'. This clearly illustrates the non-disruptive but evolving role that this technology seems to be able to play in post-market and market infrastructure activities, since the roles of each player (participant and central entity) do not change in this scenario.

In this respect, blockchain technology is of particular interest for powering areas of post-market activity that are as yet unautomated and which have remained structured around largely manual processes.

2.4. The emergence of blockchain initiatives for post-market automation

French legislation is supportive of this movement. A ministerial order was adopted on 8 December 2017, for instance, relating to the use of a shared electronic registration system for the representation and transmission of financial securities.⁸ Following on from the so-called Sapin II Law of 9 December 2016, it makes it possible to register the issue or sale of financial securities in a blockchain.

⁸ <https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000036171908>

Box 2: Opportunities and limits of smart contracts

Smart contracts are contracts in which certain clauses can be triggered automatically if certain predefined events occur. They are a growth area, particularly in insurance, where policies can now cover passengers for flight delays, for example. These policies are recorded in a blockchain and linked to air traffic databases, automatically triggering compensation for passengers in the event of a delay.

For post-market activities, smart contracts could be particularly useful for the execution of corporate actions, as yet a relatively unautomated area. For example, one fintech uses blockchain technology to offer smart contracts that have been programmed to carry out around 50 standard corporate actions. Such automation of corporate actions is not exclusive to blockchain technology, however, and could be carried out using other information technologies.

Smart contracts have yet to be tested for the contractualisation of more complex post-market transactions, such as the management of flows relating to collateral or margin calls. The benefits of these automation methods are therefore still open to debate.

Initiatives have already emerged, proposing a simplification and automation of certain post-market activities. A case in point concerns commercial paper, which is currently traded over the counter and for which reconciliation takes place manually in the back offices of the various parties involved in a transaction, followed by settlement and delivery. A current initiative aims to develop a commercial paper trading platform and a settlement and delivery service that will automate and streamline the entire commercial paper life cycle, from issuance and trading to settlement and delivery. It relies partly on blockchain technology, and on the T2S platform for settlement and delivery.

It is also the approach taken by another initiative to help improve access to finance for certain players, for example by promoting SMEs' access to capital markets based on blockchain technology. To achieve this, the post-market process for SMEs would have to be redesigned to simplify it by providing a lighter infrastructure than a central securities depository (CSD), comprising fewer intermediaries – specifically with no brokers and no central counterparty (CCP) – a relatively redundant entity as far as SMEs are concerned as they have little

need for securities netting. The aim would also be to ensure issuers transparency on their investors and shareholders, which is currently lacking. Blockchain technology appears well placed to offer appropriate solutions in this area thanks to its original ledger functionality.

Other initiatives focus on the activity of issuing and distributing fund units, currently still a very manual process – particularly when carried out outside CSD channels. Fund management companies' challenge of finding out more about the identity of investors is also highly significant, and here too blockchain technology could provide an appropriate response.

2.5. As yet unproven technology

Despite the initiatives currently underway, questions remain about blockchain technology's translatability into real-life projects that can be deployed on a large scale.

Firstly, the question of the technology's performance and its ability to handle large volumes has not yet been answered convincingly. Indeed, blockchain technology has so far been used in niche activities or closed environments, in segments with

low-volume requirements. Depending on blockchain's public or private nature and its transaction validation methods, the performance-related questions that can be asked can vary significantly. For example, bitcoin requires the resolution of highly sophisticated algorithms for the validation of new blocks in order to guarantee the blockchain's security in an open environment with anonymous participants not bound by mutual trust. To validate a transaction, it requires miners to perform extensive calculations necessitating considerable computing power, and therefore significant IT capacity; this validation protocol uses a lot of energy for a limited performance (see above, Section 1.2.4). Conversely, under some blockchains counterparties validate transactions directly, without them being disclosed across the network and with no algorithmic resolution validation mechanism. However, such an organisation requires the use of closed or private blockchains, including ex ante control of authorised participants based on predefined participation criteria.

Generally speaking, the less burdensome the validation protocol for new transactions in terms of calculation, the easier it is to increase transaction processing speed; it is therefore a matter of striking a balance between transaction security, the open or closed nature of the blockchain and the required level of performance – high in the case of post-market activities, for example.

