



Instant revolution of payments?

The quest for real-time payments

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Traditional retail payment systems do not match the immediacy and ubiquity of digital processes in commerce and social life. In several countries, instant payment systems have been introduced to bring payments up to the speed of digital processes, but also for more general economic reasons like infrastructure modernisation or financial inclusion.

Instant payments come in different shapes and sizes. Instant may simply mean the issuance of a payment guarantee to the payee in real-time. The ECB, though, defines instant payments as real-time crediting of the payee's account.

In the euro area, the ECB calls for the establishment of a pan-European instant payment solution, building on SEPA. The aim is to prevent a re-fragmentation of the euro payments market through instant payment systems developed for national markets only.

However, different technical and organisational set-ups can feasibly provide real-time services: The main alternatives are closed-loop transfer structures, open-loop payment systems or decentralised payment networks.

Mobile payments will be an attractive alternative to cash payments if executed instantaneously. In other use cases, instant payment execution will be an upgrade of existing electronic payment solutions and a platform for further service innovation.

The development of instant payment solutions opens up opportunities for new processes, technologies and providers. The type of payment service provider also determines the type of money transferred: bank deposits, e-money or privately issued money.

Reach and large transaction numbers: Widespread use by payers and payees, as well as providers' ability to process large numbers of transactions will remain crucial for success in retail payment services, also in real-time, and regardless of the technical set-up.

The rule 'same business, same regulation' needs to be applied to safeguard the operational and transparency standards achieved in the payments market. Besides, a level playing field for all payment service providers will foster innovation and competition, rather than regulatory arbitrage.

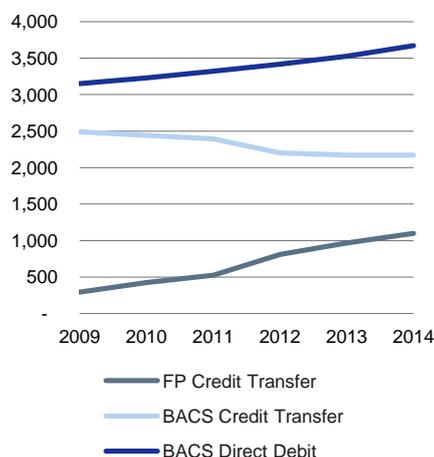


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UK: "Faster Payments" eat into traditional BACS credit transfers

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Number of transactions in millions



For comparison: Card payments are the most frequent payment instrument in the UK with 13 billion transactions in 2014.

Sources: Payments UK, Deutsche Bank Research

What are instant payments?

Payments that are completed instantly, of course! From the user's perspective, a payment is completed once the payee has received the money. However, this is not as trivial a question as it seems, especially in the case of non-cash payments.

When speaking about electronic payments, "instant" (also "immediate", "real-time") means less than one minute, ideally only a few seconds. There is a general understanding that the payer and the payee of an instant payment will receive speedy payment confirmation. Making a more detailed examination, however, there are various definitions of "instant": the instant issuing of a payment guarantee to the payee, or the instant crediting of the payee's account. The latter means that the beneficiary can immediately re-use the funds for another transaction.

During the past 15 years, retail bank payment systems with (close to) instant crediting of the payee's account have been introduced in several countries. In Europe, the UK took a lead in establishing "Faster Payments" in 2008, which is gaining ground in the UK market for credit transfers. More recently, instant payment systems were established in Poland (2012), Sweden (2012) and Denmark (2014).¹ It is too early, though, to judge the success of these newly implemented services. Overall, it is difficult to estimate the market's demand for real-time payments as it is hard to gauge what degree of immediacy in fund availability is expected by payers and payees. Market players do and will develop different technical and legal systems to offer instant payment services, and this study will explore a range of feasible solutions. Technological advances open up new possibilities for making electronic payments. Nevertheless, the basic drivers in electronic payments markets persist, especially reachability and economies of scale.

ECB definition

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"Instant payments are hence 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 payee's account (within seconds of payment initiation, with the payer receiving confirmation thereof and the payee being able to use the amount credited) irrespective of the underlying payment instrument used (credit transfer, direct debit or payment card) and of the underlying arrangements for clearing and settlement that make this possible."

Source: ECB, "Pan-European instant payments in euro: definition, vision and way forward", 12 November 2014.

In Europe, the European Central Bank has taken the lead on pushing and shaping the development of a real-time payments system based on its mandate to promote safe and efficient payment systems. The ECB calls for at least one pan-European solution for instant euro payments based on one common scheme or several interoperable schemes.² The solution should be a layered, open-loop set up leveraging the harmonisation achieved by SEPA³. The ECB explicitly defines a real-time payment as a fund transfer whereby the funds are immediately credited to the payee's account. The central bank is indifferent, though, with regard to the payment instrument or clearing and settlement procedures chosen by the payment service providers.

The European Retail Payments Board (ERPB) agrees with this definition but makes explicit mention of different options for clearing (bilateral interbank clearing or clearing via infrastructures) and settlement (with guarantees between banks or in real-time).⁴ The ERPB is composed of supply and demand side representatives of the European retail payments market. It supports the ECB's quest for a pan-European or interoperable instant payment solution in order to prevent a fragmentation of the single European market. At the ERPB's request, the European Payments Council (EPC) – a supply side industry body – developed a scheme for instant payments based on the SEPA Credit Transfer. There will be further work on open questions that remain regarding the scheme

¹ "Flavours of fast. A trip around the world in immediate payments", Clear2Pay, June 2014.

