

From SEPA to the digital euro: payments past, present and future

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Refereed by: Alfred Taudes, Vienna University of Economics and Business

This paper investigates the increasing importance of electronic retail payments for the euro area economy, including Austria. Looking back 20 years, we address payments-related developments and regulatory aspects and summarize recent studies and empirical data on selected economies that underline the growing importance of electronic retail payments systems for competitiveness and economic growth. Specifically, we analyze changes in payment behavior over time, most recently under pandemic conditions. Furthermore, we discuss the role of European players in the electronic retail payment value chain and outline success factors for electronic payment systems. Against this backdrop, we provide an outlook on the potential developments of electronic retail payments in the euro area, 15–20 years ahead. We present the most likely baseline scenario and an alternative scenario, and discuss related policy implications and possible solutions, such as the introduction of a digital euro. An annex offers a comprehensive overview of key characteristics of retail payments processes and systems.

JEL classification: G20

Keywords: retail payments, payment behavior, electronic payment systems, European payments autonomy

Effective and efficient as well as safe and resilient, electronic payment systems are undisputedly one of the critical backbones of modern market economies all around the globe. After all, we rely on such systems to transfer value between financial institutions in a secure and efficient manner, facilitate capital flows and investments, enable citizens and companies to purchase goods and services and governments to collect and make payments without the involvement of cash (Humphrey, 2019).

Due to the increasing globalization and digitalization of economic activities and the accompanying significant changes in customer preferences, the share of electronic transactions in the euro area, including Austria, has grown steadily relative to cash in recent years. Twenty years after the introduction of euro cash, electronic payment systems are more important than ever as the financial plumbing of the euro area's market economies, highlighting the important roles of payment systems for the financial stability and strategic autonomy of all euro area and EU countries.

In this paper, we seek to answer the following questions: How have innovations and regulations impacted retail payment systems in Europe within the past 20 years? (Section 1.) What is the role of retail payments for the EU economies? (Section 2.) How has COVID-19 impacted customer and payment behavior in Europe and Austria? (Section 3.) What is the role of European players in the retail payment chain? (Section 4.) What are the likely scenarios for Europe's future retail payments

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architecture (Section 5, which concludes the paper). On top of that, an annex provides an overview of today's payment systems infrastructures and services.

1 How have innovations and regulations impacted retail payment systems in Europe within the last 20 years?

As a yardstick for analyzing the impact of innovation in payments on European economy, let us first emphasize the benefits retail payment systems are expected to provide. As put forward by Scott (2014, p. 69), the seven desirable benefits of retail payment systems are: “(1) finality and reversibility; (2) universality (ability to use at point of sale (POS) and remotely); (3) recordkeeping; (4) liquidity (maximizing interest earning assets); (5) security and safety; (6) financial inclusion and access; and (7) fungibility and ease of use.” Technological progress, financial innovation and changing consumer preferences have raised the importance of points (6) and (7) – access and ease of use – in particular. New market entrants foster innovation but also create lock-in effects and barriers for competition through the network effects they generate. Here is where the need for regulation comes in.

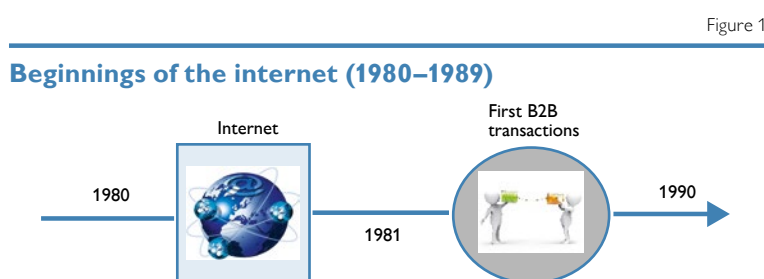
1.1 Twenty years of innovation in payments

Without any doubt, technological innovations over the past 20 years have hugely changed the payments landscape in Europe and beyond. Payments have been and continue to be the activity affected most by technological innovation (Petralia et al., 2019). In recent years, new payment methods, numerous new platforms and interfaces have been developed and innovation is ongoing (Bech and Hancock, 2020).

Developments before the year 2000

If we look into the history of payment methods, cash has long been the predominant method of payment. When newly emerging plastic, credit and debit cards supplemented the cash-dominated payment landscape from 1950 onward, retail payments in particular started to become more diverse. The biggest game changer in this process has been the development of the internet – the networking infrastructure that connects devices together² – from 1960 onward, which opened the door for online shops and online payments. Early milestones (figure 1) include the first ever electronic business-to-business (B2B) transaction made in 1981 (Cashbook, 2020).

In 1990, the World Wide Web (Web 1.0) came into being as a way of accessing information through the medium of the internet. The World Wide Web started as a proposal for a “hypertext project,” the idea being to link up large bodies of data to grant universal access to them (Berners-Lee and Cailliau, 1990). Figure 2 below gives a brief overview of the most important payments-related developments between 1994 and 1999.



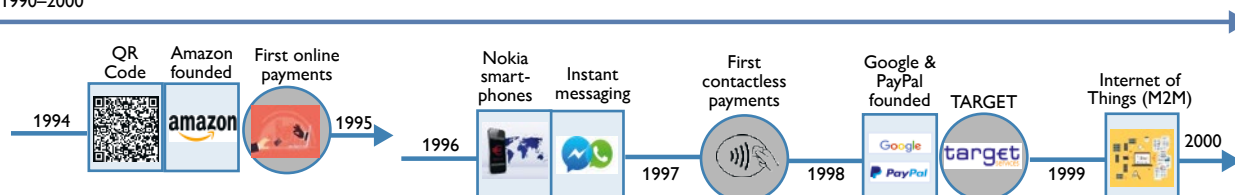
Source: Authors' compilation (photos from OeNB and ZDNet).

² See *A short history of the internet* | National Science and Media Museum.

Figure 2

Payments in the context of Web 1.0 (1990–1999)

WEB 1.0
1990–2000



Source: Authors' compilation (photos from LogosMarken, Newsfeed, OeNB, Tagesspiegel, Wikimedia and Wikipedia).

With the founding of Amazon in 1994, the era of customer online payments started. Also in 1994, the quick response code (QR code) was developed, by the Japanese automotive company Denso Wave, as the next generation of bar codes for accessing online information through scanning.³ In 1996, Nokia developed the first smartphone, which would usher in the mobile payments revolution. In 1997, US Mobil gas stations started to use “Speedpass,” the first ever contactless payment system. It ran on contactless payment devices that clipped onto a key ring (NFC, 2017).

Another milestone in the history of payments was the incorporation of Google and PayPal in 1998. While Google did not start to provide payment services until 2015, PayPal was founded on the very promise of low-cost, almost effortless digital payments for consumers and businesses. The founders' idea was to convince customers to share their emails, banking, and credit card information in return for fast, low-cost payments. Today, PayPal services are available in more than 200 markets worldwide (PayPal, 2022).

The creation of the euro area and the changeover to the euro as the common currency of the euro area economies in 1999 went hand in hand with the creation of the high-value payments system TARGET, which also became operational in 1999 (ECB, 2004). TARGET was meant to further stimulate economic activity, European integration and stability, and designed to ensure safe and efficient payments between national central banks of the euro area. Ultimately, it became the first payments system to exchange final, real-time payments between companies in Europe.

1999 was also the birth year of peer-to-peer (P2P) technology. Within a P2P network, the “peers” are computer systems which are connected to each other via the internet. P2P would later play an important role in the rollout of nearfield communication (NFC) payments.

In 2000, the Internet of Things emerged, which refers to the growing network of noncomputing devices that are engineered to be able to connect and exchange data over the internet.⁴

³ *History of QR Code | QRcode.com | DENSO WAVE and Sorensen (2021).*

⁴ *Internet of Things (IoT) | SUSE Defines.*

Developments after the year 2000

What came after 2000 was a whole new generation of the web, or Web 2.0 (Pacelt, 2021). Figure 3 below gives a brief overview of the most important developments between 2002 and 2008, as outlined below (electronic payments-related legislation at the EU level is addressed in table 1).

In 2002, the development of NFC technology marked a technological breakthrough for electronic payments. NFC is a radio frequency identification technique (RFID) used for the electronic exchange of data. Yet, it took until 2013 for NFC to be used for contactless payments. More recently, NFC became particularly popular during the COVID-19 pandemic (see section 4).

Social media services, in particular Facebook, have almost become a synonym for Web 2.0. Facebook, which was founded in 2004, has its own peer-to-peer payment tool: In addition to its chat function, the Facebook messenger can also be used for sending and receiving funds (Cautero, 2021). Another important innovation of the Web 2.0 era was the video portal YouTube, which was officially launched in 2005 and has been a Google subsidiary since 2006.

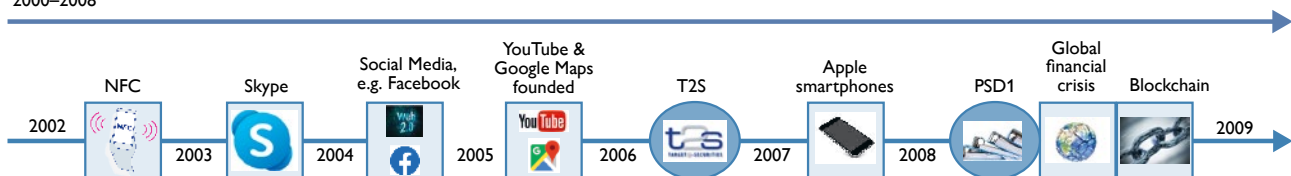
With the further development of smartphones and the introduction of Apple smartphones in 2007, payment behavior was lifted to a new level – now, people were able to pay directly via their smartphones without using a PC. This was the beginning of m-commerce, driven by the specific properties that made mobile phones particularly suitable for processing payment transactions, their ease of handling and their high prevalence in the population (Pacelt, 2021).

