

Standardisation and Innovation in the European Market for Retail e-Payments

Estandarización e innovación en el mercado europeo de pagos electrónicos minoristas

Master's Degree in Information and Knowledge Society – UOC
New Economy and Network Firm
Networks, Efficiency and Wellbeing in the Knowledge Society Economy

Master's Thesis Supervisor: Ana Isabel Jiménez Zarco (ajimenez@uoc.edu)
Student: María Dolores Fernández Martínez (mdfdez@uoc.edu)

Table of contents

Title - Título

Abstract - Resumen

Keywords - Palabras clave

1. Introduction

- 1.1 Justification of the TFM
- 1.2 State of the Art
 - 1.2.1 Demand side economies of scale, also known as network economies, network externalities or network effects
 - 1.2.2 European Integration: SEPA retail e-Payments market
- 1.3 Literature Review
 - 1.3.1 Issues, topics and concepts from the literature review
- 1.4 Aims of the Study
- 1.5 Scope of the Study
- 1.6 Statement of the Research Questions
- 1.7 Theoretical Framework
- 1.8 Statement of the Research Hypothesis
- 1.9 General Research Methodology

2. Methodology

- 2.1 Nature of the Study
- 2.2 Surveys and Sources of Data
- 2.3 Measurements and insights

3. Analysis and Results

4. Conclusions

- 4.1 Main contribution and value of the study
- 4.2 Limitations of the study
- 4.3 Further research directions

5. References

Annex 1. General references on SEPA payments

Annex 2. Other references

Title

Standardisation and Innovation in the European Market for Retail Payments

Título

Estandarización e innovación en el mercado europeo de pagos minoristas

Abstract

In the process that goes from SEPA standardisation to the apparition of innovations in SEPA retail electronic payments market, interoperability is a key factor in the value proposition for consumers and social wellbeing enhancement. Expectations of stakeholders on the final size of the network can be influenced by cultural aspects that moderate the potential network effects of standardisation.

Resumen

En el proceso que transcurre desde la estandarización de la zona SEPA hasta la aparición de innovaciones en el mercado de pagos electrónicos minoristas SEPA, la interoperabilidad es un factor clave de la proposición de valor para los consumidores y el aumento del bienestar social. Las expectativas de los interesados pueden verse influidas por aspectos culturales que moderan los potenciales efectos de red de la estandarización.

Keywords

standardisation; integration; interoperability; electronic payment systems; financial industry; banking networks; network externalities; single euro payments area;

Palabras Clave

estandarización, integración; interoperabilidad; sistemas de pago electrónico; industria financiera; redes financieras; externalidades de red; area única de pagos en euros;

1. Introduction

The Digital Single Market Strategy (DSM)¹, part of the Digital Agenda for Europe 2020, is one of the top ten political priorities of the European Commission (EC), to be completed in order to ensure the free movement of persons, capitals and services, the access and engagement in online activities, the conditions of fair competition, the protection of consumer and personal data and the removing of geo-blocking and copyright issues. The Digital Single Market strategy, adopted since 6 May 2015, aims to reach a market over 500 million people, creating opportunities for citizens, existing companies and new startups, as long as they have the required digital skills.

Furthermore, the implementation of digitising measures will give companies, researchers and public authorities the opportunity to exploit the maximum benefits from the new information and communication technologies (ICTs), as well as fostering investments through networks, allowing national and regional initiatives and strategic partnerships. Sadly, the Internet and other digital technologies are not available for all citizens, many of them cannot benefit from online goods and services. At the same time, internet providers, online startups, businesses and governments do not benefit from the potential of the new digital instruments due to regulatory barriers and the separation in many national markets, so it is necessary to move towards a digital single market. Among other several critical areas for the unlocking of the data economy potential value, bringing down barriers and digitising the European industry is a very important issue, for instance the financial technology (FinTech) industry.

The Digital Single Market aims to define standards and interoperability as a precondition for competitiveness, digital innovation, compatibility among infrastructures and openness of the European digital market, mainly in the critical areas of health, transport, energy, entrepreneurship and small and medium-sized enterprises. The standardisation is related to the European Union legislation and policies and each year the plan is extended, for instance: blockchain and distributed digital ledger (accounting) technologies are included in the 2018 Rolling Plan for ICT Standardisation.

European legislation and policies must be linked to the standardisation process because of the important technological requirements on privacy, security and accesibility. With the ICT standards implemented in the single market, European businesses will be able to expand beyond national borders, industries will interconnect equipments in order to access data sources, consumers will be empowered to choose from multiple offers, public services will offer digital services to citizens in networks that will reach them beyond national borders. Regulations will support high-speed and trustworthy infrastructures that will provide quality and cost-effective innovative services. Investment in digital networks and online platforms will balance society and economy, will improve the competitiveness in industry and in the market for the different players, and will allow the participation of citizens in society.

¹ Source: European Commission <https://ec.europa.eu/digital-single-market/>

Efficient, safe and stable financial systems play a key role in the modern economies and represent the main channel for the transmission of the flow of transactions along the economy. The promotion of the integration of the European financial markets is a top priority, given that different national conventions and infrastructures have survived the introduction of the single currency (euro) in the European Union, with the consequent loss of efficiency. The financial integration has also impacted on consumption patterns, enhancing the welfare of the individuals, who are able to better manage their decisions.

The Eurosystem is the Eurozone's monetary authority and is composed of the European Central Bank (ECB) and the national central banks of the member states whose currency is the Euro; its main target is to maintain the price stability in order to keep secure the value of the Euro². The European System of Central Banks (ESCB) consists of the ECB and the national central banks of all the European Union (UE) member states, whether they have adopted the Euro or not. For that reason, the Eurosystem and the ESCB will coexist as long as there are EU member States that do not belong to the Eurozone³.

The Eurosystem aims to establish a common market infrastructure and implement it with banking integration initiatives⁴. The ECB was instrumental in laying the foundations for the standardisation and integration of cross-border payments establishing the Single Euro Payments Area (SEPA) on 28 January 2008. The SEPA initiative is supported by the European Commission (EC), the European Central Bank (ECB), the European Payments Council (EPC), the European Association of Craft, Small and Medium-sized Enterprises (UEAPME), EU governments and other public authorities, in the common challenge of overcoming technical, legal and market barriers among countries, in the process of harmonising and integrating retail payment systems and creating a single domestic market for retail payments in euro.

A common legal basis has the role of ensuring that SEPA payment services and transactions are processed under a harmonised legal framework in all the countries included in the SEPA territory. The European Commission (EC) has the responsibility for political leadership and normative frameworks, such as the Payment Services Directives. The European Central Bank (ECB) is in charge of guidelines and controls of the SEPA procedures and its roadmap. The European Payments Council (EPC) holds the responsibility of deciding and coordinating SEPA policies. SEPA will enable customers to make cashless euro payments to any other user located anywhere in the SEPA territory, in a way as efficient, fast and safe as a national payment. The SEPA territory consists of 34 European countries as well as other countries which are not part of the euro area and the European Union. SEPA is the initial step towards an eventual integration with a global payments environment.

² Source: European Central Bank https://www.ecb.europa.eu/ecb/orga/escb/html/mission_eurosys.es.html

³ Source: Bank of Spain <http://www.bde.es/bde/es/secciones/eurosistema/>

⁴ Source: Speeches by Yves Mersch (member of the Executive Board of the ECB) press releases published in 2017 and 2018
<https://www.ecb.europa.eu/press/pr/date/2017/html/index.en.html>
<https://www.ecb.europa.eu/press/pr/date/2018/html/index.en.html>

1.1 Justification

The present work is intended to be the final thesis of the master's degree in "Information and Knowledge Society"(IKS) in the Open University of Catalonia, with specialization itinerary in the 'Knowledge Economy and Network Firm', focusing on the standardisation, integration and innovation of the retail e-payments market included in the implementation agenda of the European Digital Single Market (DSM) Strategy.

1.2 State of the Art

1.2.1 Standardisation and demand side economies of scale, also known as network externalities or network effects

This section intends to present several important concepts in the theoretical background regarding this important property of the knowledge-based economy.

Network effect or network externality⁵ is the increase in benefit, value or utility that a user obtains from a product, service or technology with the increase in the number of other users of the same product, service or technology. All network externalities have effects, that can be positive or negative, in the knowledge-based economy.

Positive network effects are improvements in the market conditions that are directly derived from standardisation, due to a massive use of a product and its complementary products or services. Some positive effects are increase in value, cost reduction, improved conditions of access and usability and an increased variety, due to the innovative complementary products and services, whose development and exploitation becomes profitable due to the massive number of potential users.

Negative network effects that can appear, and must be avoided, are: congestion, saturation of information, dominant position of a product in the market and practices that restrict the competition.

The impacts of these network effects in the knowledge-based economy reach many areas, from consumers' wellbeing to dynamics of production, market structure, business strategies and public policies.

⁵ Source: **Torrent-Sellens, J. (2012)**. *Knowledge Products and Network Externalities: Implications for the Business Strategy*. Journal of the Knowledge Economy and other academic sources.

1.2.2 European integration: SEPA retail e-Payments market

This section intends to present an outlook on the legal and technical background supporting standardisation, integration and innovation in the SEPA e-payments market, based on information provided by the ECB website and Yves Mersch speeches⁶, which are necessary to understand the selection of surveys and measurements that will be analysed in the present work.

The European Central Bank (ECB) in conjunction with the European Commission (EC) have established the European Forum for Innovation in Payments (EFIP), that brings together the national payment committees with the Euro Retail Payments Board (ERPB), with the purpose of fostering innovation for retail electronic payments in Europe. Retail payments have three main characteristics: low value, high volume and time-critical.

Harmonised legislative framework for SEPA payment services

The **Payment Services Directive (PSD 1)**, or Directive (EU) 2007/64/CE, was created by the European Commission (EC) and opened the SEPA e-payments market in order to allow the Payment Services Providers (PSPs), payment institutions that are non-bank players, to provide payment services, fostering competition in the e-payments industry.

This PSD Directive establishes the compulsory quality requirements that all non-cash payment systems must achieve. It was aimed at increasing the competition and thus reduce prices for customers, innovating e-payment services and improving their quality of service. This Directive can be considered the legal framework for SEPA payment services. It applies to credit cards, bank transfers and receipts, digital devices and other payments through telecom networks. It was adopted in 2007 and entered into force in 2009⁷.

The **Revised Payment Services Directive (PSD 2)**, or Directive (EU) 2015/2366, opens the way for bank-as-a-platform to become a new model and allows payment account access for regulated and authorised third-party providers of payment services. These new actors in the SEPA e-payments market are expected to provide innovative services at reduced costs and to increase the choice for consumers, with the development of the single standardised access to the payment accounts that this revised PSD2 Directive regulates.

Future innovations in the SEPA retail e-payments market depend on both instant payments and account access allowed by this directive. New actors such as third-party providers are expected to work together with banks and organisations in charge of setting the standards. The incumbent banks

⁶ Source: European Central Bank website and speeches by Yves Mersch (member of the Executive Board of the ECB), from the European Central Bank press releases published in 2017 and 2018:

<https://www.ecb.europa.eu/press/pr/date/2017/html/index.en.html>

<https://www.ecb.europa.eu/press/pr/date/2018/html/index.en.html>

⁷ Source: European Commission https://ec.europa.eu/info/law/payment-services-psd-1-directive-2007-64-ec_en

already in the market also have an opportunity in the competition, as long as they implement instant (real-time and end-user) payments, as well as legacy batch processing systems. It was created in 2015 and is in force since 2018⁸. EU countries had to transpose this Directive into national law by 13 January 2018 and communicate it to the European Commission, but some Members have not done it yet⁹.

Regarding the Spanish transposition, the *Real Decreto-ley 19/2018, de 23 de noviembre, de servicios de pago y otras medidas urgentes en materia financiera* has been published on the *Boletín Oficial del Estado* (BOE number 284, Saturday 24 November 2018)¹⁰.

SEPA payment schemes

There are four schemes, using fully interoperable global standards, to ensure that consumers and businesses can send and receive cross-border payments, quickly and easily, without any difference from domestic payments.

Two of them are mandatory schemes that have replaced all domestic payment schemes in the euro area, and two of them are optional:

- Mandatory **SEPA Credit Transfer (SCT)** scheme, by EBA Clearing, the provider of pan-European payments infrastructure, founded by the Euro Banking Association in 1998.
- Mandatory **SEPA Direct Debit (SDD) Business-to-Business (SDD B2B)** scheme, by EBA Clearing, live since 2009.
- Optional **SEPA Instant Credit Transfer (SCT Inst)** scheme, live since 2017, created by the European Payments Council (EPC), on guidance from the Euro Retail Payments Board (ERPB). There are eight countries that have signed up for this scheme: Germany, Italy, Austria, the Netherlands, Estonia, Latvia, Lithuania and Spain. Those users with accounts in banks that have joined and implemented this real-time scheme, can send and receive instant payments across Europe in less than ten seconds.
- Optional **SEPA Direct Debit (SDD) Business-to-Business (SDD B2B)** scheme, not for retail payments but for businesses.

⁸ Sources: European Commission https://ec.europa.eu/info/law/payment-services-psd-2-directive-eu-2015-2366_en, EUR-Lex <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32015L2366>

⁹ Source: European Commission, National implementation https://ec.europa.eu/info/law/payment-services-psd-2-directive-eu-2015-2366/implementation/implementation-eu-countries_en, National implementing measures for Directive (EU) 2015/2366 <https://eur-lex.europa.eu/legal-content/EN/NIM/?uri=CELEX:32015L2366#ESP>

¹⁰ Source: BOE - Official publication: Boletín Oficial del Estado (B.O.E) ; Number: 284/2018 ; Publication date: 2018-11-24 ; Page: 14474-14568 Direct text access: <https://eur-lex.europa.eu/legal-content/ES/TXT/PDF/?uri=NIM:265274>

The SEPA Cards Framework of the European Payments Council (EPC) is a set of general principles and rules for standardising card payments. The EPC Cards Working Group has been coordinating the standardisation process of several independent initiatives since 2006. The SCF aims to establish interoperability based on an environment compliant with the EMV Standard and overcome technical or regulatory barriers that would interfere with cross-border payments.