² ECB, "Pan-European instant payments in euro: definition, vision and way forward", 12 November 2014.

³ Single Euro Payments Area. For a list of countries and further information please refer to <http://www.ecb.europa.eu/paym/retpay/paymint/html/index.en.html>.

⁴ Euro Retail Payments Board (ERPB), Statement following the second meeting of the ERPB held on 1 December 2014, published at www.ecb.int.



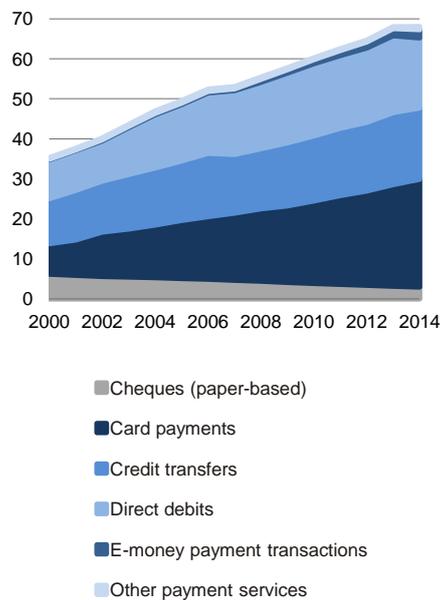
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as well as clearing and settlement. The ERPB expects the instant payment scheme to be ready for implementation by November 2017.⁵

Electronic payments on the rise

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Number of transactions in billions, euro area



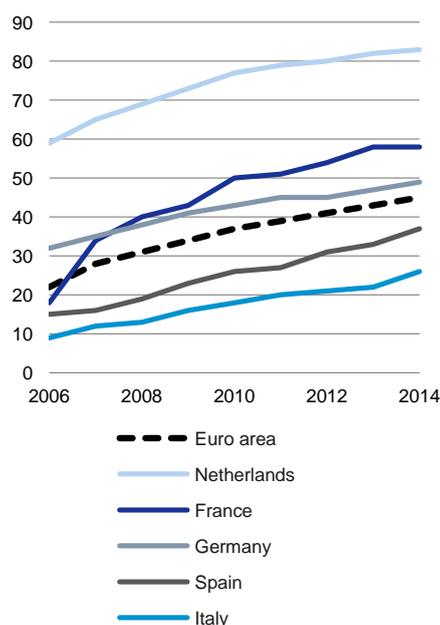
Note: The number of payments stagnated in 2014 due to changes in the payment statistics methodology.

Sources: ECB, Deutsche Bank Research

Online banking ever more popular among Europeans

4

Share of internet banking users in total population in %



Sources: Eurostat, Deutsche Bank Research

Why instant payments?

To this day, cash is the only instant payment method of broad importance and with a pan-European reach in the euro area: The moment a payer hands over euro banknotes or coins the recipient possesses this amount of money and can use it immediately for other transactions. By contrast, the prevalent electronic retail payment methods in Europe – card payments, bank transfers, direct debits – usually imply an execution lag of one day between the time when the payer dispatches the payment instruction and the time the recipient will be able to re-use the transferred amount of money.⁶ Likewise, the payer and/or the payee do not always have access to instant payment confirmation.

This may come as a surprise in a world where the internet – online or mobile – has introduced easy, fast and ubiquitous access to information, communication and commercial transactions to most consumers and businesses in Europe and around the globe. Consumers increasingly expect to be able to buy and pay anytime, anywhere. Digitalisation is changing the way people conduct business and is also opening up new technical possibilities for making payments. E-commerce now accounts for 14% of retail sales in the euro area.⁷ Indeed, online shopping is one example which demonstrates that the established electronic payment instruments were originally designed for point-of-sale (POS) situations, payroll or bill payments, and do not cater to specific needs in the online world.

Banks and card payment companies, the dominant incumbents in the payment market, are expanding their service offerings to adapt to the requirements of non-traditional payment situations. More and bolder payment innovations are coming from a plethora of new non-bank payment service providers. Many of these are start-ups and belong to the new “fintech” industry.⁸ Non-banks are competing with banks by offering specific value added services along the bank payments chain, e.g. convenient and time-saving payment initiation. But there are also large established firms like telecom companies, web-based retailers or internet service providers entering the payments business. They tend to offer end-to-end transaction services based on fast in-house book transfers that bypass incumbent payment systems.⁹ The rise of mobile payments also drives the demand for real time payments.¹⁰ Mobile payments with instant execution are expected to offer consumers an attractive alternative to cash payments. Shifting hitherto cash payments to electronic payment methods would considerably enlarge the market and the profit pool for non-cash payment service providers.

Notwithstanding the wave of digitalisation, regulatory authorities have been the driving force for the development of those instant retail payment systems that already exist. Supervisors (usually central banks) participate in national retail payment markets as catalysts for change or even as operators of retail payment systems. Central banks have pushed for immediate retail payments for different reasons like improving financial inclusion (e.g. Kenya), strengthening customer

⁵ ERPB, Statement following the fourth meeting of the ERPB held on 26 November 2015, published at www.ecb.int.