The transition to Web 3.0 was marked by the development of the blockchain technology in 2008, which constitutes the technical basis for crypto assets such as bitcoin. A blockchain is a continuously expandable list of records in individual blocks and an application of distributed ledger technology (DLT). A financial blockchain is defined as “an open, distributed global ledger that can record transactions between two parties efficiently and in a verifiable and permanent way” (Cashbook, 2020). What the web does for the exchange of information, the blockchain does for the exchange of value.⁵ Therefore, the blockchain is also referred to as the “Internet of Value” (Bundesverband ITNM, 2016).

Figure 3

Payments in the context of Web 2.0 (2000–2008)

WEB 2.0
2000–2008



Source: Authors' compilation (photos from Content-Manager, GoogleWatchBlog, iStock, OeNB, Omniseure, Wikimedia and Wikipedia).

⁵ *Difference Between Internet of Things and Internet of Value | Difference Between.*

Figure 4

Payments in the context of Web 3.0 (2009–2016)

WEB 3.0
2009–2016



Source: Authors' compilation (photos from Deutsche Bundesbank, Ocdn, OeNB and Wikimedia).

Figure 4 above gives a brief overview of the most important developments between 2009 and 2015, as outlined below (electronic payments-related legislation at the EU level is addressed in table 1).

Bitcoin, the world's first and strongest crypto asset, was developed in 2009. It was designed as a decentralized accounting system in which payments are cryptographically legitimized and proceed peer to peer, that is to say without the need for intermediaries such as banks and without the need for a bank account – unlike more recent digital currency designs, such as the digital euro that the Eurosystem is in the process of exploring.

An important technological phase with a positive influence on m-commerce in particular followed in 2013 with the development of beacons and biometric touch. A beacon is a small Bluetooth device that transmits signals that other devices like your smartphone can see. Biometric touch, the use of electronic fingerprint recognition (Touch ID), was established by Apple in 2013 for unlocking devices. By now, both Apple Pay and Google Pay, but also most banking institutions, use Touch ID for payments authentication.

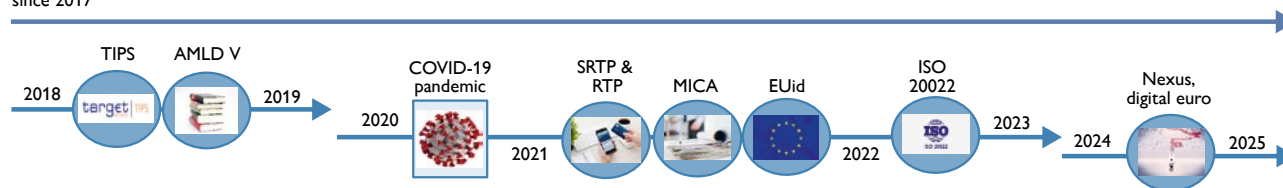
Launched in 2015 as an integrated platform for processing securities against central bank money, TARGET2-Securities (T2S) revolutionized securities settlement in Europe by bringing to an end complex cross-border settlement procedure and the difficulties caused by different settlement practices among countries (ECB, 2022a).

The next paradigm shift, to Web 4.0, started in 2017. Figure 5 below gives a brief overview of the most important developments since 2017, as outlined below.

Figure 5

Payments in the context of Web 4.0 (since 2017)

WEB 4.0
since 2017



Source: Authors' compilation (photos from Indellient, OeNB and Pei).

Web 4.0 is known as the symbiotic web and characterized by a blurring of the boundary between human minds and machines (Pacelt, 2021). Web 4.0 will bring, for instance, virtual reality meetings and artificial systems communicating the way humans do using natural language.⁶

The need for real-time interaction in social and economic terms created the trend toward instant payments systems. The first real-time payments system established in Europe was Faster Payments System (FPS) introduced in the UK (2008), followed by Swish in Sweden (2012), MobilePay in Denmark (2013) and Vipps in Norway (2015). In 2017, RT1 and in 2018 TIPS (TARGET Instant Payment Settlement) Systems were launched as the first pan-European instant payments systems (OeNB, 2022a). TIPS enables payment service providers to offer fund transfers to their customers in real time and around the clock, every day of the year. TIPS was developed as an extension of TARGET2 and settles payments in central bank money – in euro only at the time of writing, but other currencies can be supported as well. TIPS was scheduled to begin settling instant payments in Swedish krona as of May 2022 (ECB, 2022b).

Yet, instant payments have been no effective substitution for cards payments at the point of sale because some issues remain unresolved, in particular payment initiation and requests for payment (also referred to as pull payments, in contrast to push payments).

In June 2021, the SEPA Request-to-Pay (SRTP) rulebook became effective, paving the way for from-account payment solutions at the point of sale (see annex). Growing SRTP use for real-time payment initiation is set to bring benefits for trade merchants, banks, acquirers, billers and consumers.

1.2 History of European payment directives and regulations over the last 20 years

Regulatory action to tighten and harmonize payment regulations on the European level has had the single greatest impact on payments in the last 20 years, with heightened requirements driven by changing payment behavior as well as two key events.

The first event were the attacks of September 11, 2001, that led to increased monitoring for banks of anti-money laundering (AML) and terrorist financing (EC, 2022a). The second event was the global financial crisis starting in 2008, which resulted in regulations such as Basel III introduced to help restore the balance in perceived risk versus confidence in leveraged institutions. These two regulations also marked the beginning of the continuous need for banks to adapt to new requirements and dedicate significant resources to compliance (Hocking, 2018), in line with the emerging regulatory framework (see table 1).

⁶ See *Story of the Internet. From Web 1.0 to Web 4.0 - Botland*.

Table 1

Electronic payments-related legislation at the EU level

Regulation/ directive	Scope/objectives
Payment Services Directive (PSD I)	The PSD I, which was created to foster a more integrated EU payments market, entered into force in December 2007. The directive aimed to increase competition and participation in the payments industry, including nonbanks, and to create a level playing field by harmonizing consumer protection and the rights and obligations for payment service providers and users (EC, 2022b). The PSD I was updated in 2009 and 2012.
Single European Payments Area (SEPA)	In 2014, SEPA was implemented in Europe. SEPA refers to the common payments area of 36 European countries, including all 27 EU countries plus the EFTA countries Iceland, Liechtenstein, Norway and Switzerland as well as Andorra, Monaco, San Marino and Vatican City. SEPA enables customers to make cashless euro payments in an easy, efficient and safe way from just one account by using harmonized payment instruments (OeNB, 2022b).
Payment Services Directive II (PSD II)	In 2015, the PSD I was replaced by the PSD II. Next to enhanced security requirements, the update also included enhanced data protection (Cashbook, 2020). The new rules are intended to better protect banks from fraud when their customers pay online, promote the development and use of innovative online and mobile payments, and make cross-border payment service providers in Europe more secure (EC, 2015). The PSD II is also intended to strengthen financial start-ups ("fintechs").
Regulation on electronic identification, authentication, and trust services (eIDAS)	While working on the PSD, the European Commission also made efforts to develop a comprehensive European identity (eID). The outcome was a regulatory framework, adopted in 2014, that was to enable all European citizens to use digital identification services across the EU. By September 2018, it was mandatory for every member state to make the service available. However, only 19 member states have introduced an eID to date, and not all eIDs are compatible.
5 th Money Laundering Directive (AMLD V)	The AMLD V was published on June 19, 2018. By end-November 2021, all EU member states except Ireland and the Netherlands had reported full implementation. However, infringement procedures were launched against 21 EU member states for the lack or delay of notification of national transposition measures. The AMLD V directive focuses not only on sanctions but also on the redesign of the know-your-customer processes to meet the standards and procedures proposed by the AML and eIDAS regulations (EC, 2020).
Regulation on crypto-asset markets (MiCA)	As part of the digital finance strategy, the European Commission proposed MiCA in September 2021. The regulation supports regulatory safety, enhancing investor protection, innovation, competition and market integrity, reducing market fragmentation and increasing financial stability regarding stable coins. In its proposal, the European Commission differentiates between crypto assets already covered by EU regulations and assets currently exempt from these regulations. For the latter, including stable coins, the European Commission foresees stringent rules for issuers or companies applying for permission to offer services within the common market (EC, 2020).
Regulation on a European digital identity (EUid)	Furthermore, in June 2021, the European Commission proposed a European digital identity (eID) framework. In the future, all citizens and companies should be able to provide proof of their identity, pass on documents in electronic form using an eID wallet and use Europe-wide online services (EC, 2020 and BKA, 2021).

Source: Authors' compilation.

1.3 Outlook

In the years ahead, the focus in Europe will be on the design and implementation of the digital euro, and on better facilitating cross-border payments and implementing data-reach payment formats such as ISO 20022 to support the digital transformation and the emergence of machine-to-machine payments.

The investigation phase of the ECB's digital euro project is scheduled to run until October 2023. The Governing Council will then decide whether to move to the next phase, which would involve the development of integrated services as well

as testing and possible live experimentation of a digital euro. This phase could take around three years.⁷

With technological change and enhanced cross-border payment systems, subject to enhanced security and data protection, payments will become cheaper and faster. A promising project in this context is Nexus, a model developed for connecting instant national payment systems into a cross-border platform. Nexus is a joint effort of the BIS Innovation Hub, Banca d'Italia, the central bank of Malaysia, BCS in Singapore and PayNet in Malaysia. The project has already moved to the testing phase, connecting the payment systems of Singapore, Malaysia and the euro area in order to provide an experimental proof of concept.⁸

2 What is the role of retail payments for the EU economies?

As argued by Yves Mersch, a former ECB Director, retail payments systems make trade easier, increase competition and innovation, foster financial integration and inclusion and complete the single currency project. Furthermore, retail payment systems facilitate the four freedoms of the European Union i.e. free movement of people, goods, services and capital (Mersch, 2014).

According to an ECB study from 2009, banks in countries with more developed retail payment services perform better – both in terms of their accounting ratios and their profit and cost efficiency (Hasan et al., 2009). Due to ease of use, scalability – almost no incremental costs per additional unit – and security, retail payment systems increase competition and innovation by tailoring services toward user preferences and enable e-commerce and m-commerce to thrive. Among all available payment instruments, card payments have been found to be most widespread. This is also confirmed by Scott (2015), who looks into five retail payments instruments, i.e. cash, checks, payment cards, automated clearing house transfers and virtual/digital currencies. His study finds debit and credit cards to be highest in demand, based on a detailed set of characteristics covering diverse interests and objectives of parties involved in payment systems, e.g. finality and reversibility, universality, etc.