Secondly, the issue of transaction confidentiality and participant access management – and therefore participant identification – once again can be resolved only by using closed blockchains. Blockchain was initially based on principles of total openness to the public, anonymous participation or the use of pseudonyms, and universal access to the transactions carried out. These characteristics have proved ill-suited to the requirements of post-market activities, for which players must be known and transactions confidential. Only closed blockchains can meet these requirements.

Another current blockchain challenge relates to its ability to fulfil standardisation and interoperability conditions. This is because there is a particularly strong need for norms and standardisation if a project involves complex uses, for example linking multiple players and a number of transaction processing systems and/or integrating a process in its entirety. Standardising such a process is therefore essential to enable all its systems to interlink, regardless of the technology used (traditional or blockchain). A number of approaches have been suggested in response to the first question – one of interoperability between blockchains: (i) impose one's own standard, with the aim of becoming the norm for post-market activities, (ii) use a service provider providing all the necessary services and using the same technology, or (iii) not concern oneself with standardisation – the case of some fintechs who consider that there is no standard for blockchain technology at this stage. In this regard, it should be noted that the issue of harmonisation is a key element for post-market players (including the authorities): how can it be ensured that any developments based on this technology do not call into question the already huge efforts made in Europe to harmonise post-market activities?

Meanwhile, there has been little consideration of questions of interoperability between blockchain on the one hand and non-blockchain technologies on the other – and the research that does exist is often carried out in closed environments, for security reasons. However, this question may not represent a major challenge, insofar as blockchain relies on long-standing, reliable technical tools such as cryptographic protocols and decentralised infrastructures. In this respect, it can be considered that blockchain is less a technical innovation – since it is based mainly on existing technologies – than an organisational one, insofar as its novelty lies above all in the way it uses these existing tools to create a secure distributed system.

3. The role of central banks in this environment

3.1. The Banque de France and the Eurosystem's catalyst and market infrastructure operator roles in the context of innovation

In addition to their oversight role, the Eurosystem central banks and the ECB

also play the roles of catalyst and market infrastructure operator. In their catalyst role they monitor the industry's efforts to develop innovative new services and processes, and provide support for market initiatives. As market infrastructure operators, meanwhile, the Eurosystem and the Banque de France have initiated a number of innovative programmes to improve the efficiency of the market infrastructures that they operate.

Box 3: Central bank digital currencies (CBDCs)

The possibility for a central bank to unilaterally issue digital currency, a new form of money, has often been suggested – notably in the context of reflection on the cashless society concept (see Chapter 2). This would take the form of a claim on the central bank, which would be distributed digitally and be a separate instrument to the reserves currently available to commercial banks. The idea raises two different issues depending on whether one is considering payment between businesses (wholesale, therefore) or retail payments.

As far as retail payments are concerned, the main consideration here is the public circulation of a paperless payment instrument that is a direct claim on the central bank, as opposed to traditional paperless payment instruments, which represent claims on commercial banks.

To date, most developed countries consider that there is no reason to issue this type of instrument, in that: the retail payments industry and its associated infrastructures are sufficiently efficient and secure, and payment service providers' offers meet all existing demand. Moreover, the current sharing of duties between central banks and commercial banks is adequate for responding to the challenges posed by changes in payment methods (instant payments, for example). Such is the current position in the euro area.

Issuing a CBDC does not necessarily solve the issues raised by the potential decrease in the use of cash and the need to maintain financial stability. On the contrary, there are major uncertainties about the implications of issuing this type of instrument, in particular regarding the respective roles in the economy of central banks and commercial banks, including in the event of a crisis of confidence in the banking system (heightened bank run risk).

As regards wholesale payments, issuing a CBDC would involve introducing an instrument similar to reserves, i.e. a direct claim on the central bank, which could only be held by the players currently authorised to participate in the large-value payment system.¹ The main difference would therefore relate to the technology used to issue and distribute the instrument. These considerations relate to the use of blockchain technology by the private sector, with the main objective of facilitating the interoperability of these solutions with the central bank's currency, which would also be distributed using blockchain technology.