⁶ Directive 2007/64/EC on payment services in the internal market (“Payment Services Directive I”) As of 2014. Source: Eurostat.

⁷ Dapp, Thomas F., “Fintech – the digital (r)evolution in the financial sector”, Deutsche Bank Research Current Issues, November 2014.

⁸ Bank for International Settlements, “Non-banks in retail payments”, September 2014.

⁹ In this study, “mobile payment” means a payment which is initiated via a mobile device (e.g. smartphone), regardless of the underlying payment instrument or transfer system.



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protection (e.g. UK), or due to high inflation rates (e.g. Brazil).¹¹ These examples show that the urgency of real-time payments – as judged by regulators or market participants – also depends on the existing technical infrastructure and service level in a given national market as well as on the general economic and financial development of a country. In developed markets, the switch to instant payments usually implies for incumbent payment service providers a need to upgrade or substitute existing infrastructure, which makes the firms’ investment decisions more difficult. In emerging markets, by contrast, a lack of electronic payments infrastructure or a large number of unbanked citizens can make an investment in a new and instant payment system more attractive for providers.

Users’ perspective: payment use cases

The debate on instant payments mainly focuses on retail payments, which are only vaguely defined. From a user’s perspective, retail payments are described as “everyday payments between individuals – private persons, companies, NGOs, government agencies – of relatively low value and typically not of a time-critical nature”.¹² Electronic retail payments comprise many different instruments like credit transfers, card payments, direct debits, remittances or e-money transactions. Most electronic payment instruments can be initiated via various access channels, e.g. internet (online or mobile), plastic card, ATM¹³ or even paper-based in a brick-and-mortar branch. The time lag between payment initiation and execution is usually one business day, because the clearing and settlement of payments for efficiency reasons is done in batches once or several times per business day (see below paragraph on open-loop).

Typical payment use cases

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Parties	Location of payer and beneficiary	Typical use cases	Typical payment instruments
C2C (P2P)	Proximity	Informal payments (e.g. pocket money)	Cash
	Distant	Allocation to distant family E-commerce, internet auctions	Remittance, credit transfer, e-money transfer E-money transfer, credit transfer
C2B	Proximity	Point-of-sale	Cash, card payment
	Distant	Bill payment E-commerce	Credit transfer, direct debit Card payment, e-money transaction, credit transfer, direct debit
B2C	Proximity	Change, refund	Cash
	Distant	Payroll, e-commerce refund	Credit transfer, card payment
B2B	Distant	Invoice payment	(Same-day) credit transfer

Source: Deutsche Bank Research

The choice of payment instrument and access channel depends on the use case: the parties involved, the situation in which a payment is initiated and the reason for the transaction. The parties involved are consumers (C) and/or businesses (B). For simplicity, public authorities are also included in “businesses”. Basically, two distinct payment situations can occur: both payer and payee are in the same place (proximity payment) or they are not (distant payment). A POS transaction when checking out at a store is a typical proximity payment. Naturally, the time lag between the seller receiving the purchase price and the buyer receiving the goods is very short as these payments are mostly

¹¹ Boston Consulting Group, SWIFT, “Time for real-time payments?”, Presentation at Sibos Boston, October 2014.

¹² ECB, <http://www.ecb.europa.eu/paym/retpaym/undpaym/html/index.en.html>.

¹³ Automated Teller Machine.

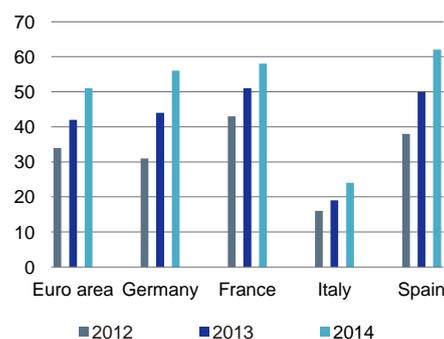


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Widespread mobile internet access

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Percentage of population aged 16-74 using mobile internet access



Sources: Eurostat, Deutsche Bank Research

made in cash or by card (the merchant usually receives an instant payment guarantee by the card system). If payer and payee are transacting from different places, there is usually a longer time lag between the receipt of money by the payee and the delivery of goods (or services) to the payer. Table 5 depicts typical payment use cases.

The option to pay instantaneously is certainly a service enhancement in all payment situations. However, the value added by instant payments will be greater in some use cases than in others. Mobile payments can offer payers and payees a true and attractive alternative to cash payments if they are executed in real time. Comparable to cash payments, the money could be transferred immediately, also between consumers (also called person-to-person/P2P). This is a market segment where electronic payments have not been successful in the past¹⁴ due to a lack of speed and a lack of end-user devices. With today's high adoption of smartphones and other mobile devices in Europe, virtually anybody can technically initiate a transaction as well as receive a payment confirmation in any place. Mobile instant payments are even more convenient than cash payments if linked to an account as trips to the ATM become obsolete. Mobile instant payments are also an attractive alternative in POS situations (C2B) with the potential to substitute cash as well as card payments. In comparison to card payments, which offer merchants an instant payment guarantee, real-time payments could mean an instant crediting of funds, i.e. an improved liquidity position for the merchant.