2.1 Resilience and financial stability over the cycle

Intuitively, the argument that diversifying the sources of banking income, to include commission income, should insulate bank balance sheets better from credit cycle risks has some merits. This “conventional wisdom” was supported by early academic research and sustained by newer research. However, Baselga-Pascual et al. (2018), while showing that income diversification increases profitability, do not find a significant relationship between revenue diversification and bank risk. They analyzed a large sample of euro area banks across the time period of 2000 to 2012, covering two major economic downturns, the first following the burst of the dotcom bubble and the second after the collapse of Lehman Brothers.

The simplified argument that the use of electronic payments fosters financial stability is the following: as efficient and safe electronic payment instruments are easier, smoother and faster to use, they should ideally act as a catalyst for quicker responses to changing economic circumstances. From a policy standpoint, electronic

⁷ See *FAQs on the digital euro (europa.eu)*.

⁸ See <https://www.bis.org/about/bisih/topics/fmis/NEXUS.htm>.

means of payments should have a higher influential impact on the economic behavior of individuals than traditional payment instruments.

In consequence, economic recoveries should happen faster, contractions should be shallower and reverberations on the economy as a whole less harsh. Therefore, the use of more efficient instruments of payment also increases financial stability.

Initial evidence from the first rounds of COVID-19 lockdowns seems to support this argument. After a couple of weeks, demand for cash recovered to normal levels as people experienced uninterrupted consumption, having switched to internet orders and delivery services and NFC payments, with almost no fraud incidents.⁹ Observation supports the argument of a higher economic resilience due to lower execution risks of payment processes. However, we are not aware of conclusive academic research on this issue.

2.2 Strengthening competition and growth potential

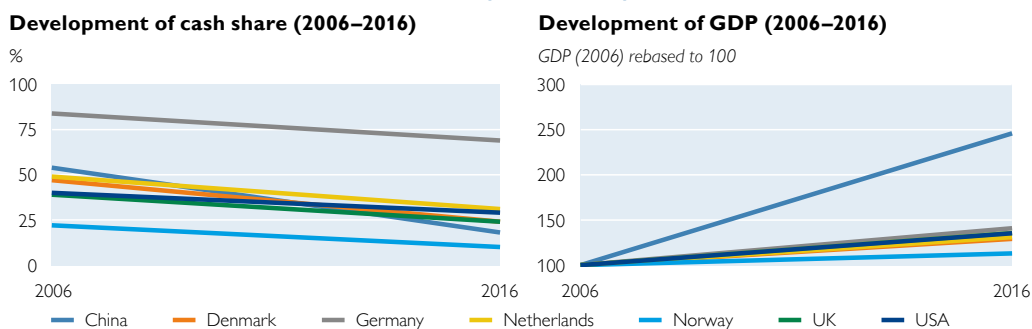
In an international study, Moody's (2016) analyzed the impact of electronic payments on economic growth based on macroeconomic data for 70 countries making up 95% of global GDP. The study suggests that in the period under review, from 2011 to 2015, higher card usage contributed approximately 0.1% of global GDP, or USD 296 billion. The impact of electronic payments on GDP increases with electronic payments penetration rates. Furthermore, increased electronic payments raise efficiency as transaction costs decline and convenience for customers and business rises. Moody's assumed that a higher share of electronic payments also improved government tax collection through more transparent transactions and increased financial inclusion.

The chart below shows the share of cash in payments in seven different countries in 2006 compared to 2016 (IMF, 2019).

This analysis does not imply that there is a causal relationship between a higher share of electronic payments and, *ceteris paribus*, higher GDP growth. While China successfully increased its GDP 2.5 times as the use of cash declined from 54% to only 18% in the observed ten years, Denmark did not see a corresponding nexus in economic growth when its cash share use dropped from 47% to 24%. This misalignment does not come as a surprise, considering the differences of the two

Chart 1

Development of cash share and GDP (2006–2016)



Source: Based on IMF (2019).

⁹ As in other countries, the limit for Austrian NFC payments was increased for convenience to EUR 50 per transaction.

countries e.g. in geographic size, number of inhabitants, level of economic development and education.

A rough comparison of assumingly economically more similar countries like Denmark, Germany and Netherlands shows kind of similar developments in GDP (+29%, +41% and +31%, respectively, from 2006 to 2016) but widely diverging cash share levels. In fact, looking at these three countries, the counterargument could be made that Germany, the country with the highest cash share in 2006 and 2016 among the three by a margin, also posted higher GDP growth rates (+10% over Denmark and +12% over the Netherlands).

In conclusion, based on the above research, we cannot deduce a substantial and durable statistical relationship between electronic payments and GDP development. Nevertheless, the qualitative and intuitively convincing arguments of higher efficiency, increased velocity of money, lower transaction cost and higher convenience, i.e. higher productivity and higher consumer satisfaction, should not simply be discarded. The results from the analysis may be skewed due to characteristics of business cultures and habits of countries and pricing differences of payments instruments at end-customer level.

2.3 Financial inclusion

A study on Latin America and the Caribbean published by the Bank for International Settlements (BIS) suggests that electronic payments “represent a highly potential instrument for fostering financial inclusion as individuals and firms interact in the economy via the payments they make to each other through different instruments and channels” (Morales Resendiz, 2017). Likewise, experts of the United Nations Conference on Trade and Development (UNCTAD) say that mobile money holds the key for financial inclusion in underbanked Africa (UNCTAD, 2018). It is open for discussion whether these findings hold true for developed geographies like the European Union or the United States. One argument for it is that mobile devices – increasingly the entrance gate for ever more services – are so ubiquitous and cheap that even economically weak individuals can afford them. However, the instruments to use services, e.g. mobile devices, are not the only factor that counts for financial inclusion. Therefore, the general case cannot be made in the end.

2.4 Future role of retail payment systems

In the future, retail payment systems might increasingly take on the role of a catalyst stimulating the generation of new services, enhancing productivity and efficiency, and alleviating consumer satisfaction. Essential to this idea is the integrating role of retail payment systems, as they are centrally located in the ecosystem of economic transactions.

Crucial for achieving the promises is a frictionless user experience for end consumers, reducing the number of interaction requirements, currently clicks. Furthermore, subject to consumer consent, insights can be gained from the integration of customer loyalty in the payment process and exploration of the vast data volume generated.

Due to their central role in human interaction, payment systems could bring a higher quality of life to people. Because of technological advancements, these benefits can be achieved on an unprecedented scale and speed and at incomparably low costs. Challenges remain, however, with regard to privacy, data protection, safety and financial inclusion.

3 How has COVID-19 impacted customer and payment behavior in Europe and in Austria?

The COVID-19 pandemic that dominated developments in 2020 and 2021 has also significantly changed both consumer and payment behavior. With travel and contact restrictions imposed across Europe, people in Austria likewise experienced full lockdowns that paralyzed large parts of the economy and led to an economic downturn while increasing the public debt burden.

The pandemic, *inter alia*, also sped up the digitalization process, bringing forward changes that would otherwise have taken years to come. According to McKinsey's "Digital Sentiment Survey 2021" for Germany (McKinsey, 2021), the pandemic accelerated the use of digital channels across Europe by an average of 13% across a wide range of areas. Around 80% of European consumers with internet access used digital services in the last six months, and around 74% of respondents in Austria reported to prefer digital channels. The McKinsey study shows that across Europe, after the digital push caused by the pandemic, digital usage is slowly declining again and preparing for a "new normal" – those who used more physical channels before the pandemic will do so again once the pandemic is over. At any rate, digitalization as a driving factor in electronic payment transactions has also strongly impacted payment behavior during the pandemic.

For a detailed analysis of the COVID-19 impact, we will use the data from the payments surveys conducted by the Oesterreichische Nationalbank (OeNB) in 2020/21 (see box 1).

Box 1

OeNB surveys on payment behavior in Austria

In addition to surveys conducted every other year on the payment behavior of people in Austria, the OeNB has been running payment diary surveys at four-year intervals since 1996. Both types of surveys are carried out by the Institute for Empirical Social Research (IFES) on behalf of the OeNB. In both surveys, respondents – women and men over the age of 15 – are interviewed via questionnaire. In the payment diary survey, participants are also asked to keep track of their payments during the survey period. The results on the payment behavior of people living in Austria are representative in terms of age, gender and region.

The OeNB's payments surveys 2019 and 2021 were conducted without additional payment diary entries in the second half of the year, with interviews of around 1,400 people each. In 2019, the payments survey interviews were made from September to late October 2019. In the gap year between the 2019 survey and the 2021 survey, the OeNB conducted a payment diary study, which started in early September 2020 but was extended to April 2021 (with interruptions). For the payment diary study, a total of 2,552 people were interviewed, almost half of whom (1,260) completed the payment diary for seven days. In view of contact restrictions from mid-November 2020 and the increasing number of infections in Austria, face-to-face interviews were unlikely to be a stable option at some point. From February 2021 onward, the data were therefore collected through telephone surveys, with the diaries being sent by post (Dorfmeister et al., 2022). The payments survey 2021 interviews were carried out in the period from November until December 2021. Due to ongoing pandemic-related restrictions, this survey was conducted mainly online (80%) or through telephone interviews.