At this stage, however, the research carried out by central banks on the possibilities of using DLTs for the infrastructures they operate (large-value payment systems and settlement and delivery platforms) is inconclusive (see 3.1.1. *infra*). At best, DLTs simply meet the functional requirements defined for testing purposes. They have not shown any advantages over existing infrastructures, which are critical to the economy, highly sophisticated and technologically adapted to the complexity of financial market infrastructures' activity.

¹ These are credit institutions and investment firms in the case of TARGET2.

3.1.1. The Eurosystem's initiatives to promote innovation and meet market expectations

With the aim of improving the efficiency and reducing the cost of its market infrastructures while responding to new user needs, the Eurosystem seeks to take advantage of technological innovations while remaining vigilant about the associated risks, such as cyber risk.

To that end, as part of the Vision 2020 programme (see Chapter 6, Section 6), the Eurosystem has developed and launched (in November 2018) the TARGET Instant Payment Settlement Service (TIPS) for central bank money settlements. An 'instant payment' is one that can be made 24 hours a day, seven days a week, with immediate transfer of value, credit to the beneficiary's account and availability of funds. Although similar payment systems already exist in countries such as the United Kingdom ("Faster Payments"), Singapore ("Fast and Secure Transfers – FAST"), Denmark ("Express Transfers") and Australia ("New Payment Platform – NPP"), the introduction of instant payments in the euro area is a new innovation in a market of 340 million people in 19 countries. TIPS is a tangible illustration of how the Eurosystem both adapts to market developments and innovations by enabling private players to take advantage thereof, while relying on Eurosystem infrastructures capable of implementing them, and works to promote the harmonisation and interoperability of Europe's payment markets.

Lastly, the Eurosystem has also begun work to assess the potential of blockchain technology applied to financial market infrastructures. The ECB is similarly continuing work to test potential blockchain uses in market infrastructures, specifically in conjunction with the central bank of Japan as part of the Stella project.⁹ During the first phase of their cooperation, the ECB and the Bank of Japan sought to analyse whether their payment systems' functionalities

could operate efficiently and securely in a blockchain environment. The second phase, which ended in March 2018, focused more on implementing a delivery versus payment (DvP) system in a blockchain environment. The banks concluded that the technology was too immature to be used satisfactorily either for large-value payment systems or to manage DvP issues (particularly operational risk management).

3.1.2. The Banque de France's initiatives

The LAB is an experimental laboratory set up by the Banque de France in 2017 as a space for exchange and work with innovative players based on calls for contributions. Its objective is to review the opportunities and risks of new technologies, carry out strategic monitoring of their development and assess their potential for the Banque de France's various business lines and working methods. A concrete example of the Banque de France's action in the area of data management is the "Data Lake" initiative – a set of projects aimed at using new technologies such as artificial intelligence and big data management in the Bank's information system and thereby strengthening its ability to fulfil its financial and monetary stability role.

Meanwhile the Banque de France launched a software program using blockchain technology to manage the identifiers assigned to direct debit issuers such as EDF and the French Treasury, called the SEPA creditor identifier (ICS). This identifier is essential for issuing SEPA-format direct debits, as once it has been assigned to a direct debit issuer, the debtor's banker checks that the identifier indicated in the direct debit received is identical to that shown on the mandate signed by the client.

The software, developed by the Bank under the MADRE project, was built based on the suggestions of commercial banks, given that they are the ones who request identifiers on behalf of their direct debit issuing clients.

9 http://www.ecb.europa.eu/pub/pdf/other/ecb.stella_project_report_september_2017.pdf
http://www.ecb.europa.eu/pub/pdf/other/stella_project_report_march_2018.pdf

Blockchain technology was chosen for several reasons:

- it gave the banks a role in implementing the service (whereas until then it had been the Banque de France that assigned the identifiers). Once it became each account-holding institution's responsibility to decide whether or not its clients could issue direct debits – and therefore have an ICS – the logical next step was to implement decentralised ICS request input management by all the banks in the market;
- it made it possible to immediately provide the new identifier, whereas previously it took several days between the request and the allocation;
- the file containing these identifiers could be used to test this new technology in a real-life situation, whereas before, despite being the subject of numerous laboratory experiments in closed test environments, it was still rarely used for professional purposes.