As regards e-commerce, though, instant payment execution by itself will not overcome the lack of trust between sellers and payers if these are unknown to each other, for example a small merchant and a client or two private persons. There will still be a time-lag between the physical delivery of the goods purchased online and the payment of the purchase price. Therefore, the party who fulfils first runs the risk that the other party will not deliver. In an extreme case, the buyer will not pay in advance of receiving the goods and the seller will not ship the goods before receiving the corresponding purchase price.¹⁵ Mitigation can be achieved by services added to the actual payment, e.g. escrow solutions for commercial transactions between parties who cannot reasonably assess each other. In this set-up, the payment service provider will not release to the seller the (full) purchase amount received from the buyer until the latter has received the merchandise.

In some use cases, instant payment execution will be a limited improvement in service compared to existing instruments. Therefore, repeated transactions between consumers and businesses – like utility bill payments or payroll payments – are not an obvious starting point for offering instant payments. Neither are urgent high-value payments, which occur typically between businesses and are already executed intraday.

Providers' perspective: technical set-up

Cash enables real-time proximity payments. Cash is central bank money. For cash payments, payers and beneficiaries need a purse but not an account. What about electronic real-time payments? Existing and planned real-time payment solutions vary in many aspects. Most of them are centralized and account-based systems, transferring commercial bank money or e-money. However, virtual currency schemes can combine currency and payments characteristics and are rather decentralized. Below, we will present different solutions for setting up and operating instant retail payment networks. In order

¹⁴ "Innovations in retail payments", Committee on Payment and Settlement Systems, BIS, May 2012, p. 56.

¹⁵ Ibid., p. 30.



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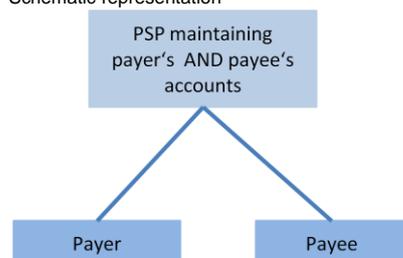
to capture the wide range of traditional and new services, we use a wide definition of instant payments: i.e. payments with instant confirmation, instant payment guarantee and/or instant posting of funds.

Closed-loop systems

Three-party payment system

7

Schematic representation



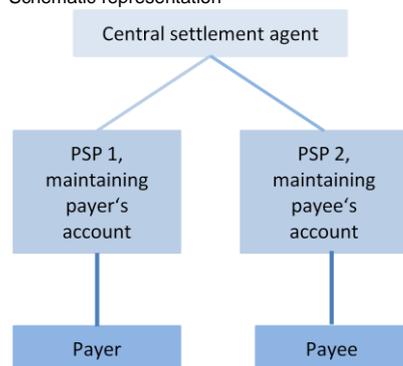
Source: Deutsche Bank Research

In closed-loop payment systems (also “three-party-systems”), transactions only take place between consumers and/or businesses holding accounts with one specific payment system provider. This set-up allows the payment service provider to handle fund transfers as book-to-book transactions (also: in-house transactions). There is no need for settlement between different account-maintaining institutions, thus facilitating real-time processing. This set-up is both the basis for some incumbent payment systems and for newly introduced services, some of which deliver in real time. Three-party card payment systems have long offered card payments for both merchants and consumers maintaining direct links with the card company. Card payments – if accepted by the system - typically include an instant payment guarantee to the merchant. E-money institutions (such as Paypal¹⁶) are a relatively new type of closed-loop payment service provider. Payment users convert bank deposits into e-money issued by the provider for (real-time) transactions with other users who hold e-money accounts with the same provider. Also, points earned in bonus programmes to be used at defined retailers are closed loop systems. Service providers of closed-loop systems tend to be non-banks offering end-to-end payment services, usually by leveraging a large network of clients from their main business line. However, book-to-book transactions can also be credit transfers via bank accounts if both payer and payee hold their account with the same credit institution. In this case, instant confirmation and posting is a question of adapting the bank’s in-house technology and processes which are basically geared towards batch-processing of high payment numbers in a four-party-system.

Four-party payment system

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Schematic representation



Source: Deutsche Bank Research

In an open-loop system (also “four-party-system”), users can maintain payment accounts at different institutions. The prevalent four-party payment systems are bank payment systems and card payment systems. Open-loop systems are characterised by coordination among all participating providers to create and adhere to common standards. At the same time, though, they enable these participants to compete for business by offering payments and value-added services at differing price and service levels.

The bank payment system is a tiered network with a central point for settlement. If payer and beneficiary maintain accounts at different banks, a payment requires the exchange of payment information (clearing) and the actual transfer of funds (settlement) between those two institutions.¹⁷ The clearing of a payment comprises the sorting and transmitting of payment orders prior to settlement. Thus, clearing focuses on the processing of the payment information. By contrast, settlement is the transfer of funds which requires account entries: the sending institution’s account at the settlement agent is debited and the receiving institution’s account is credited. Typically, the central bank serves as settlement agent.¹⁸ The banks, in turn, debit and credit their customers’ accounts. High value and time-critical payments are usually cleared transaction-by-transaction

¹⁶ Starting out as an e-money institution in Europe, Paypal has since acquired a banking licence in Luxembourg, but continues to operate its payment services based on e-money.