The SCF covers card payments and card withdrawals in euro within the SEPA area, as well as in other currencies of the Member States that want to apply Regulation EC No.2560/2001 on cross-border payments in euro. But the SCF does not apply to other card-based services such as electronic purses or debit card overdrafts (lines of credit).

EMV is the international standard for payment card security. Card stakeholders in the EU must complete migration to the EMV standard and become compliant with the new cross-border requirements on security, in order to avoid the cases of card fraud in cross-border payment transactions perpetrated with the previous magnetic stripe technology. The EMV standardisation is based on the harmonization supported by the technical standard developed by the three large card schemes Europay, MasterCard and Visa. The consortium of financial companies EMVCo has been founded to manage the EMV specifications¹¹. The EMV integrated circuit (chip) enable new card functions, a higher level of security and contains information such as account balance, authentication code, limit, expiration date, card cancellation among other data.

So, although cards are the single most important e-payment instrument used in Europe, the largest European card networks are not interoperable due to technical differences, with the result that there is no European card scheme. Despite the work done by the European Cards Stakeholders Group (ECSG), there is no real political will and the European card schemes have no priority for addressing this situation; they do not see business case for developing the standardisation and integration of the pan-European card payment network, in which any card could be used at any payment terminal.

In fact, the alarming situation is that non-European card schemes are playing a more than significant role offering SEPA-compliant payment solutions in Europe. EMV cards schemes, which are non-European, are solving the security problem for frauds in SEPA cross-border payments, so it is more convenient for European consumers to use them. Given the fact that SEPA reliance on non-European card schemes is not intended to be maintained forever, as one of the SEPA goals is to become successful at a global level, domestic governance issues related to the provision of solutions for European card schemes is not to be neglected.

Although these EMV schemes are SEPA compliant and show an efficient performance, the inconvenient for SEPA is that these global giants (Europay, Visa and MasterCard) might use their

¹¹ EMVCo <https://www.emvco.com>

network power in order to achieve a dominant position in the European e-payments market. That is one of the possible negative network effects, mentioned in a previous section of this work, that should be avoided, because it would restrict the European competition and innovation expected to be fostered by SEPA.

Regarding to European banks, they are focused on their respective national markets and thus passively resist the European standardisation objectives of the PSD2 directive by means of their lack of cooperation. Allegedly, because of lack of long-term profit expectations compared to the high investments required of them, they remain focused on earning short-term profits. Banks are not cooperating with granting technical access to their systems for new Payment Service Providers, putting a risk the innovative and competitive European-wide market initiatives that European financial technology companies and start-ups can provide.

SEPA payment infrastructures

There are several technical infrastructures, also called systems or platforms, for the processing of SEPA payments.

Platforms governed by EBA Clearing:

- EURO1 / STEP1 for retail payments in euro
- STEP2 (live since 2003 and used for SEPA since 2008, replaced STEP1), Short Term European Paper 2 for SEPA payments.
- STEP2 SDD Core (used for SEPA since 2009) for SEPA payments.

Platforms governed by EBA Clearing for real-time end-to-end SEPA transactions:

- RT1 (live since November 2017). This platform processes instant SEPA credit transfers fully compliant with the optional SCT Inst scheme of the European Payments Council (EPC), aligned with the global messaging standards for real-time payments ISO 20022. This platform supports Payment Service Providers for transactions between payment accounts in less than 10 seconds end-to-end and the beneficiary has immediate availability of the payment amount; over 99% of the payments are processed in a couple of seconds. It is operative on any day of the year, around the clock.

Platforms owned and coordinated by the Eurosystem (European Central Bank, ECB):

- TARGET (live since January 1999), Trans European Automated Real-time Gross Settlement Express Transfer System is a real-time gross settlement (RTGS) platform, mainly for large-value payments in euro.
- TARGET2 (live since November 2007) is the second generation of the TARGET infrastructure, used by both central and commercial banks for national and cross-border real-time large-value transactions in euro.
- T2S, TARGET2-Securities (live since June 2015). Developed and operated by four central banks of the Eurosystem: France, Germany, Italy and Spain is a platform for national central

banks and central securities depositories (CSDs) to provide core, borderless and neutral services for securities settlements in central bank money in Europe. It processes large-value real-time payments in euro between EU banks.

- TIPS, TARGET Instant Payment Settlement (live since November 2018), is a high-end platform to innovate instant payment service in central bank money, full reachable.

Global Financial Messaging Standards

ISO 20022 harmonisation programme¹² gives support to end-to-end automation for all business domains, facilitates the creation of new services and an efficient integration and interoperability of market infrastructures for payments and securities.

ISO 20022 Universal financial industry message scheme¹³ has many potential benefits: cost saving, customer satisfaction, access to new markets, increased productivity, competitive advantage and improved quality. It is the global messaging standard for the financial industry and can be used for cards, securities, trade services, forex (foreign exchange) and cash. It is a methodology or set of rules that can be implemented on financial networks and has maintenance, governance and evolution processes for business transactions and associated messages. It also includes a common repository.

SEPA mobile

Many European consumers are moving to online payment channels and make retail payments with their mobile phones¹⁴, so they demand the European Payments Council (EPC) to facilitate safe and efficient mobile payment services for retail transactions. Many of these channels are provided by companies not domiciled in Europe which comply with European legislation in order to use its payment infrastructure, so it is vital to control the governance and regulations for mobile payments and limit SEPA dependence on non-European countries.

Those companies might be affected by extraterritorial jurisdiction that could affect its operations and the SEPA payment solutions they provide. Besides that, mobile payments use several different technologies not interoperable among them, so this mess might affect SEPA interoperability and the security of mobile transactions; such negative situation would decrease the consumers welfare.

¹² Source: SWIFT <https://www.swift.com/standards/about-iso-20022>

¹³ Source: ISO20022 www.iso20022.org

¹⁴ Source: European Central Bank website and speeches by Yves Mersch (member of the Executive Board of the ECB), from the European Central Bank press releases published in 2017 and 2018:
<https://www.ecb.europa.eu/press/pr/date/2017/html/index.en.html> ,
<https://www.ecb.europa.eu/press/pr/date/2018/html/index.en.html>

The European Payments Council (EPC) defines the objective of the Single Euro Cash Area (SECA) Framework (updated in 2016) as: *the development of a common set of rules and best practices for the distribution and recycling of wholesale and retail euro cash in the Eurozone* ¹⁵.

Both the EPC and SEPA encourage the shifting from cash to e-payments with the aim of reducing and harmonising cash services, and to increase the cost and efficiency of cash since its proportion among retail payments is falling. There are also ongoing SECA standardisation processes for professional cash handlers ¹⁶, for Automatic Teller Machine (ATM) cassettes ¹⁷ as well as for banknotes and coins ¹⁸.

1.3 Literature Review

This section includes annotations from selected academic papers on standardisation, network effects and SEPA electronic payment systems. Most of them have been obtained from the UOC Virtual Library, searching for the keywords ‘network externalities’, ‘payment systems’, ‘electronic payments’, ‘financial’, ‘banking industry’, ‘single european payments area’. Some of the authors are referenced in Torrent- Sellens, J. (2012) and Torrent- Sellens, J. (2002).

Ackerberg, D.A., Gowrisankaran, G. (2006). Quantifying equilibrium network externalities in the ACH banking industry. *The RAND Journal of Economics*; Autumn 2006; 37, 3; ProQuest Central, pg.738.

We seek to determine the causes and magnitudes of network externalities for the automated clearing house (ACH) electronic payments system. We construct an equilibrium model of customer and bank adoption of ACH. We structurally estimate the parameters of the model using an indirect inference procedure and panel data. The parameters are identified from exogenous variation in the adoption decisions of banks based outside the network and other factors. We find that most of the impediment to ACH adoption is from large customer fixed costs of adoption. Policies to provide moderate subsidies to customers and larger subsidies to banks for ACH adoption could increase welfare significantly.

Au, Y. A., & Kauffman, R. J. (2008). The economics of mobile payments: Understanding stakeholder issues for an emerging financial technology application. *Electronic Commerce Research*

¹⁵ Source: European Payments Council <https://www.europeanpaymentscouncil.eu/what-we-do/sepa-cash> , <https://www.europeanpaymentscouncil.eu/document-library/guidance-documents/single-euro-cash-area-seca-framework>

¹⁶ Source: Herbei (2009)

¹⁷ Source: EPC <https://www.europeanpaymentscouncil.eu/news-insights/insight/one-size-fits-all-epc-initiative-standardise-atm-infrastructure-increases>

¹⁸ Source: EPC <https://www.europeanpaymentscouncil.eu/sites/default/files/KB/files/Cash%202021-05%20v4%200%20-%20SECA%20Framework%202016.pdf>

and Applications, 7(2), 141–164. <http://doi.org/10.1016/j.elerap.2006.12.004>

Economic theory provides a unique vantage point from which to examine issues with respect to emerging technologies, where **standards** and adoption, **business** process changes and implementation outcomes, information security, investments and **business** value, and industry impact require care and consideration on the part of senior management **strategists** and financial services leaders. In this article, we examine a new technology application which is coming into its own around the world, in association with the revolution in wireless connectivity: mobile payments. Although there are likely to be nuances and surprises with this technology application, we caution the reader to recognize that many of the same economic forces will be at work as were with other financial services and related technology applications in the past. We apply a robust evaluative framework that permits identification of the relevant stakeholders and applicable theory in the analysis of consumer, firm, business process, market, industrial and social issues. Our findings are intended to guide senior **managers** in dealing with the economic aspects of mobile payments, and to help identify some important directions for the research. 2007 Elsevier B.V. All rights reserved.

Avadanei, A. (2010). Single Europayments Area and its Implications on the European Small and Medium-Sized Enterprises. CES Working Papers, II, (3), 2010.

The scope of this article is to discuss the implications of the Single Euro Payments Area from the perspective of the European **SMEs**. The current unpredictable and very challenging market situation has not fundamentally changed the fact that payment services need to continue modernization in order to become more flexible, agile and adapt in order to comply with its important purpose in society. **SEPA** is needed to ensure the new modern payment platform that can enable Europe to move beyond basic **services**, increase payments **efficiency**, embrace **innovation** and integrate **further services** in the trade process. European Small and Medium-sized Enterprises see SEPA as an important step towards the completion of the internal market, but such a major initiative has to be well **planned**, must meet the practical needs of enterprises and provide, at least in the long run, positive incentives for all market participants.

Beijinen, C., Bolt, W. (2008). Size matters: Economies of scale in European payments processing. *Journal of Banking & Finance* 33 (2009) 203 - 210.

This paper investigates the existence and extent of economies of scale in the European payment processing industry. It is expected that the creation of a single European payments area (SEPA) will spur **consolidations and mergers** among European payment processors to more fully realize payment economies of scale. We find evidence for the existence of significant economies of scale using data of eight European payment processors during the years 1990–2005. The analysis also reveals that **ownership** structure is an important factor to explain cost differences across European processing centers.

Bolt, W., & Humphrey, D. B. (2007). Payment network scale economies, SEPA, and cash replacement. *Review of Network Economics*, 6 (4), 453–473. <http://doi.org/10.2202/1446-9022.1129> The goal of SEPA (Single Euro Payments Area) is to facilitate the emergence of a competitive, intra-European market by making cross-border payments as **easy** as domestic transactions. With cross-border inter-operability for electronic payments, card transactions will increasingly replace cash and

checks for all types of payments. Using different methods, we estimate card and other payment network scale economies for Europe. These indicate substantial cost efficiency gains if processing is consolidated across borders rather than “piggy-backed” onto existing national operations. **Cost reductions** likely to induce greater **replacement of small value cash** transactions are also illustrated.

Calabrese, A., Gastaldi, M., Iacovelli, I., Leviardi, N. (2010). New Technologies in the Payment System Industries: The SEPA Project. *American Journal of Economics and Business Administration* 2 (4): 384-394, 2010.

Problem statement: The Single Euro Payments Area (SEPA) project plans to establish an integrated market for extending European integration to retail payments; it aims to provide incentives for using payment systems **instead of cash** for all **micro** payments, in order to improve both **efficiency** and **competition** in the Euro area. In this study we described the SEPA and its effects on competition and innovation in the payment systems. Moreover, we will discuss the main technological **innovations** (particularly mobile payments, biometrics payments and smart cards) and their impacts on retail payments. Approach: In order to analyze the impact of new technologies on cash usage we employed a mathematical model. This model is an extension of duopolistic competition to three market players; it allows analyzing **market changes** caused both by SEPA and technological **innovations**. Results: Our numerical simulations showed that new technologies cause a **reduction of cash usage**, such as SEPA project states. Conclusion: New payment technologies provided new benefits than the traditional payment systems. These new technologies **reduced** the transaction **times** and the logistic **costs** of cash management; moreover they improve the transactions **safety**, their easiness and convenience. Such benefits push consumers to use these new payment technologies for micro-payments (pubs and bars, nightclubs, fast food outlets, retail fuel, convenience store and vending machines), thus **reducing the use of cash** such as SEPA project state.

Carton et al. (2014). Framework for Mobile Payments Integration, *Electronic Journal Information Systems Evaluation*, Volume15, Issue 1.