The main French banks and the Banque de France worked together closely to develop this new software, and the new system went live on 15 December 2017. The partner banks joined the blockchain venture in two main phases, in March and June 2018. For its part, the Banque de France continues to process identifier requests from banks that do not participate in this project, thereby ensuring the coexistence of two systems – one traditional and the other based on blockchain technology.

3.2. Central banks' oversight role, at the intersection of innovation, stability and regulation

While the current wave of technological innovations and the emergence of new players are creating new opportunities for the financial industry in general and for market infrastructures and payment systems in particular, they also pose specific risks and challenges, particularly in operational,

legal and financial terms, which it is the financial system's regulators, overseers and supervisors' job to manage.

3.2.1. Ensuring the efficiency and security of financial market infrastructures

The regulations applicable to market infrastructures reason in terms of functions performed and services provided to the market. They make no prescriptions as to the technology used to perform these functions and services. Whether the technology used is blockchain or another, all that matters from a regulatory point of view, insofar as a service such as settlement and delivery meets the definition of the central securities depositories regulation (CSDR - see Chapter 12), for example, is that it complies with the relevant rules.

Similarly, the status of the player providing the service is not taken into account. Whether it is a new entrant or an established player, if it performs functions that fall within the scope of market infrastructures, it must comply with the relevant regulations: CSDR, European market infrastructure regulation (EMIR) or the systemically important payment systems (SIPS) regulation.

Regulatory neutrality as regards technology and participants aside, the most advanced initiatives for applying blockchain technology to post-market activities¹⁰ raise two, more specific, implementation challenges: compliance with the delivery-versus-payment (DvP) principle (see Chapters 5 and 18) and use of central bank money as a settlement asset (see Chapter 5).

As regards DvP, initiatives based on blockchain technology and offering a solution for transferring an asset in exchange for a payment should be able, if they were developing effectively, to ensure the DvP of the transactions they process. This mechanism is important because it eliminates settlement risk (or principal risk), i.e. that of not being paid despite having

¹⁰ Improvement of the commercial paper processing chain, post-market solution for listed and unlisted SME securities, solution for monitoring fund liabilities, etc.

delivered the asset, or not having the asset delivered despite having made the payment. To meet this requirement, blockchain technology-based solutions would have to be able either to have the assets and the settlement asset (money) on the same platform (integrated system) or to ensure very close interconnection between the platforms used to process the assets on the one hand and the settlement asset on the other (interfaced system).

As regards the settlement asset, the Principles for Financial Market Infrastructures (PFMI) consider that the safest settlement asset is central bank money, and that this should be used wherever possible. This would require solutions based on blockchain technology to access central bank money, and thus to meet the central bank's access criteria.

These two elements are fundamental to ensure the security and efficiency of market infrastructures. For initiatives with a securities settlement and delivery dimension, responding to these imperatives may result in use of the T2S settlement and delivery platform (see Chapter 14), which can be used for DvP in central bank money. This requires the player offering this service to have CSD status, in accordance with the provisions of the CSDR. This would both ensure the security and efficiency of post-market activities and offer the benefit of the improvements that blockchain technology potentially provides.

3.2.2. Innovation creates new threats for the financial system

Innovation can pose fraud and security-related problems due to its digital nature and the cyber environment in which it functions, combined with the rapidly increasing numbers of players involved in financial and payment processes, the greater circulation of personal data and the proliferation of potential "points of failure". These new 'cyber' risks are sparking considerable concern sector-wide, including for proven market infrastructure

and payment technologies, particularly online card payments, which account for more than two-thirds of all card payment fraud in France. Moreover, the most recent technologies that have not yet been tested on a large scale, such as blockchain, are likely to create new security risks that warrant early and permanent monitoring.

Technological innovation could also threaten long-term financial stability owing to the process of increased automation. The development of high-frequency trading, for example – which, furthermore, is questionable in terms of its economic usefulness – could undermine financial markets' resilience in times of stress. New services such as smart contracts, which represent the computer coding of predefined situations,¹¹ can be integrated into a blockchain: this could create new channels for the transmission of shocks, or new forms of interdependence or procyclicality and, therefore, be a potential source of financial instability.