¹⁷ For a detailed description and definition of payment clearing and settlement, and bank and card payment systems, please refer to “The Payment System”, European Central Bank, 2010.

¹⁸ Ibid. Alternatively, banks can use corresponding banking structures for settlement.



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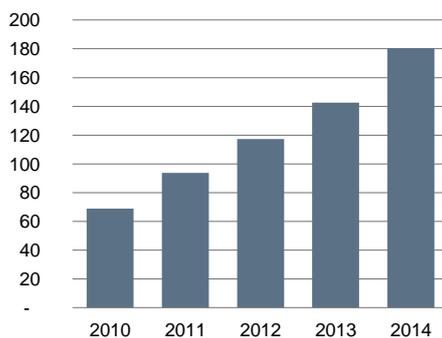
and settled between banks in a Real Time Gross Settlement (RTGS) system. Retail payments, by contrast, are usually processed in slower low-value payment systems employing cost-saving clearing measures like batch processing, netting and central automated clearing houses (ACH). So far, the priority has mostly been the efficient rather than the real-time processing of large low-value payment volumes.

Open-loop systems with an additional intermediary domain

Dutch iDEAL online payment service:
issues instant payment guarantee

9

Number of transactions in millions



Reminder: The total number of credit transfers in 2014 in the Netherlands was 2 billion (including iDEAL payments). In addition, there were 3.2 billion card payments and 1.2 billion direct debits.

Sources: Currence iDEAL BV, Deutsche Bank Research

A new intermediary domain built on top of existing bank payment systems has developed between (online) merchants and consumers, filling the service gaps of traditional payment instruments.¹⁹ Speeding up payments is one but not the only aim of many providers in this intermediary domain. The focus is on making payments more convenient for consumers by offering simple handling and/or integration of payments into customers' online or mobile purchase experience. Banks have the opportunity to benefit from this intermediate layer. By offering application programming interfaces (APIs) banks can facilitate the integration of bank payment services into retailer apps or digital ecosystems.²⁰ But banks also face the danger of becoming merely the providers of accounts that feed the payment accounts which their customers maintain at other payment service providers.

Services provided in this digital intermediary layer of the payment chain are based on the existing "slow" four-party-payment systems in order to generate reach. Therefore, real-time services offered by the new intermediary layer do not allow for a real-time *crediting* of the payee's account. It is payment *information* and/or a payment *guarantee* which are provided real-time. An actual credit to the beneficiary's account in real-time would imply that his bank extended a short-term loan to the beneficiary.

Services in this new intermediary domain are often offered by non-banks (e.g. payment initiation services, digital wallets), but there are also bank offerings. The Dutch iDEAL service is one example of an intermediary service based on the open loop bank payment system. Banks and other payment service providers joined in the iDEAL service to provide online shoppers with easy access to their bank accounts and merchants with an instant payment guarantee. This service is especially successful in the online shopping market: in 2014, 54% of all online purchases in the Netherlands were paid for using iDEAL.²¹

Open-loop payment systems with instant availability of funds

There is a range of different set-ups for the interbank space: batch or individual clearing, different types of settlement, and operating hours. Most existing instant retail bank payment systems, though, are characterised by a separation between a real-time *clearing* layer (especially transmission of payment data between banks) and a deferred net or hybrid *settlement* layer²², i.e. settlement only takes place once or several times a day. This means that banks credit their clients' accounts real-time based on the payment information received real-time from the clearing process. But banks themselves only receive the funds later in the next settlement cycle. Posting funds on the beneficiary's account in real-time

¹⁹ "Opinion Paper on Next Generation Alternative Payments: Infrastructure Requirements", EBA Working Group on Electronic Alternative Payments, European Banking Association (EBA), Version 1.0, 15th December 2014.

²⁰ "Digital Payments Transformation. From transactions to consumer interactions", Accenture, 2013.

²¹ eCommerce Payment Monitor, survey conducted by GfK, Thuiswinkel and iDEAL, www.thuiswinkel.org/bedrijven/publicatie/27/online-betalen.

²² "Flavours of fast. A trip around the world in immediate payments", Clear2Pay, June 2014.



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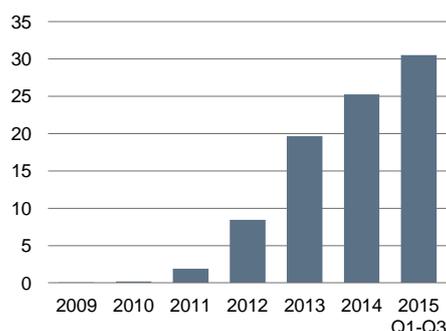
therefore constitutes a non-payment risk for the beneficiary's bank until the next settlement cycle is executed. In order to mitigate this risk, instant payment systems using deferred settlement tend to limit the maximum amount per payment. Also, in the settlement procedure, bilateral or multilateral limits between participating banks and collateralization requirements may apply. Some instant retail payment systems also settle in real time, though. They were developed by enhancing real time gross settlement (wholesale) systems in a way to process retail payments, too.²³