This paper derives a theoretical framework for consideration of both the technologically driven dimensions of mobile payment solutions, and the associated **value proposition** for customers. Banks promote traditional payment instruments whose value proposition is the management of **risk** for both consumers and merchants. These instruments are centralised, costly and lack decision support functionality. The ubiquity of the mobile phone has provided a decentralised platform for managing payment processes in a new way, but the value proposition for customers has yet to be elaborated clearly. This inertia has stalled the design of sustainable revenue models for a mobile payments ecosystem. Merchants and consumers in the meantime are being seduced by the **convenience** of on-line and mobile payment solutions. Adopting the purchase and payment process as the unit of analysis, the current mobile payment landscape is reviewed with respect to the creation and consumption of **customer value**. From this analysis, a framework is derived juxtaposing customer value, related to *what* is being paid for, with payment integration, related to *how* payments are being made. The framework provides a theoretical and practical basis for considering the contribution of mobile technologies to the payment industry. The framework is then used to describe the components of a mobile payments pilot project being run on a trial population of 250 students on a campus in Ireland. In this manner, weaknesses in the **value proposition for consumers**

and merchants were highlighted. Limitations of the framework as a research tool are also discussed.

Gao et al. (2007). A Study on the Interaction between Network Effects and Standardisation. 2007 International Conference on Management Science & Engineering (14th), August 20-22, 2007. Harbin, P.R. China.

The economics theory of network effects takes a very important role in the economics field with the revolution of ICT (Information Communication Technology). It focuses on the unique characteristics of ICT products differing from other products, the influence of network effects on the market structure, the firms' behaviors and performance of the ICT industry. In the ICT industry, the competition of technological standards usually results in the market situation of "**the winner takes all**" because of the characteristics of network effects. Therefore, the effectiveness of deploying **competition strategies** is a critical point to the firm. The interaction between network effects and standardisation is described in this paper. It is shown that the competition strategies in firms are affected sensitively by the standardisation in the markets with very strong network effects. Also the proper opportunity and route of technological choice in the markets with the same condition are pointed out. In addition, Chinese 3G policies are investigated according to the references mentioned above.

Gowrisankaran, G., Stavins, J. (2004). Network Externalities and Technology Adoption: Lessons from Electronic Payments. RAND Journal of Economics, Vol. 35 (2004), pp. 260-276.

We seek to analyze the **extent and sources of network externalities** for the automated clearinghouse (ACH) electronic payments system using a **quarterly panel data** set on individual bank adoption and usage of ACH. We provide three methods to identify network externalities using this panel data. The first method identifies network externalities from the clustering of ACH adoption. The second method identifies them by examining whether banks in areas with higher market concentration or larger competitors are more likely to adopt ACH. The third method identifies them by examining whether the ACH adoption by small branches of large banks affects the adoption by local competitors. Using fixed effects and panel data these methods separately identify network externalities from technological advancement, peer-group effects, economies of scale and market power. We find evidence that the network externalities are moderately large.

Herbei, M. (2009). The Single Europayments Area (SEPA) - The Pan-European Market for the European Integration. Journal Finance - Challenges of the Future, Year VII, No. 8/2008. Accesible online http://www.financejournal.ro/fisiere/revista/1588727502FPV08_09.pdf

Kalemli-Ozcan, S., Papaioannou, E., Manganelli, S., Peydró, J.L. (2008). Financial Integration and Risk Sharing: The Role of the Monetary Union. Prepared for the 5th. European Central Banking Conference on The Euro at Ten: Lessons and Challenges. October 2008.

This paper first reviews the literature on financial integration with a specific focus on the euro area. We discuss how to measure financial integration and describe the main legislative and regulatory harmonization **policies** that the EU member states have implemented in financial markets. Second, we present empirical results showing a positive impact of these **policies** and of the single currency on cross-border banking integration. We also find that banking integration increases

consumption **risk** sharing. Our results, therefore, suggest that the increased crossbanking integration triggered by the euro has fostered ex-post the optimality of the currency union by improving cross-country **risk** sharing.

Popovici, M. C. (2014). Framework for Mobile Payments Integration, CES Working Papers - Volume VI, Issue 3

With the creation of the euro by the Maastricht Treaty in 1992, European integration has deepened. Even with this step done the financial market is fragmented. In order to eliminate this disadvantage, the European Union has taken a number of **measures**. The first step is the Financial Services Action Plan in 2000, through the Lisbon Strategy. Second is the European Commission Regulation 2560/2001 to harmonise fees for cross border and domestic euro transactions. Third is the first pan-European Automated Clearing House in 2003. Last great step made is the **Single Euro Payments Area (SEPA)** in 2008. In this paper, we want to research the **degree of implementation** of SEPA by using quantitative indicators: credit transfers, direct debits and payment cards, and the effects of this system on bank **efficiency**.

Popovici, M. C. (2015). The Implementation of **Single Euro Payments Area** in Romania and the Effects on **Efficiency**, SEA - Practical Application of Science, Volume VIII, Issue 1(7) / 2015

Adoption of the single currency, euro, on 1 January 2002, in 12 countries, then in other seven states, represents a step towards closer economic and monetary integration in the European Union. The banking market remains fragmented after euro adoption and cross-border transactions in the single currency involves high costs and long periods of settlement and clearing. European Union response to this problem came in the form of the Single Euro Payments Area. The objective of the papers is to analyze the degree of **implementation** of SEPA in Romania and to investigate the impact on banking **efficiency**. The results showed low degree of **implementation**, especially on direct debit, but Romania has more time until October 31, 2016 to make the necessary changes. The consumers will benefit from a quicker settlement and clearing and at lower costs.

Rodríguez-Ardura, I., Meseguer-Artola, A. (2010). Toward a Longitudinal Model of e-Commerce: Environmental, Technological, and Organizational Drivers of B2C Adoption. The Information Society, 26(3), 209–227. <http://doi.org/10.1080/01972241003712264>

Despite the important benefits for firms of commercial initiatives on the Internet, e-commerce is still an emerging distribution channel, even in developed countries. Thus, more needs to be known about the mechanisms affecting its development. A large number of works have studied firms' e-commerce adoption from technological, intraorganizational, institutional, or other specific perspectives, but there is a need for adequately tested integrative frameworks. Hence, this work proposes and tests a model of firms' business-to-consumer (called B2C) e-commerce adoption that is founded on a holistic vision of the phenomenon. With this integrative approach, the authors analyze the joint influence of environmental, technological, and organizational factors; moreover, they evaluate this effect over time. Using various representative Spanish data sets covering the period 1996-2005, the findings demonstrate the suitability of the holistic framework. Likewise, some lessons are learned from the analysis of the key building blocks. In particular, the current study provides evidence for the debate about the effect of competitive pressure, since the findings show

that competitive pressure disincentivizes e-commerce adoption in the long term. The results also show that the development or enrichment of the consumers' consumption patterns, the technological readiness of the market forces, the firm's global scope, and its competences in innovation continuously favor e-commerce adoption. Despite the important benefits for firms of commercial initiatives on the Internet, e-commerce is still an emerging distribution channel, even in developed countries. Thus, more needs to be known about the mechanisms affecting its development. A large number of works have studied firms' e-commerce adoption from technological, intraorganizational, institutional, or other specific perspectives, but there is a need for adequately tested integrative frameworks. Hence, this work proposes and tests a model of firms' business-to-consumer (called B2C) e-commerce adoption that is founded on a holistic vision of the phenomenon. With this integrative approach, the authors analyze the joint influence of environmental, technological, and organizational factors; moreover, they evaluate this effect over time. Using various representative Spanish data sets covering the period 1996-2005, the findings demonstrate the suitability of the holistic framework. Likewise, some lessons are learned from the analysis of the key building blocks.

Sammut - Bonnici, T. (2010). Network Strategy in the Digital Economy. Sammut-Bonnici, T., & McGee, J. (2010). Network Strategy in the Digital Economy. In J. McGee, H. Thomas & D. Wilson (Eds.), *Strategy: Analysis and Practice* (2nd ed.,). UK: Maidenhead: McGraw-Hill.MPRA Munich Personal RePec Archive Paper No. 50620, posted 29 October 2013. Online at <https://mpra.ub.uni-muenchen.de/50620>.

This chapter is concerned with the 'new' world of information technology and knowledge intensity. This is a world marked by big investments in R&D, different cost structures and significantly changed demand conditions. You should read this chapter in conjunction with Chapter 19, which deals with knowledge, information and innovation. In this chapter we are concerned with how the logic of **competitive advantage** applies to the new conditions in which we find ourselves. To anticipate the conclusions, we will see that the **strategic** context has shifted a great deal. This means that fundamental demand and cost conditions have changed, resulting in different **strategies** being pursued. The new world and the new economy does mean that the old strategic logic is outmoded. Instead we see a significant change in the **strategic** context that results in the logic of **competitive advantage** being applied in different ways. The chapter presents and contrasts the differences between the old world of scale and scope economies and the new world of network externalities. There is an extensive discussion of what network externalities are and how they arise but the reader should read this in the context of addition, not replacement - scale and scope have not been replaced; there is, however, another important practical phenomenon to consider. Networks are supported by many layers of infrastructure and we go into some detail to show how the technological infrastructure can be identified and analysed. There are many implications for competition which we review. Finally, we summarize the implications for **strategy** - although it is a new world, the logic of competitive advantage still applies.

Srinivasan, R., Lilien, G. L., Rangaswamy, A. (2004). First in , First out? The Effects of Network Externalities on Pioneer Suwival, *68* (January), 41–58. <http://doi.org/10.1509/jmkg.68.1.41.24026> Network externalities are playing an increasingly important role in the economy, and they have

significant implications for firms' **marketing strategies**. The authors study the effects of network externalities in conjunction with other product and firm characteristics on the survival of pioneers. They apply an accelerated failure time model to data on 45 office products and consumer durables. The authors find evidence that network externalities have a negative main effect on the survival duration of pioneers. However, for more radical products and for technologically intense products, increases in network externalities are associated with increased survival duration. The larger the pioneer, the more network externalities increase its survival duration, whereas incumbent pioneers experience a decrease in survival duration compared with nonincumbents. The findings of this article contribute to theory in marketing strategy and have important implications for firms that are developing market entry strategies for products with network externalities.

1.3.1 Topics and concepts from the literature review

*new market dynamics; management of expectations; size of the network;
new business strategy; consolidations; mergers; alliances;*

Sammut (2010)

New network economy: The author highlights the idea that the new economy is an extrapolation of the new industry that appears from the new Information and Communication Technologies, because networks are composed of interconnected nodes that have a cooperative behavior, instead of a competitive one.

Dynamics of positive feedback: Companies working in the new economy can obtain benefits from both the supply and the demand sides when they learn that the new economy is driven by positive feedback, contrary to what happened in the old industrial economy driven by economies of scale. The philosophy of the feedback from the supply side is that the bigger a network becomes, the lower the costs and prices will be and the more users will join the network. That is why standardisation and interoperability are so important, because of the critical mass of nodes a network company can achieve. From the point of view of the demand side, the more users join a network, the bigger the incentives will be for other users to join, thus adding more positive feedback.

Demand and network effects: Also called network externalities, they have their origin from the demand side because new users will have more utility when they join a network as the increasing number of other users make the size of the network grow. So, the demand for a product or service depends on the total demand in a complementary class, in other words, it is influenced by a consumer externality.

Standardisation: When there are strong consumer externalities there is a powerful demand due to the positive feedback, so there is a tendency to a single network or a single standard, which means great value for its users. This means a new market dynamics which leads to new business strategies

focused on interconnection and interoperability, thus integration and higher quality of products and services, with the result of higher value for consumers.

New business strategy: In the old economy scale diminishing returns were the drivers, but the new economy is driven by the increasing returns to scale of the networks. So it is vital for corporations to understand how this new network economy works and they must update their strategies in order to survive in this new environment facilitated by the new ICT technologies.

Value in the new economy: In contrast to the old economy law, in which value came from the shortage of resources, value in the new economy comes from abundance. The reason is that the bigger the actual demand is and the bigger the expectations of future demand are, value in a consumers' network is increased the more; this happens because of the many expected possible interactions with other consumers. This value is called 'synchronization value', defined as the increase in value that comes from the possibility of interaction with other users in the network. This value enhances the network effects, also named pull from the demand side. In fact, when the pull driven by the expectations about the final size of a network is big enough, it reaches a point in which there is a winner-takes-all effect for the competing network with the biggest size expectations, called 'tipping point'. When there are enough consumers' expectations about the final network size, and a critical number of users is engaged, the market reaches a critical mass. The more optimistic the consumers' expectations, the faster the achievement of the critical mass. From this point onward, the number of new users that join the network experiments an exponential growth up to the maximum number of users.

Expectations management: The problem is that users will not join a small network because of the small installed base, and the base is small because users do not join the network. The solution to unlock this paradoxical situation can be found in the management of expectations towards inducing an optimistic user's perception on the success of a product, service or network. Balance must be observed between the actual consumers' demand and expectatives on future total demand.

Strategy: Increasing consumers' expectations about the success of a product/service and the final size of a network, with brand and corporate image building, besides preannouncements or predictions of figures, and moves towards combining cooperation and competition practices within industries.

New industrial order: By means of connectivity and modularity, traditional hierarchy and competition are to be replaced by complementary and co-operative networks.

Beijnen (2008)

Merging and consolidating payments processors: The author outlines the advantages attained from the consolidation of Automatic Clearing Houses (ACHs) in the Euro area. The main potential benefit from the SEPA process would be the large economies of scale effects, with a business strategy of cost-effective e-payment processing in the new SEPA environment. The research is addressed from

the point of view of the estimation of economies of scale in the market of payments processing, through the analysis of processor cost data. References are taken from several studies for the US settlement and processing systems from the nineties, that were spurred by the consolidation of the Federal Reserve payment processors.