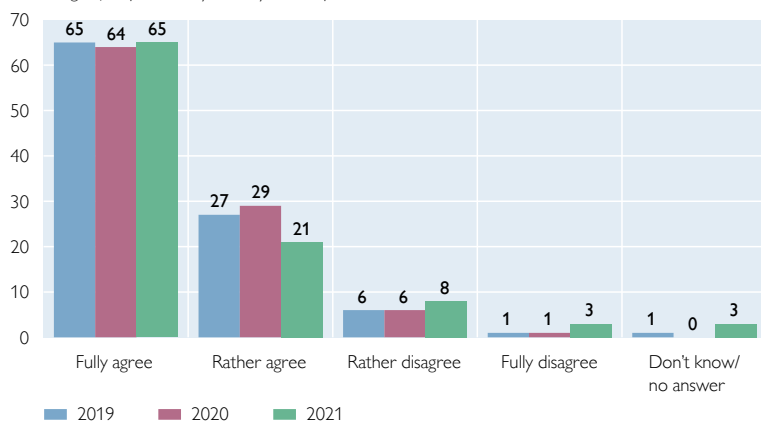
In the payment diary survey 2020/21, respondents were asked whether their payment behavior at the point of sale had changed during the pandemic, since mid-March 2020. Around one quarter responded that they had adjusted their payment behavior during the pandemic, while 70% said they had not. The payments survey in the 2nd half of 2021 again found only 22% of those surveyed to have changed their payment behavior, while 70% responded that they had not changed their behavior.

Ultimately, COVID-19 has accelerated the trend towards cashless payments, but it did not mark a pivotal change. The perceived risk of infection – 69% of the respondents interviewed in 2021 believe that the risk of infection is lowest for contactless payment cards, mobile phones and other devices or instruments that do not require a PIN entry – accelerated existing digital trends, but the trend was not sustained. Only 26% of Austrians said that they were making contactless card payments without entering a PIN or signature more often than before the outbreak of the COVID-19 pandemic (IFES, 2021).

Chart 2

Perception of cash as optimal means of payment in Austria (2019–2021)

Percentage of respondents, year-on-year comparison



Source: OeNB payments survey 2019–2021.

payments more often than before the outbreak of the COVID-19 pandemic (IFES, 2021).

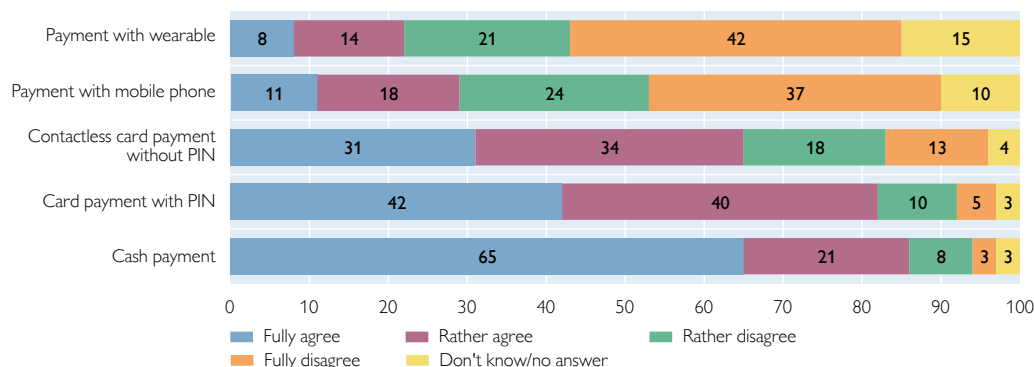
3.1 Cash as the optimal means of payment at the point of sale

The results show that cash is still dominating payments at the point of sale in Austria, yet contactless card payments have gained massively in importance. In 2021, 65% of those surveyed in Austria fully aligned with the idea of cash being the optimal means of payment. This figure has been pretty stable in recent years. At the same time, the percentage of those who tend to see cash as fairly optimal (“rather agree”) decreased from 29% in 2020 to 21% in 2021.

Chart 3

Perception of different payment instruments as optimal means of payment in Austria (2021)

Percentage of respondents (n = 1400)



Source: OeNB payments survey 2021.

Overall, the pandemic seems to have increased the trend toward card and cashless payments among consumers. While in 2019 most respondents (94%) said they owned one or more payment cards and 93% stated that they had a debit card with a payment function, 69% confirmed that they had already made a contactless payment (not distinguishing between amounts under or over EUR 25) (IFES, 2021). In 2020, 97% of the respondents had at least one payment card; in most cases this was a debit card (94%). Point-of-sale transactions with debit cards in 2020 show a proportional increase from 10% to 27% compared to 2019. In contrast, credit cards facilitated only 2% of point-of-sale payments in 2020.

Ownership of NFC-enabled debit cards and knowledge of how to use them also increased significantly from 31% (2019) to 84% (2020). In 2020, 77% of 60-to-69-year-olds confirmed having an NFC-enabled ATM/debit card. Since 2017, only ATM/debit cards with NFC capability have been issued (IFES, 2020–2021). The higher response rate for NFC-enabled cards can also be attributed to the decision of Austrian banks, together with the Chamber of Commerce, to raise the limit from EUR 25 to EUR 50 for contactless card payments without entering a PIN, as recommended by EBA (EBA, 2020).

3.2 E-/M-commerce

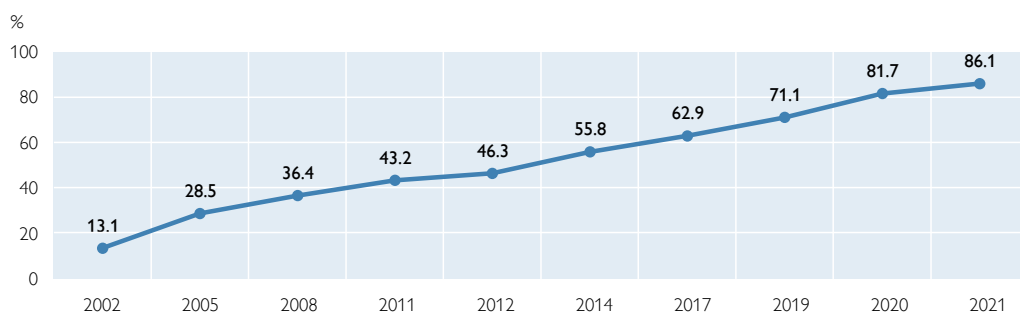
The share of people in Austria who have used the internet for consumption purposes increased steadily over the last two decades from 13% (2002) to 86% (2021) according to the OeNB's payments survey. This is in line with the general trend of the growing share of e-commerce.

In the last 12 months, many respondents (51%) shopped online but not more frequently than in the previous months. The majority of internet purchases were made from large international online platforms such as Amazon (43%). In 2020, 62% of those surveyed stated that they had bought or paid for something online in the last 12 months. The amount varies between over 80% in the group of under 30s and in the 70+ age group. A quarter (27%) of those surveyed said they had never bought anything on the internet. Around a third of those surveyed stated that they had bought significantly (11%) or slightly (19%) more online since the beginning of the pandemic.

When asked which means of payments were used for online purchases in the last 12 months, the following were mentioned most frequently: credit cards (54%),

Chart 4

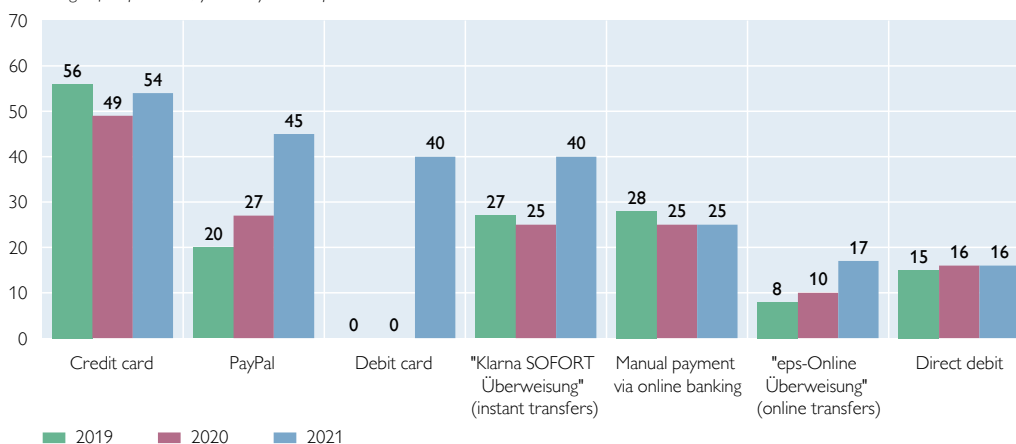
Share of people in Austria using the internet for consumption (2002–2021)



Source: OeNB payments surveys 2002 to 2021.

Means of payments used for online purchases in Austria (2019–2021)

Percentage of respondents, year-on-year comparison



Source: OeNB payments surveys 2019–2021.

PayPal (45%), ATM/debit cards (40%), Klarna instant transfers (40%), prepayment via online banking (25%), eps transfers (17%) and direct debit (16%). The least used methods have been cash-on-delivery (9%), Amazon Pay (6%), Apple Pay (4%) and Google Pay (2%). When comparing the figures for 2019 (56%) with those of 2021 (54%), credit card payments for online purchases have decreased by 2%.

As depicted in chart 5, PayPal (+25 percentage points) accounted for the largest increase during the period from 2019 to 2021, followed by Klarna instant transfers (+13 percentage points) and eps transfers (+9 percentage points). With the Mastercard debit scheme introduced in 2019, debit cards can be used for online purchases more easily and more widely than debit cards featuring the Maestro scheme introduced in 1991; the Austria-wide rollout took place in 2021. In 2021, 40% of those surveyed were already using the ATM/debit card for online purchases.

For most respondents (70%), the means of payment of choice for online/app purchases has not changed since fall 2020. 42% of those surveyed who bought something online in the last 12 months said they made the purchase on a mobile phone or tablet. More than half of the respondents (52%) who bought something on the internet via mobile phone in the last 12 months paid by credit card. Further, 37% used their ATM/debit card, 31% Klarna instant transfers, 26% wallet solutions (such as Klarna, Google Pay or PayPal) and 16% used online banking transfers for payments via app. The least widespread payment solutions for app purchases were installment purchase (2%) and prepaid cards (2%) (IFES, 2021).