Four-party *card* systems can also go real-time beyond instant confirmation or payment guarantees issued to the merchant for authorized customer transactions. The Canadian domestic debit card payment and ATM network provider offers payments with real-time posting of funds to the recipient's account, including P2P payments.²⁴

Decentralised payment networks: blockchain technology

Bitcoin transactions -
growth from low base level

Number of worldwide Bitcoin transactions
in millions



Sources: Coindesk, Deutsche Bank Research

Blockchain technology offers a way to pay in (near) real time. Moreover, this relatively novel technology is a method that allows the payer to pay the payee without using an intermediary – contrary to other electronic payment systems. Today, Bitcoin²⁵ is the most prominent example among several decentralized peer-to-peer networks using blockchain technology to transfer funds and to ensure trust between participants. A blockchain is essentially a ledger which is maintained by many participants in the network in the form of identical copies. All valid transactions executed via the network are recorded in the blockchain (also called distributed or publicly shared ledger). In order to make changes to the ledger, i.e. conduct transactions, the system uses an inherent process to reach consensus on such changes between all participants. Blockchain technology combines elements from various disciplines, like cryptography (secure communication), game theory (strategic decision-making) and peer-to-peer networking without central co-ordination.²⁶

The Bitcoin concept combines and blurs the aspects of being a privately issued currency and a system to transfer this currency²⁷. Yet, blockchain technology is not restricted to transferring virtual currencies like Bitcoin. Rather, it represents an innovative way to register and transfer any digitally represented value in a secure and decentralized manner. Trust in the integrity of the ledger is reached without central intermediaries. At present, (central) banks or public authorities serve as a source of integrity for commercial bank accounts or for public registers. As regards payments, central agents for clearing prevent double spending and invalid transactions in bank and card payment systems. By contrast, blockchain technology achieves the same within a decentralized network.

Although still in its infancy, blockchain technology might revolutionise the financial industry which is characterised by tiered, centralised networks in many markets. Besides serving as a technology for payments in privately issued virtual or fiat currencies, a large number of new services is being developed in very diverse fields like securities transfers or land registers. However, given the

²³ Summers, Bruce J., Wells, Kirstin E., "Emergence of immediate funds transfer as a general-purpose means of payment", Economic Perspectives, Federal Reserve Bank of Chicago, Q3 2011.

²⁴ www.interac.ca/en/interac-ettransfer/about-interac-ettransfer, March 25, 2015.

²⁵ For a detailed description of Bitcoin and blockchain technology, see "Bitcoin. Market, economics and regulation", European Parliamentary Research Service, April 2014; and Antonopoulos, Andreas M.: "Mastering Bitcoin. Unlocking digital crypto-currencies", O'Reilly Media, April 2014.

²⁶ Ali, Robleh et al, "Innovations in payment technologies and the emergence of digital currencies", Quarterly Bulletin, Bank of England, 2014 Q3.

²⁷ For a detailed discussion, please see "Virtual currency schemes – a further analysis", European Central Bank, February 2015.



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early stage of development, it is still unclear if blockchain technology is suited to underpinning significant instant retail payment traffic in the future.

As regards execution time, instant processing is possible. Whereas Bitcoin transactions usually take 10 minutes until validation and 1 hour to be considered final²⁸, the Ripple network transfers value within seconds, i.e. in real time.²⁹ Increased speed is largely related to a less time-consuming consensus process within the Ripple network, as opposed to Bitcoin's proof-of-work procedure.

The scalability of peer-to-peer payment networks has not yet been tested due to the very limited adoption levels. Yet, scalability is crucial as the number of retail transactions in developed markets is huge.

Scalability will also have an impact on cost and maybe even on security. Centralised retail payment systems can operate at low marginal costs as they benefit from the economies of scale inherent in information processing. Decentralised networks relying on many miners/nodes to process the same candidate transactions in parallel forego the efficiency that comes with central processing. Sceptics expect that distributed (i.e. decentralised) payment systems will not be able to compete with centralised transfer systems on cost, unless they concentrate processing in fewer miners. However, this would increase the risk of system-wide fraud as the current design of consensus processes, and thus the integrity of payments, is based on the condition that no single agent or coalition of agents controls a majority of the processing resources in the network.³⁰

Indeed, the original idea of Bitcoin – to create a peer-to-peer scheme that is independent of intermediaries and central agents – is to some degree being overhauled by real life. The Bitcoin ecosystem now includes a number of financial intermediaries, like wallet providers and exchanges, and these show a trend towards concentration. The Bitcoin trading volume is highly centralised in a handful of exchanges – no surprise given that traders seek liquidity.³¹ Today's extensive research and future technical developments will eventually show if and how blockchain technology can be geared towards processing high volumes in a peer-to-peer network at competitive marginal cost and with sufficient protection against fraud in record keeping and consensus finding.