Payment processing cost data: As the author states, publicly available data on European payments, detailed enough to make statistical- econometrical use of them, are very difficult to find. Besides that, there were no previous empirical studies for him to use either, so he had to obtain the required data set with European payment processing cost data from: direct communications, ECB Blue and Red books, annual reports from processors' websites and more detailed data from processors SIBS, TAI and Voca/BACS corporations.

Governance structure: The recommendation from the author is that public bank-owned processors need to become privately owned, if they want to become eligible to play a fundamental role in the SEPA financial environment.

*efficiency; reduction of cash usage;
reduction of processing cost and time of transactions;*

Popovici (2014) and Popovici (2015)

Cost of transactions: Popovici (2014) points the price of cross-border transactions as a source of inefficiency. It addresses the measures taken by European Union in order to solve the fragmentation of the financial market in Europe, that remained despite the advance of the European integration process. With the 'euro' single currency, consumers could compare price of banking products and services without having to convert currency. However, the price of cross border transactions was different between member states and involved long periods for settlement and clearing completion. Popovici appoints the price of cross-border transactions as a source of inefficiency. The measures that were taken in order to solve this inconvenient situation started with the Financial Services Action Plan in 2000, followed by the Regulation 2560/ 2001 issued by the EPC, then the first pan-European Automated Clearing House in 2003 and finally the Single Euro Payments Area (SEPA) in 2008.

Migration indicators: In this paper, Popovici performs an analysis of the banking efficiency of the implementation of SEPA, by means of three quantitative migration Indicators per country in the euro zone between February 2008 and March 2014, whose figures have been published by the Eurosystem and can be downloaded from the ECB webpage. Popovici (2014) concludes that the harmonised fees in the SEPA process increase the financial efficiency, but he states that transactions are not fees, but only harmonised. Since this implies less profit for banks, he claims that they will nevertheless increase revenues in another form. This paper is a fine example of market analysis from secondary sources, complemented with insights on the true nature of the banking industry.

Remittances from expatriates: Popovici (2015) complements his previous paper with a similar analysis, but it differs this time on the extended date or 'waving' for the implementation of SEPA process in Romania, because the countries that have not adopted the euro have an extended deadline to be compliant with SEPA. The focus in this paper lies on the conclusion that benefits for Romania refer mainly to remittances from Romanian expatriate workers, transactions that are less expensive, thus implying reduced cost as a source of efficiency.

Calabrese (2010)

Efficiency, competition and innovation: In Calabrese (2010) cash transactions are appointed by the author as a main source of inefficiency and lack of competitiveness on the European retail market payments. The chance of improvement in benefits comes from technological advances in payment systems: mobile, biometrics, smart cards; traditional cash and magnetic cards must be left behind. According to the author, efficiency can be increased by means of reducing logistic costs of handling cash and granting interoperability among networks, payment security and convenient use.

Benefits for consumers: The application of new ICTs to retail payments, thus leaving cash transactions, offers them other benefits such as improvement in the safety of transactions and convenience, especially for frequent micro-payments.

Consumers must be persuaded and induced: in this paper Calabrese states that consumers will find benefits if they use the new payment technology for micro-payments in vending machines, fast food and convenience stores, fuel stations, even pubs and nightclubs, instead of using cash. Unfortunately, consumers are reluctant to adopt them as much as merchants are reluctant to accept such innovations because they do not perceive their benefits, the author claims. He concludes that they should be persuaded, especially about the better quality and reliability of new services offered by the new payment systems. Calabrese finds necessary to induce consumers to use alternative devices in order to increase efficiency in transactions and reach the integration in the market of retail payments. The switch from cash to cashless payments can be helped by information and pricing policies.

Pricing of payments: Information about real operating costs should help consumers to make decisions selecting the payment options most cost-effective for their particular needs.

Methodology – numerical simulation, interviews with experts, focus groups: The interesting outlook in this paper is that the author acknowledges the shortage of available data for his research, but far from being deterred from it, he adapts and tests a numerical model of duopolistic competition to three players in order to prove the claim made by SEPA about the benefits from reduction of cash in retail payments market. The players are: smart cards, mobile and biometric payments. He used a qualitative approach with focus groups as a way to get to the factors that incentivate the adoption of mobile payments; regarding data he interviewed experts from technological firms that operate in the payments industry.

Au-Kauffman (2008)

Mobile payments: In this paper, ten years ago, the author interviewed an expert about the application of mobile phones for financial uses, especially payments. The answer was that m-payments were in a quite promising stage, but success had not been materialised yet. It was just a concept and there was a long distance to go and meet the expectations, overcoming the technological hype.

Convince consumers and retailers: The focus for the promoters of m-payments lied on finding ways to convince both consumers and retailers. While in the former case buyers just have to be persuaded to use the mobile devices, that they already own, when making a purchase, the latter case is more difficult: merchants are required to invest in new equipment if they want to become ready to accept m-payments. So the central point is the business case for merchants, besides the incentives for consumers of course.

Open questions: Among others, the interrogations to be answered are such as finding appropriate business cases for mobile payments and their place in the competition with incumbent payment schemes; the replacement of cash and cards by mobile devices as the universal payments solution or the more realistic market goal of becoming leaders in the niche of micro-payments; what gaps between technological hype and market expectations must be solved?

Bolt (2007)

Traditional scale vs. network scale economies: This author focuses on cards as a way of reducing cash use in the SEPA harmonisation of payment instruments. While traditional economies of scale can be expressed as the ratio of marginal to average cost, new network scale economies are expressed as the ratio of predicted operating cost to asset value.

Cards replacing cash for low-value transactions: Suggesting a practical strategy, the author proposal is finding a way to extend the consumers' preference for cards in medium-value purchases also to smaller payments, so that scale economies would reduce bank charges to merchants and extend the availability of card terminals. Another suggestion is that banks would use a single technology for medium and low-value transactions that would replace prepaid cards.

Inducing consumers: Direct pricing of payment instruments as a measure for persuading/inducing consumers and merchants to adopt cost efficient technology agrees with (Calabrese,2010).

Merging payments processing centers: Regarding card payment processing systems, the author proposes consolidations and shiftings as a way to have larger scale benefits. In the case of consolidations, he foresees two disadvantages that must be assessed: telecommunication expenses and the amortization of the required investments in new equipments for the bigger processing

centers. In the case of shiftings, he gives the example of three European countries which took the decision to process all the domestic retail payments in euro via the Euro Banking Association's processing platform STEP2: Luxembourg, Italy and Spain.

standards and interoperability; value proposition; safety; easiness and convenience of payments; value increase for consumers and merchants; risk sharing;

Carton et al. (2010)

Value proposition of mobile payments: While traditional value proposition clearly was the management of risk for consumers and merchants, the new value proposition of mobile payments is far from being established, apart from being perceived by customers as a decentralised payment platform. The author suggests several options: direct access and visibility of payment execution options, information to support purchase decisions such as the balance of the bank account, loyalty programme points, discounts and special terms and conditions. In short, information value and mobility - or ubiquity - value. In social networks, the customer value perception is the positioning of payment instruments as lifestyle commodities that facilitate personal finance management (PFM), with flexibility and complicity.

Key requirements for mobile payments: Standardisation and technology maturity need to be deployed in order to expand contactless payments and especially mobile payments, otherwise the popularity of cash, debit and credit cards will not be surpassed, with the exception of smart cards as their only expected challenge.

Au-Kauffman (2008)

Standards and interoperability of mobile payments: Again we find an author who highlights the importance of standardisation and compatibility as key ingredients for network externalities, by means of the creation of larger network size, which is presented as customer value. The combination of existing networks and the reduction of searching and coordination when users have to choose among several available technologies, are top reasons among others. If merchants have to accept several different mobile payment technologies, markets will remain fragmented and localised, with the consequence that the critical mass of users will not be reached by providers of payment services. With standardisation, providers can join forces and offer best services to both merchants and consumers. The more merchants equipped to accept payments with mobile devices, the more consumers will be willing to use them, but it is important that they can rely upon agreed standards.

Network economy and value creation: When the utility from using a product or service increases along with the number of other users in the network, value is created in the network economy and network externalities exist, because with every new user that joins there are additional benefits for the existing users. Direct benefits depend on direct communications or interactions among network users and indirect benefits come from the complementary goods and services that are produced because their compatibility with the existing network.

Expected utility: It is defined as the increase in utility that a consumer can expect from a payment instrument, according to the number of other consumers using it, because it becomes more practical: the more buyers using it, the more merchants willing to accept it; and the more merchants who have invested in acquiring the payment technology, the more buyers willing to adopt it for their purchases.

Financial markets: The networks of electronic banking and financial exchange markets can also have network externalities and increased expected utility if there is an increase in size and a higher participation of traders. The reason is that the variance in the price market will be reduced and this means better expected utility for those traders who have greater aversion for risk.

technological innovations; competition; new market opportunities;

Calabrese (2010)

SEPA goals: The main goal is the harmonization and coordination of payment systems in which every European citizen can use the same bank account in all the Euro area, using different payment instruments with efficiency, security, easiness and quality. Other goals are the development of efficient payments systems, improvement of quality in payment networks, the development of innovative payment solutions that address the problem of the high logistic costs of cash management, transportation and security. Other goals are the exploitation of scale economies in electronic payment systems, the reduction of cross-border transactions costs, reduction of general banking services by means of innovations and increased competition in new payment services.

New market opportunities: With the arrival of new technologies to the market of payment systems, new players may participate in the competition, so the SEPA process will bring new opportunities for traditional operators, telecommunication companies and distribution networks.

Payments systems industry: There have been technological innovations in the payments systems industry, new market players from the telecom companies, new payments services and tools from the new ICTs innovations. Traditional payment instruments are cash, credit and debit cards, but new innovative instruments are increasing competition in the payments market, such as smart cards, mobile payment devices and biometric payment solutions.

Contact and contactless smart cards with RFID tech: These cards have a microchip able to handle more data and services than the traditional magnetic band, they use a dual interface EMV, which stands for Europay-Mastercard-Visa, that allows contact and contactless payments. For medium and high-value transactions, a Personal Identification Number (PIN) will be required to the customer. For low-value transactions the smart card will allow the payment simply approaching it to the merchant's Point Of Sale (POS) device, equipped with a Radio Frequency Identification (RFID) reader.

Mobile payments with NFC tech: They are based on a short-range wireless communication technology called Near Field Communication (NFC), which is composed of Radio Frequency

Identification and interconnection sets. The mobile NFC phone has a Central Processing Unit (CPU), a Near Field Communication chip and a security device. When the mobile phone is placed near a reader equipment, this one is able to identify the smart card and charge a payment debit on a bank account or on a credit card when it belongs to a prepaid SIM card inside the mobile phone.

Mobile payments with GSM tech: Other possibilities include communications by means of Short Message Service (SMS), bluetooth and Internet access, micro-payments and transport tickets (taxi, bus, train, subway).

Biometric systems: Body features are used as a valid proof of the customer's identity. In the case of finger imprints, the merchant needs a terminal equipment that scans fingerprints and sends them to a central processor that compares them to the ones stored in its database, that stores information about the customers who have signed up as users of the payment service. Once the buyer is acknowledged, a code is required in order to charge the purchase in the customer's bank account.

policies and welfare;

Kalemli-Ozcan (2008)

Financial harmonization and welfare: The author states that retail banking activities remain fragmented, so he explains his research on interbank market integration and its effects on welfare enhancement. Although there are different levels of integration for different market segments, the financial integration process has experimented an acceleration with the euro. It has happened mainly due to its influence on consumers' consumption patterns, which they can now diversify the specific risk of their country and thus smooth consumption. Transaction costs have fallen in the markets for equity and corporate bonds, while regarding the market of government bonds, spreads have been reduced.

Gao (2007)

Size expectations: In the competition that takes place in network markets, expectations about the final size of the network is what determines what network will be the winner as the users' favorite choice, instead of traditional levels of sales. So, when users have expectations about the benefits that they will obtain if they join a network, compared to the benefits offered by other networks, a discrepancy in perceived potential value arises. The bigger the network, the bigger the benefits for joining users, so when the network operates within an established technological standard, it enjoys an 'architectural franchise', which has a very profitable position in the market, due to the high expectations it offers.

Technological choice and welfare: In this case, measures such as product or service preannouncements and strategic pricing are normally used by tech companies competing in the market. The reason for this strategy is that potential users will be willing to prefer a given technological network among others when they know in advance about its potential benefits and make up a positioning in their minds about the final size of the network and the number of

exchanges they can engage. Far beyond those reasons, a competition among different technological networks may enhance welfare for consumers because of strategic pricing benefits.

small and medium-sized enterprises; public administrations; e-government;

Avadanei (2010)

Benefits for businesses and SMEs: Benefits, opportunities and costs from SEPA should be known to all SMEs; they should actively gather information, and also express their needs and demands, so that they can take the best decisions when it comes to the implementation of SEPA requirements. Several benefits are outlined in this paper: Reduction in the cost of the fee per transaction; increment in service and security; real-time visibility, better financial reporting and planning; reduction in the number of mistakes in the address of invoices.

Herbei (2009)

PSPs are the Providers of Payment Services; SEPA will increase competition among providers of services and infrastructures, creating new businesses opportunities for them.

The Eurosystem is the organism that has defined the criteria for providers to become compliant with SEPA process and they must be assessed by the providers themselves: interoperability, processing capabilities, reachability and choice for banks.

EBA Clearing is the European Banking Association, the European industry for clearing and settlement, is in charge of the processing of SEPA payments. They guarantee the reachability of the SEPA process for anyone in the euro area, while they are compliant with the Eurosystem requirements.