3.3 Outlook

Once the COVID-19 pandemic is over, we expect a “new normal” to set in, with digital usage slowly declining again. However, what will remain is the change in the payment landscape caused by the progress of technology. For example, crypto assets may gain in importance in the coming years – new versions will become faster, and mining will become easier. Currently, the demand for crypto assets in Europe is still rather low. As a part of the Study on the payment attitudes of consumers in the euro area (SPACE), in 2020 only 3.6% of respondents reported having

access to crypto assets, such as bitcoin. The share is highest in Germany (7%) and Cyprus (7%). As with e-payment solutions and mobile payments, crypto assets are more popular among respondents between 18 and 39 years old (6% of respondents in these age groups own crypto assets). Whereas e-payment solutions and mobile payments are distributed fairly evenly between men and women, 73% of the respondents who reported to have access to crypto assets were men (ECB, 2020, p. 64).

Although crypto asset ownership in Austria remains subdued, we see a slight increase (see chart 6). When participants were asked in 2019 how great their interest in bitcoins or other crypto assets was, only 2% of respondents reported to be holding bitcoins at the time and 1% of the respondents reported that they were holding other crypto assets. From 2019 to 2021, bitcoin holdings in Austria more than doubled from 2% to 5% (+3 percentage points). Holdings of other crypto assets in Austria even increased six-fold, from 1% to 6% (+5 percentage points).

What remains is the challenge for Europe to stay competitive in the international payments landscape. Not only will the payment methods change, but so will the actors in the industry. Many of the players are American companies such as PayPal or Google, who scale innovations quicker. Due to the investment and innovations environment we have in Europe, the share of European solutions is currently declining. Although the Austrian banks are very well capitalized and could therefore play an important role, they lack innovations, especially in terms of payment solutions for merchants. As a result, Austrian and European banks may stand to lose revenues and market share or face disintermediation.

4 What is the role of European players in the retail payments value chain?

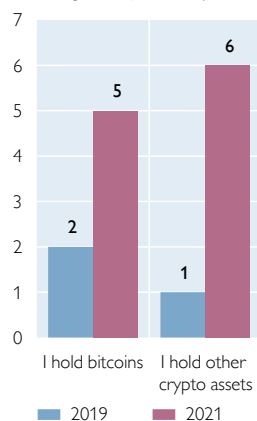
In retail payments, the major distinction in the value chain is between front-end and back-end services (see annex). Whereas front-end services for retail payments address the needs of customers, i.e. payers and payees, back-end payment services are provided for intermediaries such as banking institutions in their function as account providers or payment scheme providers.

With the creation of the Single European Payments Area (SEPA), the European Commission sought to remove remaining barriers for payments in Europe, causing domestic payments and payments between member states to be treated the same. One step toward the harmonization of the payments market was the harmonization of fees between domestic and cross-border payments between EU member states. Thus, value creation in payments was shifted from back-end payment services – such as payment data provision, payment delivery, processing, clearing and settlement,

Chart 6

Possession of bitcoins and other crypto assets in Austria (2019 vs. 2021)

Percentage of respondents, year-on-year comparison



Source: OeNB payments surveys 2019 and 2021.

booking and invoicing, respectively post-payment services such as investigation – toward front-end payment services, such as product design and payments selection (also called overlay services). New entrants such as PayPal and Apple Pay enhanced their offerings to provide a seamless user experience for smartphone users, building upon existing payments means and payments processes (card payments or from-account payments; see annex).

An internal OeNB study, conducted with zeb¹⁰ in 2021, showed that the incumbent players such as banks and card schemes continue to dominate the value chain, capturing more than 85% of the revenues created in Austria, which is slightly below the EU average of 91%. Total payments revenues generated in 2020 in the EU amounted to EUR 2.1 billion or 3% of total payments revenues generated in the EU.¹¹ Wallets and payment enablers (overlay services such as PayPal) do not play an important role, accounting for around 7% of payment revenues and leaving space for payment providers like PayOne or Ingenico. Only in the Netherlands did the payment enablers reach a more significant share with around 10% of payment revenues. This can be attributed to the long history of overlay services provided to Dutch customers: iDeal, which today holds a 70% share of all e- and m-commerce payments, was launched as early as in 2006 as an online and e-commerce payments solution by a consortium of Dutch banks. Thus, the Netherlands are one of the few countries where PayPal's share of e- and m-commerce is below 5%.

Following current growth rates without considering the effects of further innovations and market initiatives such as the implementation of request-to-pay or the European Payments Initiative (EPI),¹² payment enablers will expand their revenues by more than 50% until 2028. Together with wallets, they will capture as much as 15% of the value created by 2028. In turn, banks will lose at least 3% of their payments revenues, with payer (issuing) banks standing to lose almost twice as much in revenues from payments as the payee (acquiring) banks.

4.1 Value creation in payments – an example

In the example below, we will demonstrate the economics of value creation in payments and argue why changes may be in the offing. Let us look at the example of a tourist called Annika from Amsterdam purchasing a cappuccino and a Sachertorte for EUR 9.80 at a nice but fictitious Viennese café. See figure 6 for a short overview of all steps typically needed to process this retail payment transaction in the retail payments life cycle.

¹⁰ <https://zeb-consulting.com/en-DE>.

¹¹ The data for the revenue analysis were taken from the ECB data warehouse for the year 2018 and extrapolated to 2028 with a compound annual growth rate (CAGR) of 6.6%.

¹² <https://www.epicompany.eu>.

Figure 6

Example of a cross-border retail payment within the euro area

1	Payment method selection	Annika opens her virtual debit card in her smartphone wallet
2	Provision of payment data	NFC transmission of debit card data from Annika Annika uses Face ID or enters her PIN
3	Payment delivery	Annika's Dutch bank receives the payment
4	Processing	Annika's Dutch bank verifies and authenticates payment of EUR 9.80, checks whether Annika has sufficient funds and makes the necessary entries in the bookkeeping system
5	Clearing/settlement	EUR 9.80 are transferred from Annika's Dutch bank to the Austrian bank of the Viennese café in a collective pooling and settlement procedure
6	Booking	The Austrian bank of the Viennese café verifies and credits EUR 9.80 to the payee's account
7	Invoicing/information	The account statement of the Viennese café shows the crediting of Annika's debit card payment

Source: Authors' compilation.

First, Annika needs to choose a payment method other than cash from among the options available to the payee at the point of interaction, such as Bluecode¹³ or her debit or credit card. Let us assume that Annika opts for debit card payment using the wallet functionality of her smartphone. Once the waiter brings a mobile payment terminal to the table, Annika, whom we assume to use Apple Pay NFC proprietary technology on her iPhone, provides her debit card payment data without needing to present her card at the terminal. All Annika had to do beforehand was activate the wallet function of her iPhone and link her Apple ID with her debit card payment data. For this to work, Annika's bank also needs to be partner of Apple Pay. In other words, Apple Pay needs to have agreed to provide technical services for payment initiation and authentication, for which the bank pays fees.

As a next step, Annika's payment data need to be verified and authenticated, which is done by Face ID provided by Apple as the payment enabler in our example. Once the payment data have been authenticated, they are delivered to Annika's Dutch retail bank A, which also verifies and authenticates the payment to establish its legal and technical validity, checks the availability of the funds requested and then approves the transaction. After this process, a clearing and settlement process ensures that Annika's payment is transferred from her bank A to the receiving bank B – the bank of the Viennese café. Bank B verifies and credits the café's account, which will eventually find the payment amount on its account statements.

It is also interesting to see which stakeholders benefit from such a retail payment transaction. If Annika pays in cash, no transaction fees apply to the payer or the payee. Yet, Annika must make the effort of withdrawing cash and carry it, while the merchant needs to pay for cash collection, secure transport to the bank and insurance. In addition, no data about Annika's consumer and payment behavior are created.

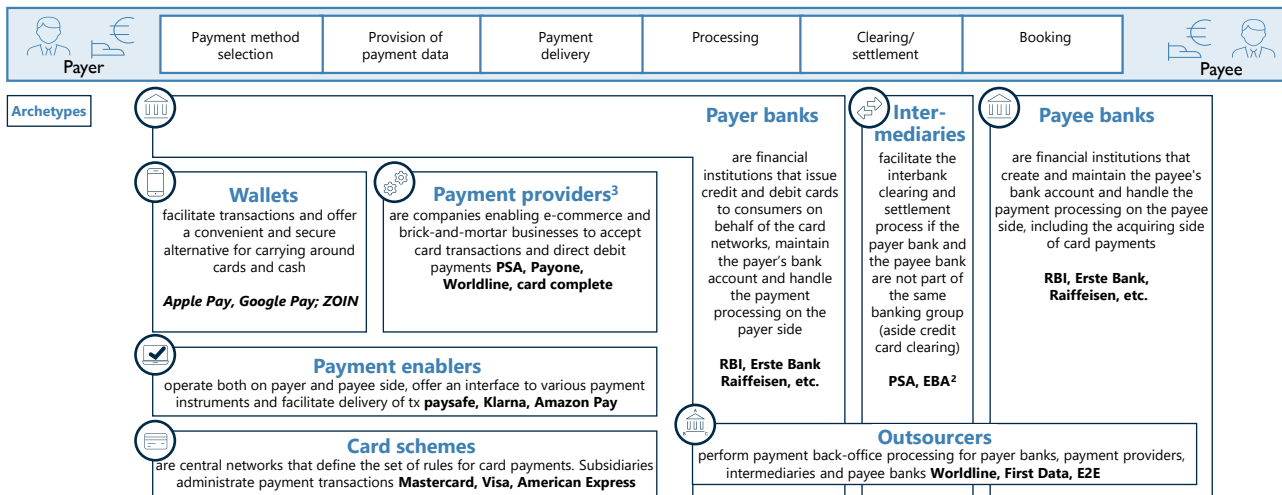
However, if Annika uses her debit card to settle her invoice instead, several more stakeholders will benefit from this transaction. After all, this transaction

¹³ <https://bluecode.com/>.

Figure 7

Current players in electronic retail payments in Europe

Eight archetypes¹ involved in single and multiple payment value chains



Source: OeNB, zeb.

¹ Note: Terms reflect a neutral description of the archetypes and are to be understood in a nontechnical and nonlegal way.