Also due to the early stage of development, there are open questions regarding the legal status of distributed ledger payments. This can be an obstacle to the widespread adoption in retail markets. At present, consumers enjoy a high level of protection with regard to regulated retail payments and bank deposits, but it is unclear if the respective rules will also become applicable to and will be enforceable on distributed ledger payments. Furthermore, Bitcoin (and similar systems) will have to overcome a rather negative image resulting from the abuse of virtual currencies for illegal transactions. There is in fact still much uncertainty on how existing laws can be enforced in peer-to-peer networks. There are no obvious financial intermediaries which a national authority or court could hold responsible for compliance with rules e.g. regarding tax evasion, anti-money laundering (AML), sanctions and to combat the financing of terrorism (CFT). News about fraud and theft (e.g. Mt. Gox) raised concerns about the safety of funds in the Bitcoin network. Progress in the legal framework and supervision will surely help peer-to-peer networks to gain trust and a higher market share among consumers and businesses. But increased reporting and filtering requirements will also add to the processing cost.

Decentralised networks:
system-wide fraud?

11

"The current design of digital currencies is predicated on the assumption that fraud — the creation of false transactions — can only be achieved by an agent, or coalition of agents, controlling a majority of computing resources on the mining network over a sustained period of time (a '50%+1 attack'). However, a number of researchers have suggested that it may be possible to defraud such schemes while possessing less than a strict majority of computing power. Potential weaknesses have been identified in two key areas: (i) the position of an attacker in the network; and (ii) the strategic timing of when an attacker chooses to release messages to the rest of the network."

Source: Ali, Robleh et al, "Innovations in payment technologies and the emergence of digital currencies", Quarterly Bulletin, Bank of England, 2014 Q3

²⁸ Lo, Stephanie, Wang, Christina J., "Bitcoin as Money?", Current Policy Perspectives, Federal Reserve Bank of Boston, September 2014.

²⁹ <https://wiki.ripple.com/FAQ> Retrieved September 2015.

³⁰ Ali, Robleh et al, "Innovations in payment technologies and the emergence of digital currencies", Quarterly Bulletin, Bank of England, 2014 Q3.

³¹ Lo, Stephanie, Wang, Christina J., "Bitcoin as Money?", Current Policy Perspectives, Federal Reserve Bank of Boston, September 2014.



Economic and regulatory challenges

Payment markets pose specific entry barriers to potential providers due to their network structure and electronic processing. First, reach is paramount for success. A transfer system is only useful if a critical mass of potential payers and payees participate. Indeed, the more people have access to a payment instrument for both sending and receiving funds, the more useful the payment instrument becomes for every single participant. Payment systems thus display positive network externalities. Therefore, potential providers of instant payment services will be in a privileged situation to offer a new payment instrument if they can leverage an existing network with large numbers of participants. This could be incumbent bank or card payment systems, digital ecosystems or any firm with a large retail client base.

Second, the processing of electronic payments is characterised by economies of scale. Payment service providers incur significant fixed costs for setting up and running the payment operation. Thus, the higher the volumes processed, the lower the average cost per transaction. This also seems to hold true for peer-to-peer networks even though overhead costs might be lower than in established and regulated payment systems.

Instant payment services need to be attractive to many users in different use cases. Only then will the transaction volume be large enough to match the cost level of existing retail payment systems. To win users in developed markets, instant payment instruments will have to offer tangible benefits, for example in e-commerce or mobile payments, compared with slower, but well established payment instruments including cash. The service must appeal to two distinct user groups – consumers and businesses – alike. In such a two-sided market, commercial providers need to balance their service offering and pricing in a way that satisfies different user expectations and still allows for a profit.³²

From the consumer's point of view, the primary tangible benefit is convenience: surveys and research on the choice of payment instruments indicate that user-friendliness is the most important criterion for the adoption and intensity of use. A payment instrument has to be easy and convenient to use in comparison to other instruments. Safety, cost and speed are found to be of secondary importance for consumers' choice of payment instrument.³³ This is plausible given that consumers today are often not charged explicit transaction fees and that they are protected from fraud to a certain extent by technical security standards and consumer protection laws.

For merchants, the payment is only one step in the sales process and should be frictionless so as not to disrupt the client's purchase decision. Merchants will usually consider their clients' payment preferences as well as the cost related to specific payment instruments. Instant payment solutions might add to a merchant's payment related costs as he might need to accept yet another payment instrument and incur the fixed costs related to it. But there could be cost savings as well since instant payments offer potential for cross-channel use (internet and POS) and the reduction of cash handling. In the same vein, instant payments will need to offer *providers* a business case, e.g. for earning profits directly or to attain other objectives like acquiring or retaining clients in the payments or other business lines. Business models based on payments data might

³² For a brief discussion of the most relevant economic theories in the field of market infrastructures, please see Kokkola, Tom, "The Payment System", European Central Bank 2010, chapter 5.

³³ See e.g.: Van der Crujssen, Carin and Plooij, Mirjam "Changing payment patterns at the point-of-sale: their drivers", DNB Working Paper, De Nederlandsche Bank, April 2015 (focus on Netherlands, choice between cash and card payments); Schuh, Scott and Stavins, Joanna, "How Do Speed and Security Influence Consumers' Payment Behavior?", Current Policy Perspectives No. 15-1, Federal Reserve Bank of Boston, February 2015 (focus on US market); Goldman Sachs Equity Research, "The Future of Finance. The Socialization of Finance", March 2015.