EACHA is the European Automated Clearing Houses Association, they develop the procedures that ensure the interoperability of all infrastructures and their compliance with the SEPA requirements.

EACT is the European Association of Corporate Treasurers, and is composed of European companies that have strong interests in SEPA because they have businesses in the euro area. They take part in the development of standards for the automated handling of payment services, including e-invoicing and e-reconciliation. Their ultimate goal is the complete automation of the processing of payments, called *e2e STP*, which stands for *end-to-end straight-through processing*, causing the reduction of the cost of processing payments in SEPA.

Users: Public administrations are important users of SEPA payment instruments, both national and cross-border, so stand among the main beneficiaries of the increase in efficiency in payments processing. They are expected to become early adopters of SEPA for the payments of retirement pensions, social security and taxes. SMEs and consumers are also users of euro retail payments in SEPA.

1.4 Aims of the Study

The main target of the present work is to outline a proposal for research on the effects of standardisation and network externalities in the knowledge economy, and highlight the benefits of the standardisation of e-payments market in the SEPA countries for stakeholders such as consumers, retailers, public administrations, banking firms and fintechs among others.

1.5 Scope of the Analysis

The present work addresses the challenge of overcoming technical, legal and market barriers in order to create a single market for retail payments in euro in the European Union, more specifically the process named 'Single European Payments Area', better known for its acronym SEPA Area, "initiated by European banking and payments industry and supported, inter alia, by EU governments, the Eurosystem, the European Commission and other public authorities, with a view to integrating retail payment systems and transforming the euro area into a true domestic market for the payment industry", as defined by Yves Mersch, member of the Executive Board of the ECB. The field of application of the present research is wide, in fact there is no economic field that is not affected in one way or another by the process of financial integration, but the focus will be the SEPA retail payments market.

As for the geographic scope of the research, all countries in the SEPA area will be considered, but the longitudinal analysis will be focused on that country or group of countries whose integration process is more advanced, according to the availability of data.

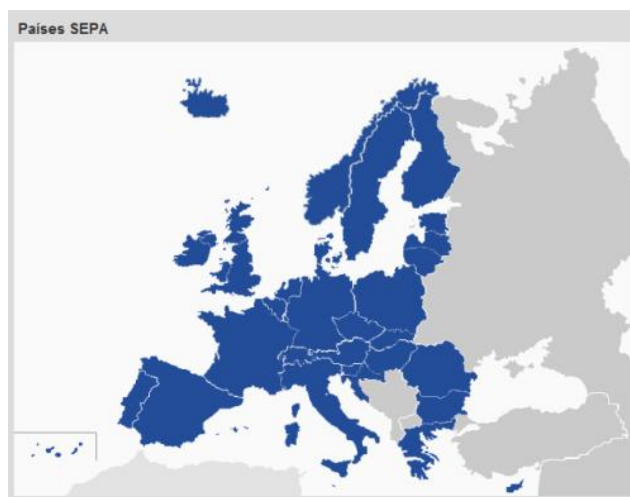


Figure 1. 'Zona Única de Pagos en Euros'

Source: S€PA, (www.sepaesp.es)

The list of countries and territories which are part of the jurisdictional scope of the SEPA Schemes and their ISO country and currency codes has been taken from 'EPC List of SEPA Scheme

Countries' (European Payments Council), Version 2.4 dated on April 28 2016 ¹⁹. They are identified by means of their ISO 3166-1 codes, which are to be used in BIN's and IBAN's codes, as required by SEPA schemes:

- EU/EEA Member states
- EU Territories under Article 355 of the EU Treaty
- Countries or territories outside the EU and the EEA
- List of countries and territories which are part of the jurisdictional scope of the SEPA Schemes: Aland Islands, Austria, Azores, Belgium, Bulgaria, Canary Islands, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, French Guiana, Germany, Gibraltar, Greece, Guadeloupe, Guernsey, Hungary, Iceland, Ireland, Isle of Man, Italy, Jersey, Latvia, Liechtenstein, Lithuania, Luxembourg, Madeira, Malta, Martinique, Mayotte, the Principality of Monaco, the Netherlands, Norway, Poland, Portugal, Réunion, Romania, Saint Barhélemy, Saint Martin (French part), Saint Pierre and Miquelon, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom.
- (Update ²⁰) As of 1 March 2019, the geographical scope of the SEPA Schemes will grow to a total of 36 countries: The Principality of Andorra and the Vatican City State. [*From that date onwards, all existing scheme participants should be able to send or to receive Credit Transfer (SCT), SEPA Instant Credit Transfer (SCT Inst) and SEPA Direct Debit (SDD) transactions to and from SCT, SCT Inst and SDD scheme participants from the Principality of Andorra and the Vatican City State (the Holy See) as and when their financial institutions join these schemes.*]

| Country/territory | BIC | IBAN | Currency code |
|----------------------------|-----|------|---------------|
| Aland Islands | FI | FI | EUR |
| Austria | AT | AT | EUR |
| Azores | PT | PT | EUR |
| Belgium | BE | BE | EUR |
| Bulgaria | BG | BG | BGN |
| Canary Islands | ES | ES | EUR |
| Croatia | HR | HR | HRK |
| Cyprus | CY | CY | EUR |
| Czech Republic | CZ | CZ | CZK |
| Denmark | DK | DK | DKK |
| Estonia | EE | EE | EUR |
| Finland | FI | FI | EUR |
| France | FR | FR | EUR |
| French Guiana | GF | FR | EUR |
| Germany | DE | DE | EUR |
| Gibraltar | GI | GI | GBP |
| Greece | GR | GR | EUR |
| Guadeloupe | GP | FR | EUR |
| Guernsey | GG | GB | GBP |
| Hungary | HU | HU | HUF |
| Iceland | IS | IS | ISK |
| Ireland | IE | IE | EUR |
| Isle of Man | IM | GB | GBP |
| Italy | IT | IT | EUR |
| Jersey | JE | GB | GBP |
| Latvia | LV | LV | EUR |
| Liechtenstein | LI | LI | CHF |
| Lithuania | LT | LT | EUR |
| Luxembourg | LU | LU | EUR |
| Madira | PT | PT | EUR |
| Malta | MT | MT | EUR |
| Martinique | MQ | FR | EUR |
| Mayotte | YT | FR | EUR |
| Monaco | MC | MC | EUR |
| Netherlands | NL | NL | EUR |
| Norway | NO | NO | NOK |
| Poland | PL | PL | PLN |
| Portugal | PT | PT | EUR |
| Reunion | RE | FR | EUR |
| Romania | RO | RO | RON |
| Saint Barthelemy | BL | FR | EUR |
| Saint Martin (French part) | MF | FR | EUR |
| Saint Pierre and Miquelon | PM | FR | EUR |
| San Marino | SM | SM | EUR |
| Slovakia | SK | SK | EUR |
| Slovenia | SI | SI | EUR |
| Spain | ES | ES | EUR |
| Sweden | SE | SE | SEK |
| Switzerland | CH | CH | CHF |
| United Kingdom | GB | GB | GBP |

Figure 2. List of SEPA Scheme Countries

Source: EPC

¹⁹ Source: European Payments Council (EPC) List of SEPA Scheme Countries:

<https://www.europeanpaymentscouncil.eu/sites/default/files/KB/files/EPC409-09%20EPC%20List%20of%20SEPA%20Scheme%20Countries%20v2%204%20-%20April%202016.pdf>

²⁰ Source: European Payments Council (EPC) Updated to the List of SEPA Scheme Countries:

<https://www.europeanpaymentscouncil.eu/news-insights/news/extension-geographical-scope-sepa-schemes-march-2019>

1.6 Statement of the Research Questions

RQ1: 'How does the standardisation of payment systems foster payment innovations in the SEPA area? (main effect, network externalities)

RQ2: 'What factors moderate the effects (network externalities) of the standardisation of payment systems on payment innovations in the SEPA area? (moderating effect)

Both research questions have been formulated according to Srinivasan, R., Lilien, G. L., Rangaswamy, A. (2004), page 42: '*How do network externalities influence the survival duration of pioneers (main effect)?*' and '*What factors moderate the effects of network externalities on the survival duration of pioneers (moderating effects)?*'

1.7 Theoretical Framework

The theoretical frame to be applied to the proposed conceptual model has been selected from two papers that have been included in the literature review; both of them develop a longitudinal research:

- The first paper is Carton et al (2014) 'Framework for Mobile Payments Integration', which undertakes the technological integration dimension by which payments are made, as well as the value proposition for merchants and consumers.

This paper describes the traditional situation in which the value transference from payer to receiver, as well as the associated risk, is managed by a small number of highly centralized intermediaries: the banks. The banking payment systems transfer funds between accounts checking credit limit lists, money laundering, terrorism funding, etc.

The key value offered by these centralized systems is the risk management of liquidity and fraud, at the same time that international law-enforcement rules are fulfilled, as stipulated for individual countries and supra-national corporations. Banks retrieve the risk management costs by charging exchange rates to payment instruments users, merchants and consumers, in return for the convenience and ease of use.

The value perceived by the consumer is the access to a payment instrument that is universally accepted, as well as the instant access to credit lines. Carton et al (2014) addresses the network externalities theory in order to explain the creation of value in

the network economy, taking as a reference the paper Au & Kauffman (2008), 'The economics of mobile payments: Understanding stakeholder issues for an emerging financial technology application', *Electronic Commerce Research and Applications*, (7), pages 141–164.

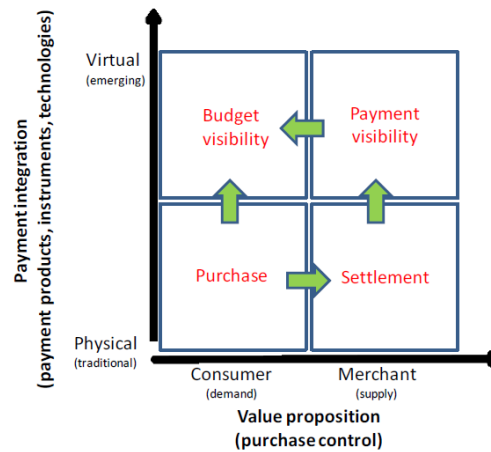


Figure 1: Integration framework for mobile payments

Figure 4. Source: Carton et al. (2014)

- The second paper is Rodríguez & Meseguer (2010) 'Towards a Longitudinal Model of E-commerce'; the authors fuse two frames in order to identify the factors that influence the commercial activities in which firms engage with their consumers:
 - The typology or group of factors proposed by Kim & Galliers (2004) 'Towards a diffusion model for Internet Systems', includes four types of factors: (a) non-technological external, (b) technological external, (c) non-technological internal and (d) technological internal.
 - The theoretical frame proposed by Tornatzky & Fleischer (1990) 'TOE framework' (technology-organization-environment), with three types of context: technological, organizational and environmental.

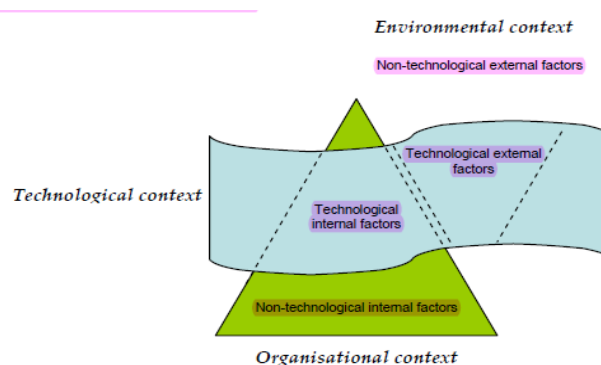


Figure 5. Source: Rodríguez-Ardura, I., & Meseguer-Artola, A. (2010)

1.8 Statement of the Research Hypothesis

The standardisation of electronic payment systems enhances product, service and banking process innovation, as in the case of the Single European Payments Area, where a single bank account will be used for payments in Euro in the SEPA zone; there will exist more safety for the users of the payment services; ease of use, speed and transaction safety will be enhanced; transaction costs will be reduced; prices for customers will be reduced; efficiency in the payment execution process will be incremented (by means of common instruments, standards and rules); innovation in the payment systems environment will be fostered (electronic invoice, payments with mobile devices), there will be no barriers for cross-border payments (transfer payments, direct debit and card payments will be faster and safer) and banking returns will be improved ²¹.

Researchers Gao et al. claim in their paper 'A Study on the Interaction between Network Effects and Standardisation' (2007) that, from the point of view of the social wellbeing, there is a compromise between the extent of interoperability and the variety of products. On top of this cost-profit ratio, compatibility is typically related to the network externalities. In fact, for these authors, in many industries such as ICT, it is mainly a matter of compatibility with network effects; Gao et al. have taken this quote from Sangin Park (2007) 'Standardisation and network externalities'. Moreover, Gao et al. (2007) claim that in the network markets, the key factor is not the sales level (whether current or accumulated), but the expectations on the final size of the network .

Although the research of the aforementioned authors refers to the standardisation strategies in the mobile communications industry in Southeast Asia, their conclusions are extrapolable to the European financial integration, given that both of them are based upon the new general purpose technologies (ICT), as well as product, service and process compatibility in the presence of network externalities, and the creation of expectatives on the final size of the network.

For all the above reasons, I propose the following research hypothesis:

H1: 'Standardisation of the SEPA e-payments market produces positive network externalities'

H2: 'SEPA positive network externalities foster the apparition of retail e-payments innovations'

²¹ Source: 'SEPAesp' (<http://www.sepaesp.es/sepa/es/>).