Unchecked technological innovation could also threaten market integration, particularly in Europe, where there have been considerable efforts over the last ten years to strengthen financial market harmonisation. Such efforts were evident in securities markets, for example, with the launch of T2S in 2015. At the same time, the current proliferation of new technologies, standards and protocols that are not fully interoperable, at least at this stage, poses a risk of market fragmentation. Moreover, this could result to some extent in social fragmentation if the new payment instruments are less available to the least well-off members of society.

3.2.3. Ensuring the security of payments and transactions

In this context, public authorities play a key role in making it possible to take full advantage of innovation while mitigating the threats it generates. Technological innovation is only beneficial to the economy as a whole if it is carried out in a secure environment.

¹¹ Such as "Sell if the following price level is reached".

Technological innovation reinforces the need for cooperation and dialogue between all the parties concerned. In France, for example, in coordination with the French Financial Markets Authority (AMF), the ACPR launched the Fintech-Innovation Unit (Pôle FinTech Innovation) in June 2016 to address this need. The ongoing dialogue between regulators, supervisors and players (banks, insurance companies and fintechs) involved in innovative projects ensures that innovations are properly understood, necessary regulatory changes promptly identified

and information disseminated effectively among the various stakeholders. The Banque de France and the ACPR have committed to a graduated and proportional approach to regulating and supervising fintechs. Such an approach differs from the 'sandbox' solution favoured for example by authorities in the UK, which has an associated threshold effect risk. As a reminder, the sandbox approach consists in regulators granting companies permission to experiment with new services relating to payments, money and securities transfers and financial investments within a simplified regulatory

Box 4 – ACPR’s Fintech-Innovation Unit

In June 2016, the Banque de France created a fintech unit within the ACPR to support changes in the French economy. Working in close coordination with the AMF, this unit aims to be the ACPR’s single entry point for fintechs, firstly to ensure they are promptly regulated at the outset and secondly to better understand their innovations in order to be able to monitor them.

The unit interfaces with the ACPR departments concerned and, where the nature of the project so requires, the Banque de France and the AMF. The Fintech-Innovation Unit also assesses the challenges that digital transformation and technological innovations pose to the banking and insurance sectors, and participates in international projects in this area.

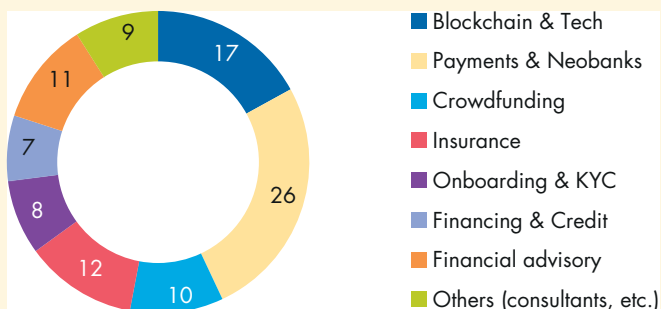
Lastly, together with the AMF’s Fintech division, it coordinates the FinTech Forum, a body for monitoring, dialogue and proposals on fintech and innovation regulatory issues, which brings together fintech professionals, experts and public authorities (CNIL, the National Cybersecurity Agency of France (ANSSI) and TRACFIN).

The Forum has established four priority work areas:

- Proportionality in approval and control;
- Use of data;
- Client identification and knowledge (KYC); and
- Market attractiveness and competitiveness.

Breakdown of innovators attending the Fintech-Innovation Unit

(%)



Source: ACPR.

framework, for a predefined period and/or level of activity. While this approach has been introduced in a few other countries, such as Singapore, it raises issues of consumer and investor protection and of equal treatment between fintechs and established players who could offer the same services but do not have the light regulation advantage. It also poses a threshold effect problem in that once the trial period has elapsed or the predefined activity level has been reached, the fintech must then comply with all other applicable regulations, without checks having taken place at the sandbox stage that it will be able to do so.

These developments involve rethinking regulation in such a way as to strike the right balance between innovation and security, which must make it possible to simultaneously achieve several objectives: to take full advantage of the sources of efficiency and savings that innovations generate, to protect the consumer and deal with financial stability issues, and to ensure that innovation benefits all parties, in particular in the form of new services and lower costs. This balance can only be achieved by means of appropriate and proportional rules, based on the risk profile of the service provided and not on the supplier's nature or legal status.

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