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also prove viable, especially for non-banks, albeit restricted by data protection rules.

Regulation and supervision of payment services aim to promote safe and efficient payment systems as these facilitate the exchange of money – an essential function in the economy. Therefore, existing services and providers are strictly regulated and supervised.³⁴ In order to make the transfer of money technically robust and secure, regulators call for high operational quality standards. Laws on various legal aspects ranging from payment finality to consumer protection are meant to ensure public trust in the reliability of payment execution and in the safe-keeping of the funds transferred. Also, payment service providers are obliged to support authorities in enforcing the law, for example as regards anti-money laundering (AML) or tax laws. Banks follow strict know-your-customer standards (“KYC”) in order to prevent illegal transactions. Sanctions and measures to combat the financing of terrorism (CFT) decided by political bodies need to be implemented and add to the filtering duties in transaction processing. In the case of instant payments, the filtering for criminal, fraudulent or sanctioned transactions before final execution is a challenge. Nevertheless, all payment service providers also benefit from stringent regulation as it underpins the transparency and integrity of payments. In this respect, the rule ‘same business, same regulation’ needs to be applied to safeguard the operational and transparency standards of current bank and card payments. Besides, this approach helps to create a level playing field for all payment service providers. New services should be based on innovation and competition, not on regulatory arbitrage.

Potential economic impact and outlook

Real-time services will reinforce innovation in payment services and could bring about a change in the market’s competitive structure. There are two main drivers. Firstly, if attractive to users, instant payments can develop into a large market by eating into existing business as well as by creating new opportunities for providers, for example by replacing cash. Secondly, state-of-the-art technology and the widespread access to (mobile) internet in Europe have considerably lowered the entry barriers to payment markets. The market has become more diverse as regards the type and number of providers as well as the services offered. This is also the case for instant services. However, due to the influence of network externalities and economies of scale in electronic payments, a consolidation towards one dominant system is likely in the longer run. Against this backdrop, it is an open question whether the current competitive landscape in payments – open loop networks – will prevail or if one or more closed-loop providers will gain the volumes and reach that are necessary for success in payments. Alternatively, a decentralised payment system could emerge. However, the current non-instant bank payment system will certainly not be replaced any time soon as it provides the necessary bridge between different payment system providers. Only if an instant payment system can match this almost universal reach and develop into the various use cases served by traditional instruments, could the incumbent systems become obsolete.

Will instant payments revolutionise the payments market? As regards the basic characteristics of electronic payments – reach, economies of scale, account-keeping – probably not. But a shift to instant payment execution certainly offers an opportunity for new processes, technologies and providers. In Europe, the ECB is calling on payment service providers to build at least one instant payment system with pan-European reach. However, which instant payment service

³⁴ In the European Union, payment regulation is mostly based on EU legal acts. Supervision is shared between national central banks, national financial authorities, the European Central Bank and the European Banking Authority.



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will be successful – and to which extent – is up to market developments and thus, an ongoing process.

Payment service providers and types of money transferred

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Based on EU legislation, where applicable

Account-maintaining institution	Type of money in payment user's account	Relation between types of money
Central bank	Central bank money (except cash)	
Commercial bank (i.e. credit institution)	Bank deposits (also called commercial bank money), held in EUR, USD etc.	Exchangeable into central bank money at par (by law)
E-money institution	E-money	Exchangeable into commercial bank money at par (by law)
Payment institution (maintaining "payment accounts")	Bank deposits: Payment institution holds funds received from its clients for payment purposes in a fiduciary (omnibus) account at a commercial bank.* The payment institution keeps track of each client's funds by means of "payment accounts".	
Network node, i.e. anybody keeping a copy of the blockchain in a distributed ledger network	Privately issued "virtual currency", based on an algorithm, e.g. Bitcoin	Exchangeable into other currencies (EUR, USD, etc.) at floating rates in private markets (subject to sufficient liquidity)

* Alternatively in highly liquid assets.
Source: Deutsche Bank Research

When looking at potential long-term effects of the payment markets evolution, a new question arises: which money will we pay with? Today, we mostly pay with commercial bank money. Nevertheless, if the prevailing type of payment service providers were to change in the future, this would have an impact on the type of money transferred (table 12). Current EU regulation recognises bank deposits – i.e. money held in bank accounts – and e-money for non-cash payment services.³⁵ Given the wide range of potential instant payment services, bank deposits as the main form of money could lose importance if non-bank providers gained a dominant position in the retail payments market. With the rise of virtual currencies a digital version of privately issued money might gain traction. Obviously, no virtual currency has yet grown to become "money" in the sense of being a medium of exchange, a unit of account and a store of value. But if one were to do so, central banks' monetary policy tools would be affected, too, for example with regard to their ability to influence price inflation.³⁶

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³⁵ Directive 2007/64/EC on payment services in the internal market ("Payment Services Directive I"). This will remain unchanged under the revised Payment Services Directive ("PSD II") which is supposed to be published in December 2015.

³⁶ For more information about digital currencies' potential impact on monetary and financial stability, please refer to Ali, Robleh et al, "The economics of digital currencies", Quarterly Bulletin, Bank of England, 2014 Q3.

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