² EBA Clearing and national central banks.

³ May also include majority of independent sales organizations and payment facilitators since they offer their services mainly to merchants.

will generate not only fee revenues but also payment and consumer behavior data that are of high value for certain stakeholders.

This simple example illustrates the complexity involved in cross-border retail payments. In this respect, retail payments markets can be understood as two-sided network markets that require a large-enough installed user base on both sides of the market to function efficiently and effectively (Weber et al., 2022).

From a European perspective, there are plenty of players involved in each of the steps described above. Nonetheless, international card schemes currently dominate the still largely fragmented national markets. Underlying payment infrastructures and schemes still remain organized along national borders but now face mounting challenges and fierce international competition in an increasingly dynamic environment at the customer interface.

Due to the limited network size in the respective home markets, interoperability and European and international reach are an issue. Therefore, the industry has also witnessed a range of cooperative payment initiatives with a dedicated European focus.

4.2 Success factors for retail payments systems

Based on the above insights, certain success factors for retail payments systems have become evident. We would summarize those success factors in the following four categories, three supply-side factors and one demand-side factor:

(1) Network effects – Payment markets are two-sided network markets that require a large-enough installed user base on both sides of the market, i.e. (i) existing infrastructure such as merchant terminals, mobile phones or bank accounts and (ii) existing user accounts such that payers and payees do not need to perform

an additional onboarding process. If an onboarding procedure is deemed necessary, it should be fast and effortless.

(2) Standardization – payments solutions should involve common standards for authorization, messaging, risk mitigation, transaction transfer and the like. Also, a basic common service level must be in place, e.g. for payment guarantees, operational performance or transfer times. This would lower coordination costs, which are an issue given the network nature of the market.

(3) Reach or forced cooperation – payments are a “reach” business; without reach, payments services are perceived dysfunctional by users. Due to the market characteristics, cooperation is often vital, for example cooperation to build a common infrastructure or set necessary common standards. At the same time, such cooperation must not foreclose competitors or suppress competition when it comes to concrete product offerings to users.

(4) Demand-side hygiene factors – characteristics of payment instruments often described in the choice-of-payments literature, such as speed, safety and security (Shin, 2009), ease of use and low costs (van der Heijden, 2002) as well as budgeting usefulness (keeping track of expenses), have become merely hygiene factors in mature markets.

Another two factors may become crucial for creating a stronger European footprint in the retail payments value chain in the future:

(5) Governance – European payments autonomy has been promoted in recent years by the European Commission and the ECB. They argue that independent governance and autonomy ensure low risk and low cost for payments providers in the long run and guarantee customers safe and efficient payments solutions. The impact of payments autonomy on the economy has become most evident since Russia’s invasion of Ukraine. It can be assumed that customers will be willing to substitute “ease of use” for transparency, governance and autonomy of payments solutions. The evidence of such customer behavior needs to be evaluated.

(6) Security and privacy – although data protection has a long track record in Europe, security and privacy is still not sufficiently explored, in particular with regard to customer behavior. Recent studies related to the digital euro provide evidence that consumers may differentiate between privacy and “perceived privacy,” willing to provide access to data in exchange for “ease of use” if they believe to retain control over the process.

Based on those six factors and their possible development over time, we can create scenarios for the future of retail payments in Europe, considering policy decisions such as increased sanctions in cross-border payments, crypto-asset regulation, and the introduction of the digital euro.

5 Scenarios for Europe’s future retail payments architecture and conclusion

Electronic payments in Europe have proven to be reliable, secure and innovative within the last 20 years. They have been driven by customer demand and technology. While technological innovations were intended to make payment instruments more convenient at the time of transaction, regulations and central payments infrastructures made electronic payments secure and reliable. The challenge for the next decade is to go beyond low costs and ease of use. Privacy, strategic autonomy, and sovereignty appear to be the major issues Europe will face.

To develop policy implications for the payments market considering those issues, we built a baseline (most likely) scenario and an alternative scenario depicting an almost reverse outcome. The time frame of the scenarios is 15–20 years ahead.

5.1 Baseline scenario

The baseline scenario is the future we expect most likely to happen in the absence of any significant policy interventions or market initiatives. Over the next 15–20 years, we expect the trend to an ever higher share of electronic payments of total payments in Europe to continue, as the examples of Sweden or Netherlands show. Considering different demographic mixes and (converging) customer preferences in Europe, we can expect a stable state at a volume of 65% to 70%. This will be propelled by a friction- and seamless payments experience, and a trusted and secure data ecosystem underpinned by new European and potentially global regulations really focusing on consumer wants and needs.

Big tech and fintech will continue to lead the market, harvesting economies of scale and network effects of their solutions, with banks hopefully following the development. The latter will strongly depend on the cooperation abilities of European banks and their capability to raise joint investments, evaluate strategic options and align alongside common governance. Since innovation has proved to be a critical success factor for payments and ultimately for maintaining the customer relationship, outsourcing innovation activities to technology providers and partners may not be a successful strategy in the long run. Innovative and protecting regulation will support more transparent products and services but will not be sufficient to prevent concentrations due to network effects.

Due to automation, mobile authentication for P2P payments but also for highly protected environments like lending processes, artificial-intelligence-enhanced validation processes, machine-to-machine payments and distributed ledgers scaling up for wholesale transactions, overall productivity gains will be huge, and so will be the value to be captured with future payments solutions.

As we assume that the bias to cash in some European societies is strongly connected to generational preferences, pivotal breaks would appear to be likely to occur once the babyboomer generations have entered retirement. This development could be hindered or stopped only by a major backlash, such as a major data security problem or outright theft leading to heavy losses on the personal income statement of individuals and thereby disrupting trust in electronic payment solutions.

We also expect the US dollar and the euro currency areas to converge regarding regulation and standardization in the area of payments due to similar expectations and approaches to key characteristics of privacy, transparency and validity. Though the approaches to innovation are different, we expect the US and the EU to take similar regulatory and supervising avenues in the upcoming consolidation phase of digitalization and its translation into products and services in the payments industry.

In this scenario, the role of central bank money as a payments instrument will decrease significantly, leaving space for market participants to capture part of the value generated by productivity gains and create business models of their own. Downside risks include the exclusion of vulnerable groups from certain payment services (digital divide), stronger exposure to threats (lack of crisis prevention

mechanisms) and loss of choice (alternatively higher costs for consumers). A possible solution to address those risks is the introduction of the digital euro as a retail central bank digital currency.

5.2 Alternative scenario

This scenario, from our perspective, depicts a dismal dystopia in which all major common European projects, including the euro, fail to deliver the desired results, with an ensuing loss of trust among European citizens. In such case, European nations will decide to push genuine “local” solutions.

As trust in institutions diminishes, even the nation states themselves show cracks and are being questioned. In payments, consequently, decentralized innovative solutions like privately issued crypto assets gain momentum. Fragmentation increases, trust in crypto assets overall grows while central bank money and bank money lose importance. Stakeholders shift significantly from regulated banking institutions and payment service providers toward unregulated global players – both individual and institutional. Transparency, governance, and security of payments systems decrease, impacting financial stability and the resilience of the economy, as examined in section 2.

5.3 Conclusion

To conclude, we assume that electronic payments will continue to capture an increasing share of total payments in our economies. A rising share of electronic payments has the potential to unlock significant productivity gains and thus represents a great share of value, which can be captured by private market participants. The analysis of payment behavior in section 3 underscores this assumption. In addition, we tried to make a case for the major advantages of electronic payment means by looking at the technological development in recent decades, by analyzing studies which concentrate on economic efficiencies, banking resilience, financial inclusion and by elaborating on the value creation of a typical payment process in a Viennese café.

For policymakers, today’s fragmented landscape consisting of tech-slow incumbents and highly innovative and highly profitable big techs as well as fast growing fintechs as challengers makes it difficult to come up with a one-design-fits-all policy. With rising geopolitical pressure, strategic payments autonomy and sovereignty move to the top of the agenda of European policymakers. Also, consumers may wish to trade “ease of use” for privacy, security and governance. This shift in customer preferences will have to be explored in detail in the months and years ahead as it can provide a valuable foundation for future policies, offsetting lock-in effects of current big tech and fintech solutions.

In our research, we identified a lack of supporting academic studies regarding the economic value of electronic payment systems in different economies and various market conditions. In addition, there is currently no clear-cut descriptive categorization of major payment markets along a number of characteristics, e.g. the USA, the EU, leading Asian markets and other geographies. Both could be very helpful as a base for further research studies and policy development.

Annex: Overview of today's payment systems infrastructures and services

Electronic payment systems appear in many different forms and sizes, and new designs continue to emerge (Bech and Hancock, 2020). Figure 8 provides a basic classification for electronic payment systems. In Europe, the major electronic payment systems services are based on underlying bank accounts.

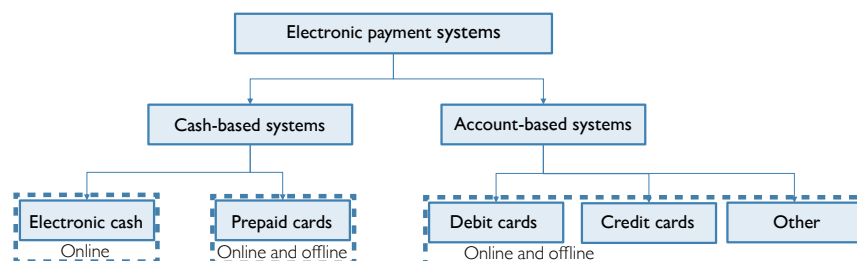
Regarding the value of payments, we typically distinguish between wholesale and retail payments and payments systems:

- Wholesale payments are high-priority and typically large-value transfers made between financial institutions¹⁴ such as banks for their own accounts or on behalf of their customers. Wholesale payments are settled via dedicated interbank settlement systems like TARGET2, the Eurosystem's real-time gross settlement (RTGS) system for euro-denominated payments. To be eligible to conduct wholesale payments, financial institutions need to hold accounts with RTGS providers. Balances on accounts with central banks are central bank liabilities and referred to as central bank money.¹⁵
- Retail payments are lower-value transactions between individuals, businesses, and governments involving cash, checks, credit transfers, and debit and credit card transactions.