1.9 General Research Methodology

The present essay intends to follow a research methodology task sequence developed in the following steps:

- a) Reading and preparation of notes in the form of 'Review of Literature'.
- b) Collection of data about historical background of the study, 'State of the Art'.
- c) Data about international and national scenario about the topic.
- d) Relevance of the topic.
- e) Formation of statement of problem.
- f) Formation of research questions and research hypothesis.
- g) Objectives of the study.
- h) Deciding the research methodology.
- i) Collection of primary and secondary data.
- j) Organization of the collected data.
- k) Analysis of the data. Application of statistical-econometric tools.
- l) Preparation of conclusions and suggestions for further research.
- m) Submission of progress reports, drafts and final research paper.

Source:

- **Yashodhan, M., Vidya, T. (2015).** Developing Research Manual for the Effective Maintenance of Research Data. Research Dimensions, Vol VI; Issue: II December 2015, pp. 24-36.

The principal objective of a researcher is to accomplish the research work in the available time frame. In order to achieve this objective, it is imperative to plan and organize all the activities associated with research in a systematic manner. But is usually experienced by the novice researchers that they fail to comply with the time span provided to them due to various reasons. It is very difficult to find out the reasons behind the delay in carrying out research activities and overcome them.

The methodological approach considers mainly secondary information and data sources; the hypothesis is developed from the research questions, in order to confirm or refute them.

The study variables arise as a result of the literature review, but it must be taken into account the scarcity of empirical studies on standardisation and network externalities and the few public data sources that are available online.

A selection must be made among all the online data sources, after a thorough inspection, to check whether we really dispose of enough relevant data for the intended research task.

Regarding the analysis of the research hypothesis for the present work, the attitude is oriented towards the preparation of an Exploratory Data Analysis (EDA), see Figure 6:

| | Qualitative | Quantitative |
|-----------|----------------------------------|------------------------------|
| Inductive | Grounded theory | Exploratory data analysis |
| Deductive | Qualitative comparative analysis | Structural equation modeling |

Figure 6. Source: 'Research Methodology' ²².

This research orientation is supported by two sources:

- a) 'Engineering Statistics Handbook' ²³ (the underlining is mine):

The EDA approach is not a set of techniques, but an attitude/philosophy about how a data analysis should be carried out. Most EDA techniques are graphical in nature with a few quantitative techniques. The reason for the heavy reliance on graphics is that by its very nature the main role of EDA is to open-mindedly explore, and graphics gives the analysts unparalleled power to do so, enticing the data to reveal its structural secrets, and being always ready to gain some new, often unsuspected, insight into the data. In combination with the natural pattern-recognition capabilities that we all possess, graphics provide, of course, unparalleled power to carry this out.

- b) 'What is Exploratory Data Analysis?' ²⁴ (the underlining is mine):

Exploratory Data Analysis refers to the critical process of performing initial investigations on data so as to discover patterns, to spot anomalies, to test hypothesis and to check assumptions with the help of summary statistics and graphical representations.

²² Source: 'Research Methodology' (online): <http://research-methodology.net>

Inductive Approach <http://research-methodology.net/research-methodology/research-approach/inductive-approach-2/>

Deductive Approach <http://research-methodology.net/research-methodology/research-approach/deductive-approach-2/>

²³ Source: 'Engineering Statistics Handbook' (online) <https://www.itl.nist.gov/div898/handbook/eda/section1/eda11.htm>

²⁴ Source: 'What is Exploratory Data Analysis?' <https://towardsdatascience.com/exploratory-data-analysis-8fc1cb20fd15>

2. Methodology

2.1 Nature of the Study

The present work consists of the preparatory steps for an Exploratory Data Analysis (EDA).

2.2 Surveys and Sources of Data

This section will be complemented with a brief description of the selected surveys: name, information that the survey offers, source of the survey, etc. The sources of the selected surveys are:

- European Central Bank Payment statistics 2017 (last release: 14 September 2018) ²⁵
- Statista (accessed via the UOC virtual library)

2.3 Measurements and insights

Selected from the 'state of the art' and 'literature review' sections and classified according to the following general criteria, when not classified otherwise in the following reports obtained from the European Central Bank and Statista:

Type of Data Base (Selected set of time series data):

Longitudinal Data Series: from year and month to year and month; Cross-sectional: geographical; or other.

Variables:

Independent variables (Aggregate term (construct) or Single item); Dependent variable.

Indicators:

Metric; Dichotomous; Proportion; Price; Dummy.

Data sources:

Survey name; Organization name; URL of the organization.

Periodicity :

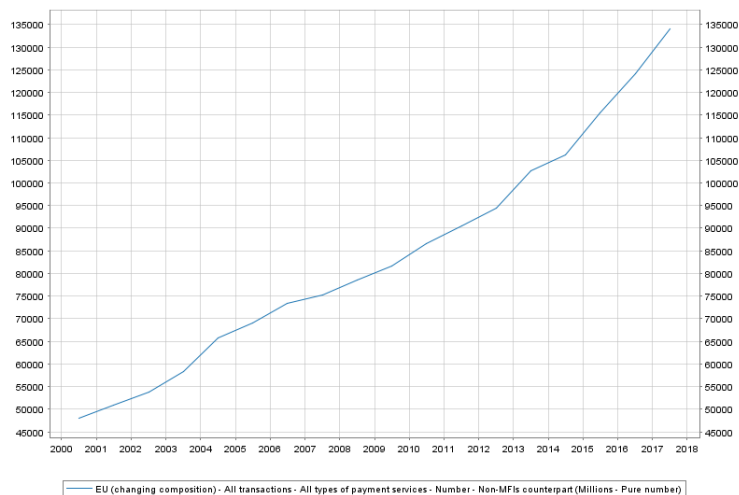
Monthly (interpolation if needed); Quarterly; Six-monthly; Three waves per year; Annual.

²⁵ Source: European Central Bank (ECB)

Statistical Press releases, Payments Instruments and Systems, Payment statistics 2017 (last release: 14 September 2018)
<https://www.ecb.europa.eu/press/pr/stats/paysec/html/ecb.pis2017.en.html>

The total number of non-cash payments in the EU increased by 7.9% to 134 billion in 2017 compared to the previous year²⁶

- Dataset name: Payment and Settlement Systems Statistics(PSS)
- Frequency: Annual
- Reference area: EU (changing composition)
- PSS information type: All transactions
- PSS instrument: All type of payment services
- PSS entry point: Not applicable
- PSS data type: Number
- Counterpart area: Not applicable
- Counterpart sector: Non-MFIs (²⁷)
- Currency of transaction: Not applicable
- Series denominat/spec calcul: Not applicable
- From: 31-12-2000 To:31-12-2017



Fact 1.

Total number of non-cash payments in the EU (static chart)
 Payment and Settlement Systems Statistics(PSS)
 Source: ECB Statistical Data Warehouse,

- Non-cash payments have been always increasing since 2005, at a faster pace during the recent years since the middle of 2015.
- This fact shows the achievement of the SEPA objective of reducing cash transactions, as expected from the SEPA standardisation process.

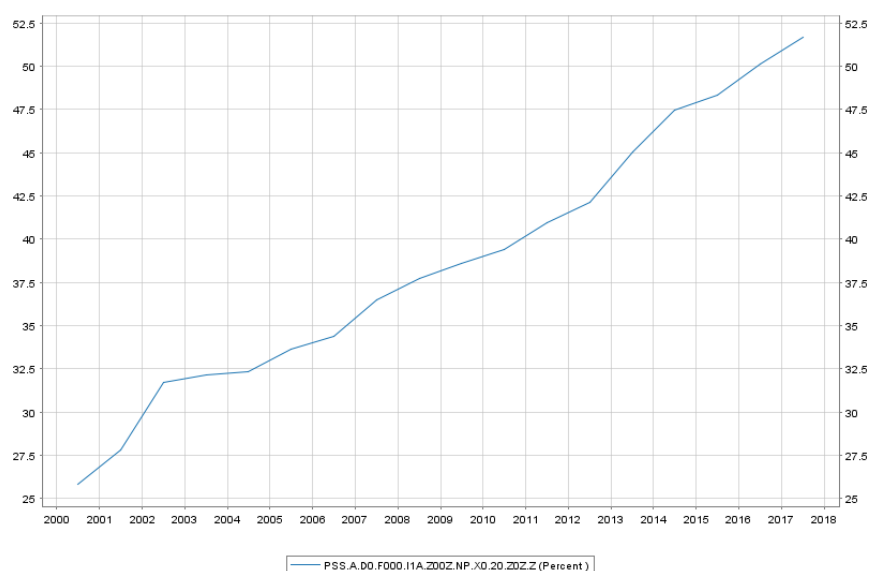
²⁶ Source: ECB

http://sdw.ecb.europa.eu/browseChart.do?df=true&ec=1&dc=&oc=0&pb=1&rc=0&DATASET=0&removeItem=&removedItemList=&mergeFilter=&activeTab=PSS&showHide=&MAX_DOWNLOAD_SERIES=500&SERIES_MAX_NUM=50&node=SEARCHRESULTS&q=PSS.A.D0.F000.I00.Z00Z.NT.X0.20.Z0Z.Z&type=series&legendPub=published&trans=N

²⁷ Source: ECB Glossary: MFIs (monetary financial institutions) are financial institutions which together form the money-issuing sector of the euro area. These include the Eurosystem and other resident financial institutions
<https://www.ecb.europa.eu/home/glossary/html/glossm.en.html#444>

Card payments accounted for 52% of the total number of non-cash payments in the EU ²⁸

- Dataset name: Payment and Settlement Systems Statistics(PSS)
- Frequency: Annual
- Reference area: EU (changing composition)
- PSS information type: All transactions
- PSS instrument: For cards issued by resident PSPs, all cards except e-money function
- PSS entry point: Not applicable
- PSS data type: Number as share
- Counterpart area: Not applicable
- Counterpart sector: Non-MFIs
- Currency of transaction: Not applicable
- Series denominat/spec calcul: Not applicable
- From: 31-12-2000 To:31-12-2017



Fact 2.

Card payments in the EU (static chart)
Payment and Settlement Systems Statistics(PSS)
Source: ECB Statistical Data Warehouse

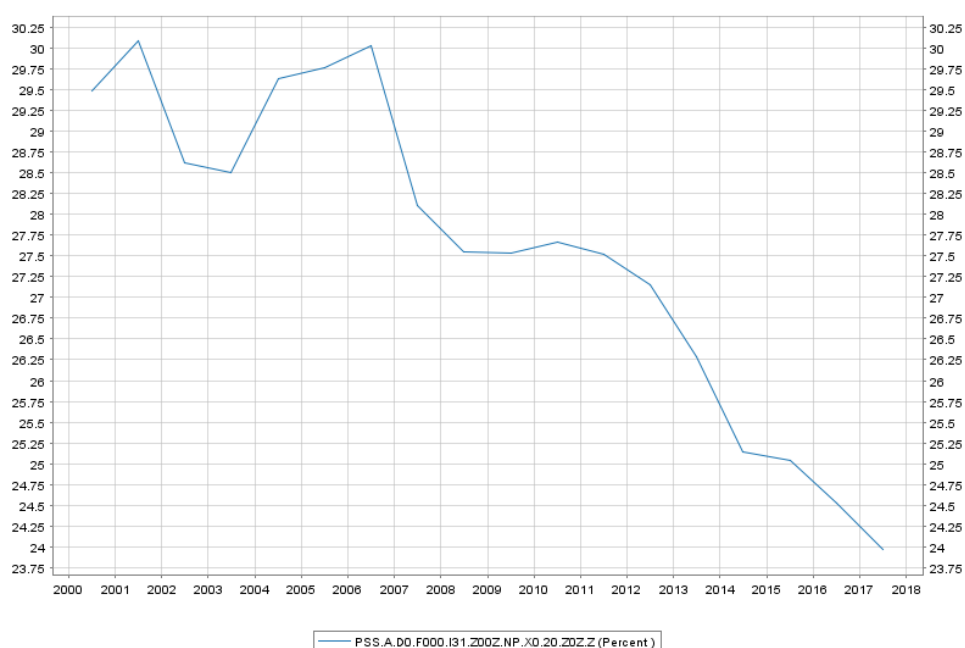
- The ratio of card payments to non-cash payments has been always increasing and it has come to a significant degree of more than half the non-cash transactions.
- This second fact also contributes to the achievement of SEPA objective of reduction of cash transactions with the progressive completion of the standardisation process.

²⁸ Source: ECB

http://sdw.ecb.europa.eu/browseChart.do?df=true&ec=1&dc=&oc=0&pb=1&rc=0&DATASET=0&removeItem=&removedItemList=&mergeFilter=&activeTab=PSS&showHide=&MAX_DOWNLOAD_SERIES=500&SERIES_MAX_NUM=50&node=SEARCHRESULTS&q=PSS.A.DO.F000.I1A.Z00Z.NP.X0.20.Z0Z.Z&type=series&legendPub=published

Credit transfers accounted for 24% of the total number of non-cash payments in the EU ²⁹

- Dataset name: Payment and Settlement Systems Statistics(PSS)
- Frequency: Annual
- Reference area: EU (changing composition)
- PSS information type: All transactions
- PSS instrument: Payment services other than cards (sent), credit transfers
- PSS entry point: Not applicable
- PSS data type: Number as share
- Counterpart area: Not applicable
- Counterpart sector: Non-MFIs
- Currency of transaction: Not applicable
- Series denominat/spec calcul: Not applicable
- From: 31-12-2000 To:31-12-2017



Fact 3.

