CHAPTER 6

Payment circuits and systems: typology

Updated on 17 December 2018

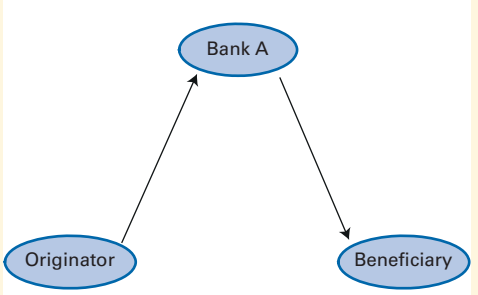
A payment is a transfer of a monetary asset to discharge a debt. A number of circuits can be used to conduct such transfers, depending on the type of payment concerned. These can be either intra-bank circuits or interbank circuits, with the latter taking different forms: bilateral (correspondent banking),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

Intra-bank ("on-us") circuit



The payment's originator and beneficiary both hold accounts at the same bank.

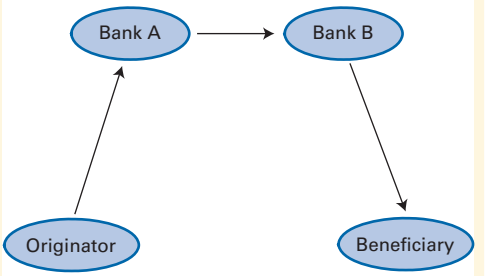
Bank A debits the originator's account and credits that of the beneficiary.

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 2016[1] 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 banking[2] 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/*

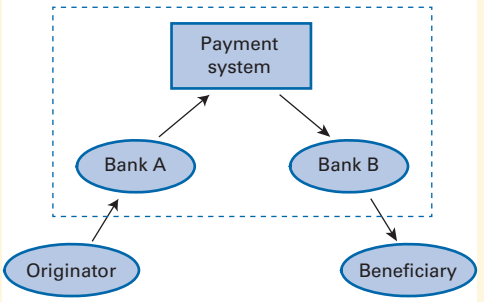
3 *https://www.bis.org/cpmi/publ/d147.pdf*

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

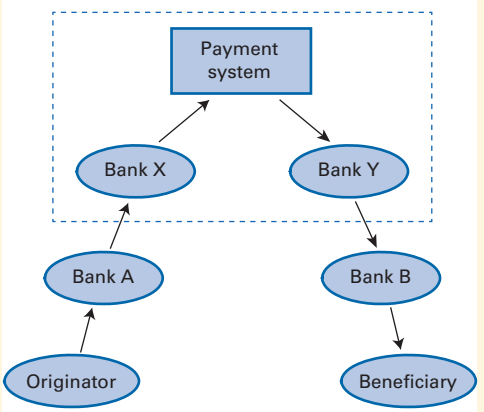
Multilateral interbank circuit using a payment system



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 enable 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 SAGITTAIRE[1] 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.

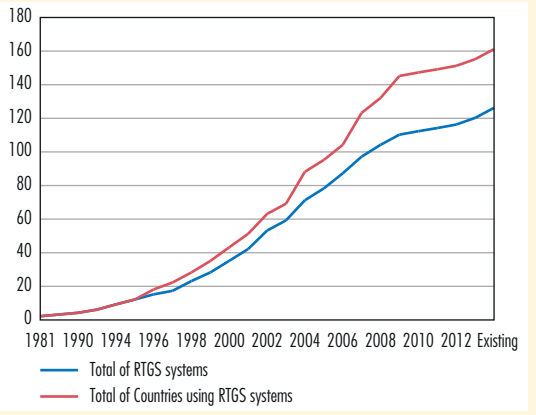
To overcome this constraint, liquidity-saving devices were progressively incorporated into RTGS systems. Examples of these mechanisms are provided in Chapter 7, Section 4 on TARGET2, the Eurosystem's RTGS system.

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.