To be eligible to conduct electronic retail payments, the payer and the payee need to hold bank accounts, and their banks need to participate in the respective electronic retail payments system. The balances on these accounts are commercial bank liabilities toward the payer or the payee and referred to as (commercial) bank money.

Figure 8

Classification for electronic payment systems



Source: Based on Kim et al. (2010).

¹⁴ Including payments between sovereigns, since they are usually carried out by the national central banks.

¹⁵ There are also a few private wholesale high-value payments systems, such as EURO1 in Europe and The Clearing House in the USA. EURO1 is an RTGS-equivalent net settlement system set up by the Euro Banking Association (EBA). It is overseen by the European Central Bank, and its participants include the Eurosystem national central banks.

Since payments are transfers of monetary value from payers to payees, usually in exchange for goods and services or to fulfill contractual obligations or other purposes of exchange (Bech et al., 2017, p. 58), retail payments can be further classified according to the type of payer or payee involved as follows:

- Person-to-person (P2P) payments, such as borrowed money returned to a friend or money transferred between family members. Sometimes those payments are also referred as consumer-to-consumer (C2C)
- Person-to-professional (P2Pro) payments like money paid in a barber shop or for the services of a mechanic
- Business-to-consumer (B2C) payments are payments made by businesses in exchange for goods or services purchased from consumers
- Business-to-business (B2B) payments are payments between companies for the delivery of goods along the supply chain or for the purchase of services like shipping services
- Consumer-to-business payments (C2B) are payments from consumers for goods and services purchased from businesses at the point of sale or online, such as grocery store or travel services purchases
- Business-to-agencies (B2A) payments are payments conducted between businesses, government agencies, and public administrations
- Consumers-to-agencies (C2A) payments are payments conducted between individuals and government agencies and public administrations, such as tax payments

Payments made or received within the euro area can be classified into domestic payments, euro-denominated payments to or from other euro area countries (SEPA payments) or cross-border payments.¹⁶ Electronic payment systems such as RTGS systems, automated clearing houses or domestic card schemes are mostly designed for domestic or SEPA transfers. International card schemes like Visa and MasterCard provide procedures and rules for the transfer of funds in multiple currencies between participants. Cross-border payments are mostly transferred bilaterally between banks between accounts they hold with each other, or through intermediaries (correspondent banks). The processing of cross-border payments requires an electronic message transfer infrastructure (SWIFT¹⁷) and liquidity in foreign currency. This is the reason why cross-border payments are still opaque, slow, and costly.

¹⁶ In the euro area, cross-border payments are payments between payers and payees from two different countries executed in a currency other than euro. Payments in foreign currency within the same jurisdiction, e. g. Austria, follow the same rules, formats and processing practices as cross-border payments.

¹⁷ SWIFT is an international network, established as a cooperative utility under Belgian law, for the exchange of encrypted electronic financial messages. It is the “post office” of the financial system. Every bank has been assigned a unique bank identifier code (BIC) consisting of 8 to 10 digits. The first four digits identify the institute, the second four digits identify the country (digits 5 and 6) and the city (digits 7 and 8) in which the institute is legally registered. To exchange financial messages, banks need to be active users of SWIFT and to “know each other” based on the exchange of encryption keys. SWIFT does not read the financial messages but just ensures the secure transfer between banks. In 2012, SWIFT was exceptionally prohibited under EU Regulation 267/2012 from providing financial messaging services to EU-sanctioned Iranian banks. In 2022, SWIFT was again mandated to restrict its services under EU sanctions on Russian and Belorussian banks.

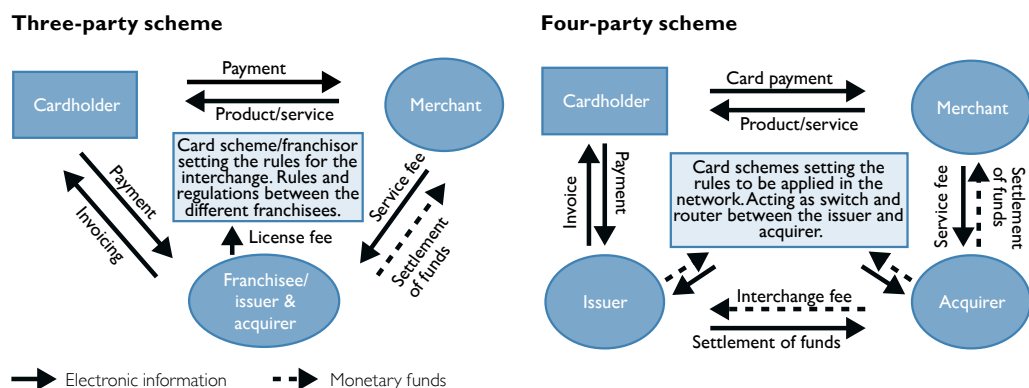
Addressing these challenges has been put as a priority to G20 countries. Further ways to analyze retail payments in particular and to obtain deeper insights into their complexity are the adoption of a process perspective, a stakeholder view or a value-chain perspective.

- From a process perspective, we differentiate between from-account payments and card payments. “From account” payments such as credit transfers or instant payments are instruments which are settled directly on the payers’ and payees’ accounts. Card transactions are also linked with card holders’ accounts but settled using card schemes.
- From a stakeholder perspective, there is a large variety of stakeholders typically involved in electronic retail payment systems (e.g. card schemes). They comprise parties like the payer, payee, issuer/acquirer, liquidity providers and account providers, overlay services, central banks, financial system oversight and regulator. Each of these stakeholders perform different tasks in the process of a transaction.

Particularly interesting for the analysis of the evolution of payments systems and the future policy implications is the differentiation between three-party and four-party retail payments systems. In a three-party model, the payer (or card holder) and the payee (or card acceptor/merchant) use the same intermediary. Although this classification is mostly used for card payments, it applies for all retail payments at the point of sale. For instance, “to account” payments like BlueCode payments in Austria work as a three-party payments system, where the consumer needs to download the BlueCode app and register, and the merchant needs to integrate its payments terminal with the BlueCode platform, which generates a QR code to be scanned by the payer.

Figure 9

Three-party vs. four-party payment system model



Source: Authors' compilation based on Wikipedia.

Alternatively, the payment process may rely on the services of a (e.g. credit or debit) card issuer and a payment terminal provider, called acquirer (see figure 9). Thus, the issuer and the acquirer are two distinct financial intermediaries, who provide licensed payment means that comply with the respective payment or card rules (“schemes”). In Europe, several national and international card schemes have been implemented. Countries like Germany, France, Spain and Italy maintain their own national card schemes, which are usually co-branded with international card schemes like Visa or MasterCard for use abroad. Other countries like the Netherlands, Belgium, Austria, and most of the Central and Eastern European countries do not have dedicated national card schemes. They use international schemes for their domestic card transactions.

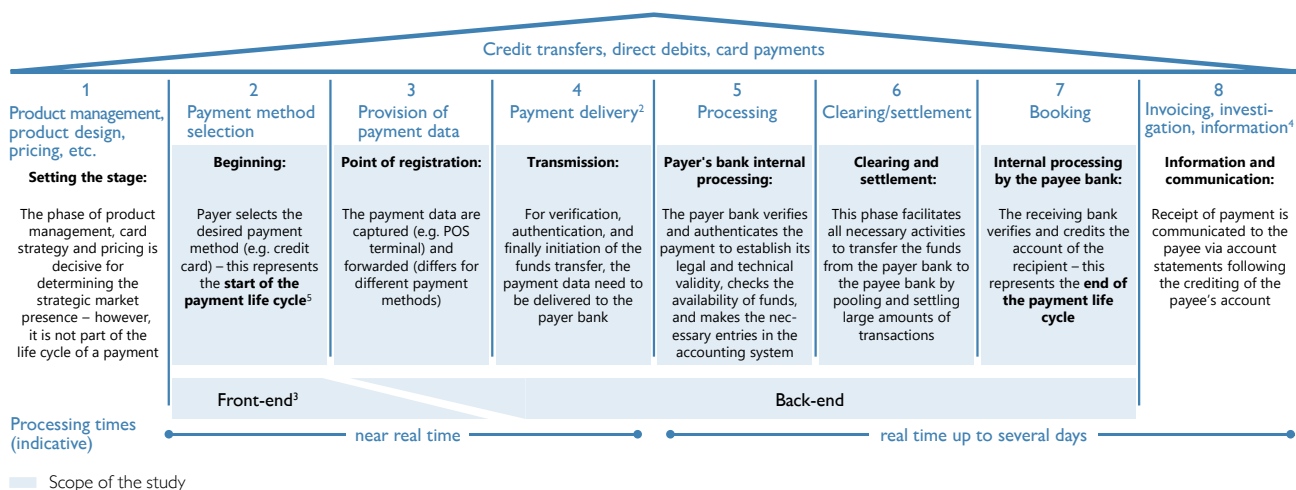
Similar to the rules for card retail payments systems, there are also rules and regulations applicable to from-account payments (“payment schemes”). The major payments schemes rolled out in Europe are SEPA credit transfers (SCT), SEPA direct debits (SDD) and SEPA instant payments (SCT Inst).¹⁸

- From a value chain perspective, payment systems can also be analyzed based on the different steps in the payment process they fulfill (see figure 10). This helps identify relevant players active at each step of the value chain and cluster players with similar business models to archetypes and assess their concentration.

Figure 10

Value chain for electronic retail payments

Overview of process steps in the payment value chain¹



Source: OeNB, zeb.

¹ Note: Terms reflect a neutral description of the process elements, they are to be understood in a nontechnical and nonlegal way.

² Payment delivery is part of the processing step as well and also takes place between step 6 (clearing/settlement) and step 7 (booking) – not repeated for clarity of presentation.

³ Visible to payer, front-to-back handover and specific scope depending on payment method.