Credit transfer payments in the EU (static chart)
 Payment and Settlement Systems Statistics(PSS)
 Source: ECB Statistical Data Warehouse

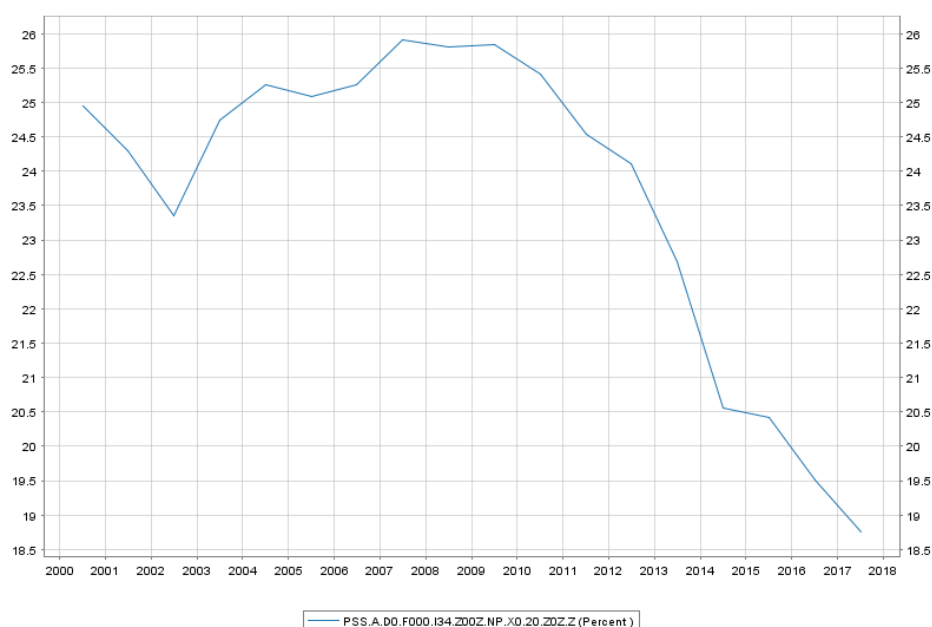
- The ratio of payment services other than cards sent (credit transfers) has been mainly decreasing since the middle of 2006, with the exception of the period from 2008 to 2010, reflecting the evolution of the process of migration of credit transfers from the old national schemes to the mandatory SEPA scheme for credit transfers SCT.

²⁹ Source: ECB

http://sdw.ecb.europa.eu/browseChart.do?df=true&ec=1&dc=&oc=0&pb=1&rc=0&DATASET=0&removeItem=&removedItemList=&mergeFilter=&activeTab=PSS&showHide=&MAX_DOWNLOAD_SERIES=500&SERIES_MAX_NUM=50&node=SEARCHRESULTS&q=PSS.A.DO.F000.I31.Z00Z.NP.X0.20.Z0Z.Z&type=series&legendPub=published

Direct debits accounted for 19% of the total number of non-cash payments in the EU ³⁰

- Dataset name: Payment and Settlement Systems Statistics(PSS)
- Frequency: Annual
- Reference area: EU (changing composition)
- PSS information type: All transactions
- PSS instrument: Payment services other than cards (sent), direct debits
- PSS entry point: Not applicable
- PSS data type: Number as share
- Counterpart area: Not applicable
- Counterpart sector: Non-MFIs
- Currency of transaction: Not applicable
- Series denominat/spec calcul: Not applicable
- From: 31-12-2000 To:31-12-2017



Fact 4.

Direct debit payments in the EU (static chart)
Payment and Settlement Systems Statistics(PSS)
Source: ECB Statistical Data Warehouse

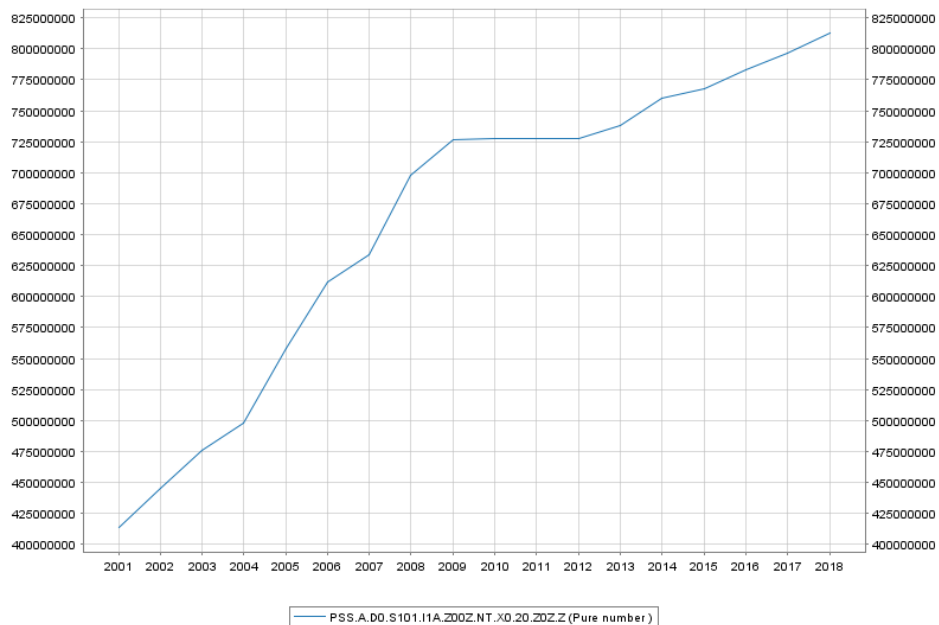
- The ratio of payment services other than cards sent (direct debits) has been decreasing since the middle of 2009, with a lower pace during the small period from 2014 to 2015, aligned with the evolution of the process of migration of direct debits from the old national schemes to the mandatory SEPA scheme for direct debit transfers SDD.

³⁰ Source: ECB

http://sdw.ecb.europa.eu/browseChart.do?df=true&ec=1&dc=&oc=0&pb=1&rc=0&DATASET=0&removeItem=&removedItemList=&mergeFilter=&activeTab=PSS&showHide=&MAX_DOWNLOAD_SERIES=500&SERIES_MAX_NUM=50&node=SEARCHRESULTS&q=PSS.A.DO.F000.I34.Z00Z.NP.X0.20.Z0Z.Z&type=series&legendPub=published

The number of payment cards issued (812 million)³¹
 represented around 1.6 payment cards per EU inhabitant³²

- Dataset name: Payment and Settlement Systems Statistics(PSS)
- Frequency: Annual
- Reference area: EU (changing composition)
- PSS information type: Number of cards
- PSS instrument: For cards issued by resident PSPs, all cards except e-money function
- PSS entry point: Not applicable
- PSS data type: Number
- Counterpart area: Not applicable
- Counterpart sector: Non-MFIs
- Currency of transaction: Not applicable
- Series denominat/spec calcul: Not applicable
- From: 31-12-2000 To:31-12-2017
- Unit: Millions – Pure number



Fact 5-a.
 Number of payment cards issued in the EU, in millions (static chart)
 Payment and Settlement Systems Statistics(PSS)
 Source: ECB Statistical Data Warehouse

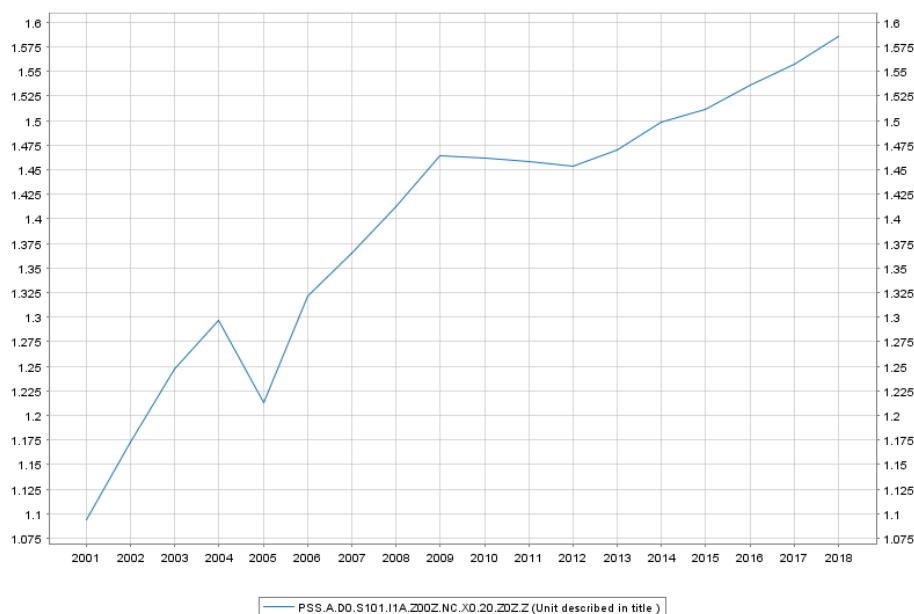
³¹ Source: ECB

http://sdw.ecb.europa.eu/browseChart.do?df=true&ec=1&dc=&oc=0&pb=1&rc=0&DATASET=0&removeItem=&removedItemList=&mergeFilter=&activeTab=PSS&showHide=&MAX_DOWNLOAD_SERIES=500&SERIES_MAX_NUM=50&node=SEARCHRESULTS&q=PSS.A.D0.S101.I1A.Z00Z.NT.X0.20.Z0Z.Z&type=series&legendPub=published

³² Source: ECB

http://sdw.ecb.europa.eu/browseChart.do?df=true&ec=1&dc=&oc=0&pb=1&rc=0&DATASET=0&removeItem=&removedItemList=&mergeFilter=&activeTab=PSS&showHide=&MAX_DOWNLOAD_SERIES=500&SERIES_MAX_NUM=50&node=SEARCHRESULTS&q=PSS.A.D0.S101.I1A.Z00Z.NC.X0.20.Z0Z.Z&type=series&legendPub=published

- Dataset name: Payment and Settlement Systems Statistics(PSS)
- Frequency: Annual
- Reference area: EU (changing composition)
- PSS information type: Number of cards
- PSS instrument: For cards issued by resident PSPs, all cards except e-money function
- PSS entry point: Not applicable
- PSS data type: Number per million inhabitants
- Counterpart area: Not applicable
- Counterpart sector: Non-MFIs
- Currency of transaction: Not applicable
- Series denominat/spec calcul: Not applicable
- From: 31-12-2000 To:31-12-2017



Fact 5-b.
 Number of payment cards issued, proportion per EU inhabitant (static chart)
 Payment and Settlement Systems Statistics(PSS)
 Source: ECB Statistical Data Warehouse

- The total number of payment cards issued (Fact 5-a) has been increasing except for the horizontalization of the line between 2009 and 2012.
- The number of payment cards issued per EU inhabitant (Fact 5-b) has been increasing after overcoming the fall experienced in 2004 to 2005, with the exception of a very light decrease in the period 2009 to 2012, perhaps due to the customer's avoidance of the maintenance costs of cards, affected by the financial crisis of those years.
- The proportion of cards with a payment function is near to 1.6 cards per EU inhabitant in 2017, which is a positive fact advancing towards the completion of the SEPA standardisation .

Non-cash payment services in the European Union ³³

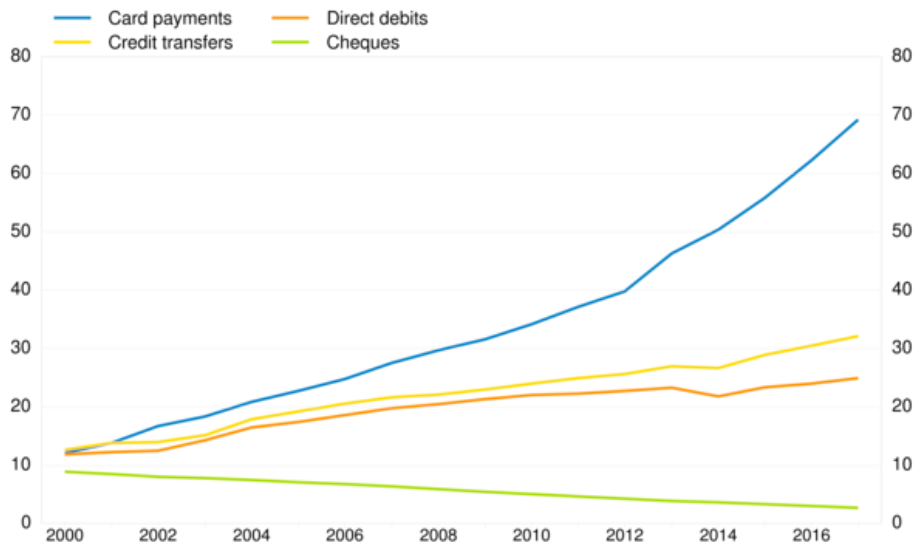


Chart 1:

Use of the main payment services in the European Union, number of transactions per year in billions (estimated), variation among countries of the relative importance of each one.

Source: European Central Bank (ECB)

- The proportion of non-cash payments in the EU in 2017 is the following: card payments are rising and reach 52% of all transactions, credit transfers rising to 24% of all transactions and direct debits rising to 19% of all transactions. That sums up 95% and the remaining 5% corresponds to other payment instruments such as cheques.
- The SEPA standardisation objective of replacing cash payments by digital payments is being achieved as expected, due to the decrease in the ratio of paper-based transactions to digital ones. The expected final size of the network EU market is in relation to EU 513 million inhabitants, which foresees a huge number of potential users joining it.
- The average value of each card transaction is €44.
- The number of Automated Teller Machines is decreasing, while the number of Point Of Sales terminal devices is increasing, so it seems that investments costs in POS equipments are significantly worth it and substitute the maintenance cost of ATMs, with the consequence of cashless payments replacing cash transactions.