⁴ This step is not part of the payment process itself but is nevertheless part of a payment transaction. Confirmation to the payer takes place at different steps of the value chain, depending on the payment method.

⁵ Defined as the steps happening between steps 2 and 7.

¹⁸ SCT, SDD and SCT Inst are payments schemes managed by the European Payments Council (EPC). The primary task of the EPC is to manage the SEPA payment schemes that facilitate over 43 billion transactions in 36 countries each year.

References

- Baselga-Pascual, L., O. Orden-Olasagasti and A. Trujillo-Ponce. 2018.** Toward a More Resilient Financial System: Should Banks Be Diversified?. In: Sustainability. *Sustainability | Free Full-Text | Toward a More Resilient Financial System: Should Banks Be Diversified?* (mdpi.com).
- Bech, M., Y. Shimizu and P. Wong. 2017.** The quest for speed in payments. In: BIS Quarterly Review. March. 57–68. *BIS Quarterly Review March 2017 - International banking and financial market developments*.
- Bech, M. and J. Hancock. 2020.** Innovation in Payments. Bank for International Settlements (BIS). Quarterly Review. https://www.bis.org/publ/qtrpdf/r_qt2003f.pdf.
- Berners-Lee, T. and R. Cailliau. 1990.** WorldWideWeb. Proposal for a HyperText Project. CERN.
- Bundesverband Informationswirtschaft, Telekommunikation und neue Medien e.V. (Bundesverband ITNM). 2016.** Blockchain #Banking. Ein Leitfaden zum Ansatz des Distributed Ledger und Anwendungsszenarien. <https://web.archive.org/web/20171222051930/http://www.digitalestadt.org/bitkom/org/noindex/Publikationen/2016/Leitfaden/Blockchain/161104-LF-Blockchain-final-2.pdf>.
- Cashbook. 2020.** Changes in payment trends over the last 10 years. <https://www.cashbook.com/changes-in-payment-trends-over-the-last-10-years/>.
- Cautero, R. M. 2021.** How Social Media Payments are Changing the Way We Buy. The Balance. <https://www.thebalance.com/how-millennials-use-social-payment-apps-4597677>.
- Dorfmeister, C., D. Höpperger, A. Pölzlbauer and C. Rusu. 2022.** Bargeld immer noch gefragt, kontaktlose Kartenzahlungen auf dem Vormarsch. OeNB. <https://www.oenb.at/Presse/thema-im-fokus/2020-2021/bargeld-kartenzahlungen.html>.
- European Banking Authority (EBA). 2020.** EBA provides clarity to banks and consumers on the application on the prudential framework in light of COVID-19 measures. <https://www.eba.europa.eu/eba-provides-clarity-banks-consumers-application-prudential-framework-light-COVID-19-measures>.
- European Central Bank (ECB). 2004.** Future Developments in the Target System. Monthly Bulletin. <https://www.ecb.europa.eu/paym/pdf/target/future/mb-target2-future.pdf>.
- European Central Bank (ECB). 2020.** Study on the payment attitudes of consumers in the euro area (SPACE). <https://www.ecb.europa.eu/pub/pdf/other/ecb.spacereport202012~bb2038bbb6.en.pdf>.
- European Central Bank (ECB). 2022a.** TARGET2-Securities Annual Report 2020. Introduction (europa.eu).
- European Central Bank (ECB). 2022b.** What is TARGET Instant Payment Settlement (TIPS). <https://www.ecb.europa.eu/paym/target/tips/html/index.en.html>.
- European Commission (EC). 2015.** European Parliament adopts European Commission proposal to create safer and more innovative European payments. Press release, 8 October 2015. https://ec.europa.eu/commission/presscorner/detail/en/IP_15_5792.
- European Commission (EC). 2020.** Anti-money laundering directive V (AMLD V) - transposition status. https://ec.europa.eu/info/publications/anti-money-laundering-directive-5-transposition-status_en.
- European Commission (EC). 2022a.** Anti-money laundering and countering the financing of terrorism. https://ec.europa.eu/info/business-economy-euro/banking-and-finance/financial-supervision-and-risk-management/anti-money-laundering-and-countering-financing-terrorism_en.

- European Commission (EC). 2022b.** Guidance on the implementation and interpretation of the law. https://ec.europa.eu/info/law/payment-services-psd-1-directive-2007-64-ec/implementation/guidance-implementation-and-interpretation-law_en.
- EUR-Lex. Access to European Union Law. 2022.** Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32015L2366>.
- EUR-Lex. Access to European Union Law. 2022.** Proposal for a regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937. EUR-Lex - 52020PC0593 - EN - EUR-Lex (europa.eu).
- Hasan, I., H. Schmiedel and S. Liang. 2009.** Return to retail banking and payments, Working Paper Series No 1135. ECB. <http://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1135.pdf>.
- Hocking, M. 2018.** The payments revolution: the biggest changes to the transaction industry in the last 20 years. Payment Eye. <https://www.paymenteye.com/2018/02/09/the-payments-revolution-the-biggest-changes-to-the-transaction-industry-in-the-last-20-years/>.
- Humphrey, D. 2019.** Payments. The Oxford Handbook of Banking (3 ed.) DOI: 10.1093/oxfordhb/9780198824633.013.11.
- IFES-Institut für empirische Sozialforschung GmbH. 2020–2021.** OeNB-Barometer: Zahlungsverhalten. 2. Halbjahr 2020 bis März 2021.
- IFES-Institut für empirische Sozialforschung GmbH. 2021.** OeNB-Barometer. Teil B. 2 HJ 2021.
- IMF. 2019.** Cash Use Across Countries and the Demand for Central Bank Digital Currency. Working Paper WP/19/46. [Cash Use Across Countries and the Demand for Central Bank Digital Currency \(imf.org\)](https://www.imf.org/en/Publications/WP/Papers/WP19/46).
- Kim, C., T. Wang and N. Shin. 2010.** An empirical study of customers' perceptions of security and trust in e-payment systems. February 2010. Electronic Commerce Research and Applications 9 (1): 84–95; DOI:10.1016/j.elerap.2009.04.014.
- McKinsey. 2021.** Global Digital Sentiment Survey 2021. Ergebnisse für den deutschen Markt. https://www.mckinsey.de/~media/mckinsey/locations/europe%20and%20middle%20east/deutschland/news/presse/2021/2021-05-24%20digital%20sentiment%20survey%202021/mckinsey_digital_sentiment_survey_germany_2021.pdf.
- Mersch, Y. 2014.** ECB/Banca d'Italia Workshop on Interchange Fees, Rome. [Efficient retail payments: key in strengthening the competitiveness and growth potential of the EU \(europa.eu\)](https://www.ecb.europa.eu/press/pr/2014/interchange-fees-rome-20140916-1.en.html).
- Morales Resendiz, R. 2017.** The role of payment systems and services in financial inclusion – the Latin American and Caribbean perspective. [The role of payment systems and services in financial inclusion – the Latin American and Caribbean perspective \(bis.org\)](https://www.bis.org/publ/ncf/ncf1701.pdf).
- Moody's. 2016.** The Impact of Electronic Payments on Economic Growth. [the-impact-of-electronic-payments-on-economic-growth-moodys-analytics-visa-february-2016.pdf \(tralac.org\)](https://www.tralac.org/publications/2016/02/the-impact-of-electronic-payments-on-economic-growth-moodys-analytics-visa-february-2016.pdf).
- Near Field Communication (NFC). 2017.** History of Mobile and Contactless Payment Systems. <http://nearfieldcommunication.org/payment-systems.html>.
- Österreichisches Bundeskanzleramt (BKA). 2021.** Schaffung einer digitalen Identität für alle Europäerinnen und Europäer - Bundeskanzleramt Österreich. <https://www.bundeskanzleramt.gv.at/themen/europa-aktuell/schaffung-einer-digitalen-identitaet-fuer-alle-europaeerinnen-und-europaeer.html#:~:text=Juni%202021%20einen%20Rahmen%20f%C3%BCr,europa-weiter%20Online%2DDienste%20erm%C3%B6glicht%20werden>.
- Oesterreichische Nationalbank (OeNB). 2022a.** TARGET Instant Payment Settlement (TIPS). <https://www.oenb.at/Zahlungsverkehr/tips.html>.

- Oesterreichische Nationalbank (OeNB). 2022b.** Single Euro Payments Area (SEPA). <https://www.oenb.at/en/Payment-Processing/cashless-payments/SEPA.html>.
- Pacelt, O. 2021.** Story of the Internet. From Web 1.0 to Web 4.0. Botland. <https://botland.store/blog/story-of-the-internet-from-web-1-0-to-web-4-0/>.
- PayPal. 2022.** About PayPal. [PayPal - Über uns - PayPal](#).
- Petralia, K., T. Philippon, T. Rice and N. Véron. 2019.** Banking disrupted? Financial intermediation in an era of transformational technology. Geneva Report on the World Economy 22.
- Scott, H. S. 2014.** The Importance of the Retail Payment System (December 16, 2014). Working Paper. In: SSRN: <https://ssrn.com/abstract=2539150> or <http://dx.doi.org/10.2139/ssrn.2539150>.
- Scott, H. S. 2015.** The Importance of the Retail Payment System. [hal-scott--mastercard-retail-payment-systems.pdf \(harvard.edu\)](#).
- Shin, D. H. 2009.** Towards an understanding of the consumer acceptance of mobile wallet. Computers in Human Behavior. 25(6). 1343–1354.
- Sorensen, E. 2021.** QR code payment: what is it and how does it work? Mobile Transaction. <https://www.mobiletransaction.org/qr-code-payment-works/>.
- UNCTAD. 2018.** Mobile money holds key to financial inclusion in Africa, experts say | UNCTAD.
- van der Heijden, H. 2002.** Factors Affecting the Successful Introduction of Mobile Payment Systems. BLED 2002 Proceedings. 20. <https://aisel.aisnet.org/bled2002/20>.
- Weber, B. and P. Niederländer. 2022.** Payment initiatives and lessons learned for the digital euro. OeNB Working Paper. Oesterreichische Nationalbank.