³³ Source: ECB <https://www.ecb.europa.eu/press/pr/stats/paysec/html/ecb.pis2017.en.html>

Retail payment systems (infrastructures) in the European Union ³⁴ in 2017

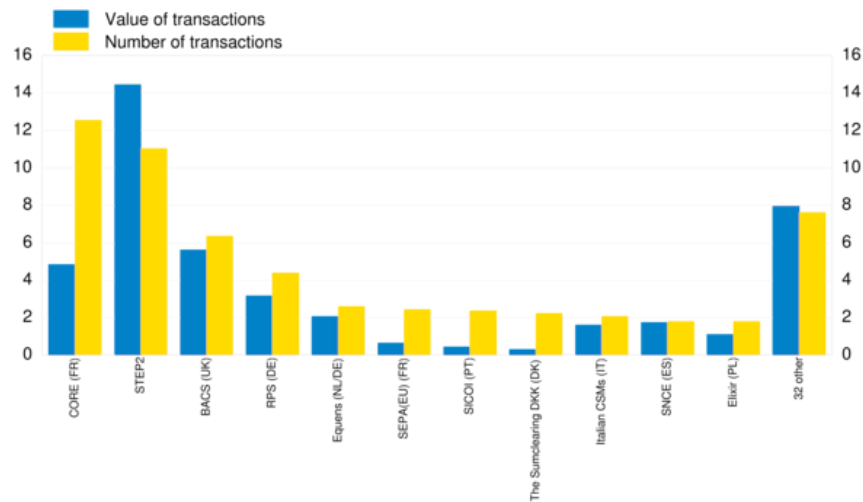


Chart 2:
Value of transactions processed by EU retail payment systems in 2017 in trillions (left-hand scale)
and number of transactions in billions (right-hand scale)
Source: European Central Bank (ECB)

- The total number of retail payments infrastructures operating in the EU is 43, but only half of them (22 systems) are located (domiciled) in the euro area, while the other half of them (21 systems) make the EU highly dependent on non-European infrastructures, subject to non-European schemes and extra-territorial jurisdiction that might affect the operation of those systems in the SEPA market transactions and cause disruptions in the European payments due to geopolitical adverse conditions (this warning has been issued by Yves Mersch).
- The four largest systems show a high degree of concentration, but this situation might be challenged by the apparition of innovations in the retail payments ecosystem, provided by new players in the market.
- The four European heavyweights are: CORE (France), STEP2 (pan-European, operated by EBA Clearing), BACS (United Kingdom) and RPS (Germany), which altogether processed 60% in volume of transactions and 64% in value of transactions.
- Nevertheless, the threat to be assessed in a future research is what proportion of the remaining 40% volume and 36% value of transactions depend on non-European systems, and the actual risk of mishaps in the global geopolitical environment.

³⁴ Source: ECB <https://www.ecb.europa.eu/press/pr/stats/paysec/html/ecb.pis2017.en.html>

EU member states with the most cashless payment transactions in 2017 (in millions)³⁵

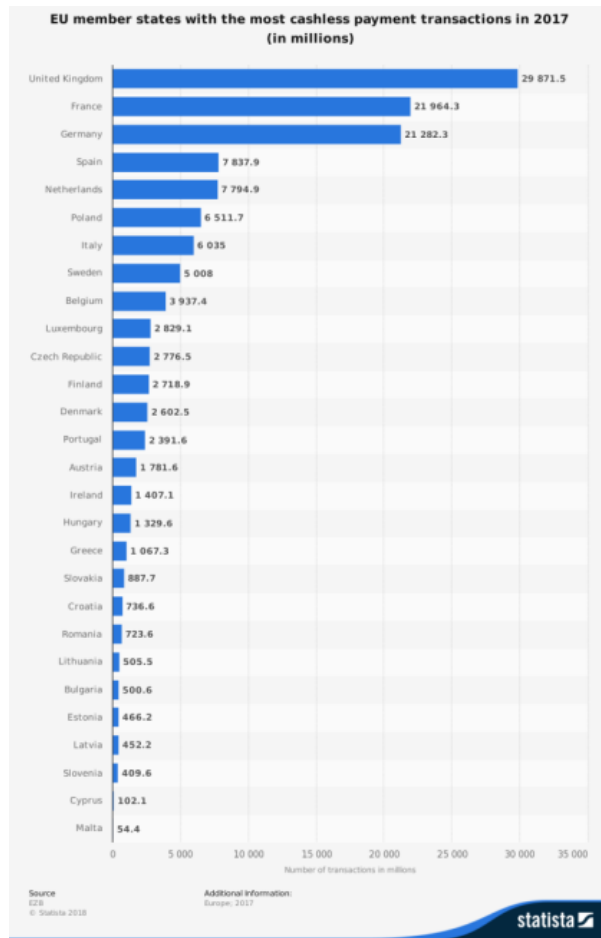


Chart 3.

EU member states with the most cashless payment transactions in 2017 (in millions)

Source: Statista

- UK is the EU member state with the most cashless payment transactions in 2017, so it is the ideal country to test innovations in cashless payments in the SEPA market of retail payments, interesting fact e.g. for the Starbucks mobile app.
- France is the second EU member in number of cashless payments and Germany is the third one, almost at the same level of France; however, Germany is a heavy cash-reliant country, due to cultural aspects related to the perceived shame linked to debt in cashless transactions. The customer's habit of paying with cash whenever possible is important when it comes to the earlier or later adoption of innovations in payments, so this could influence the implementation of innovations in the SEPA market in Germany, to some extent.

³⁵ Source: STATISTA <https://www.statista.com/statistics/276233/eu-member-states-with-the-most-cashless-payment-transactions/>

Consumer Survey (Netherlands 2017):
 'Have you ever heard about new, non-financial, companies (Google or Amazon) getting access to the payments system?' (Directive PSD2) ³⁶

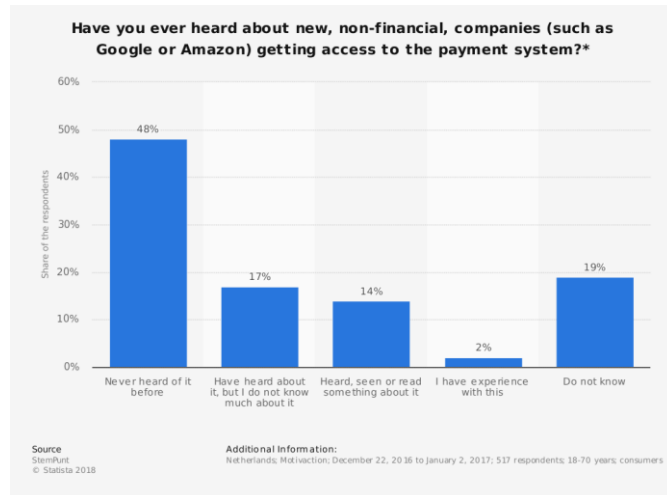


Chart 4.
 Familiarity of consumers in the Netherlands in 2017 with directive PSD2
 Source: Statista

- PSD2 directive implementation (January 2018) enables third-party providers (companies such as the GAFAs: Google, Apple, Facebook and Amazon) to access customer's account data and offer financial services to them, on top of banks infrastructures and data, a situation that banks are resisting, allegedly for lack of business cases that justify the investments required from them by SEPA harmonization in order to allow access to third companies (remember Yves Mersch's speeches on this topic).
- Almost half of the Dutch consumers had never heard of it before, which works against the protection of their own rights as consumers, due to lack of information.
 - The consumers should have been informed about it by 2017 because payments with Near Field Communication technology at Point Of Sales devices are affected by PSD2: cashless payments by debit card, mobile phone or QR codes (with Android Pay, Apple Pay and Samsung Pay) with a share of 23% in 2016, are already supported by Dutch banks.

³⁶ Source: STATISTA <https://www.statista.com/statistics/696573/familiarity-in-the-netherlands-with-psd2/>

Retail payments innovations in cashless payments:
The case of Starbucks Mobile App for Point Of Sales (POS) payments in US ³⁷ and UK ³⁸

In a very recent interview ³⁹ with an expert in Payments, Massimo Battistella, Chairman of the EACT Payments Commission, SCT Inst scheme is highlighted as the driver for instant payments innovations, especially to replace cash payments against delivery as well as for cashless payments at the counters equipped with Point of Sales (POS) devices, using mobile applications for customer’s phone, tablet or smart watch.

There is an interesting business case about this type of innovations: Starbucks own development of a mobile app, instead of using other proprietary apps that cannot be controlled by the vendor, becoming their direct competitor and even surpassing them:

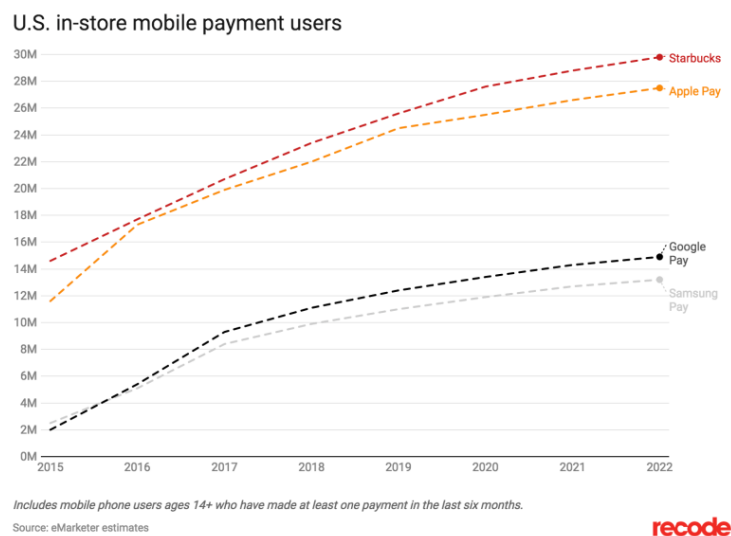


Chart 5.
US in-store mobile payment users and forecast
Source: Token Team (Gettoken.com)

- Starbucks in-store (POS) mobile app for iOS or Android has more market share in the US (23 million customers) than Apple Pay (22 million) and Google Pay (11.1 million).
- There are two main reasons for it. First one: Starbucks App gives customers a better value proposition (faster queues, ordering in advance, points to earn free beverages); Second one: Starbucks mobile app supports interoperability with both iOS and Android devices.

³⁷ Source: Token Team (Gettoken), Starbucks cashless payments <https://www.gettoken.com/starbucks-teach-event-professionals-future-of-cashless-payments/>

³⁸ Source: Business Insider <https://www.businessinsider.com/starbucks-mobile-order-and-pay-for-all-customers-2018-3?r=UK&IR=T>

³⁹ Source: European Payments Council, interview with Massimo Battistella, Chairman of the European Association of Corporate Traders (EACT) Payments Commission (31 October 2018) <https://www.europeanpaymentscouncil.eu/news-insights/insight/corporate-focus-future-payments>

- Consumers adoption of a mobile app if the value proposition is better than apps from other providers of payment services, they get better customer experiences from using it and they perceive an increased security in direct transactions from vendors rather than relying on intermediaries.
- Starbucks mobile app is available in UK for all customers since March 2018, with the strategy of the pioneer in the EU leading country in cashless payments (remember Chart 3).
- Starbucks UK will be authorised to send notifications to all customers, not only to the rewards-program members, because they can capture email address and mobile phone information and market to them directly, thanks to the PSD2 directive, since January 2018. This gives them competitive advantage over other proprietary mobile apps from Payment Services Providers.

3. Analysis and Results

From SEPA standardisation to innovations in SEPA retail e-payments

Respect to the standardisation, integration and harmonization of SEPA payment systems, the progression of the process shows a good degree of achievement of the main objectives, such as the reduction of cash payments and the migration of old national card schemes to the new SEPA schemes. Consequently, the expected positive network effects of the standardisation are appearing, especially those relatives to instant payments, despite the entering into force of the PSD2 directive and SCT Inst scheme being so recent (2018).

Interoperability, key factor in the value proposition for consumers and social wellbeing enhancement

This is the case of the Starbucks mobile app, operative for both iOS and Android devices, allowed in the UK only two months after the issuing of the PSD2 directive, in a brilliant example of an early bird taking advantage of the new business opportunities, as indeed intended by the EU digital agenda, for new players introducing innovations in the SEPA retail e-payments market.

Expectations of stakeholders and cultural aspects that moderate the potential network effects of standardisation

The expectations about the final size of the network are crucial moderating factors in the process of standardisation because they involve the taking of decision of stakeholders for investing in new technical equipments. This is the case of vendors investing in POS devices, consumers investing in mobile devices, providers of payment services investing in the development of applications, banks investing in joint ventures with fintechs, entrepreneurs investing in start-ups.

These stakeholders must be prepared to adapt their new business models according to cultural aspects of each country involved in the SEPA standardisation, or be able to shape consumer's habits in order to gain market share; standardisation opens new opportunities for them, but it does not act as a magic wand; so, in order to achieve competitive advantage in the market, they have to learn the cultural aspects of their target customers with a qualitative market research, in order to complete the expectations forecast obtained from the open quantitative data offered by the European organisms, such as the ECB statistical data warehouse. UK and German customers might show different attitudes and behaviours towards cashless innovations due to the different psychological perceptions on debt (remember Chart3).

4. Conclusions

4.1 Main contribution and value of the study

The main contribution and value of the present work, as an exploratory effort, is the determination of the possibility to perform an independent research on the field of the knowledge economy, as well as the outlining of its main topic of research, and the availability of sources of information about it.

The research topic is the standardisation of payments systems in the Euro area and its impact on innovation and social wellbeing, using public information and open source free software tools:

- literature review obtained from the UOC Virtual Library;
- public surveys and datasets downloadable from official European institutions and bodies, such as the European Central Bank, the European Commission and others;
- free of cost surveys accesible via the UOC Virtual Library such as Statista reports;
- reccomended statistical tools used in the IKS master degree subjects, which are maintained and constantly developed by voluntary teams; and other free tools which are neither maintained nor evolved, such as the ones offered by the Bank of Spain, which have little interest for beginners in the field of statistical research, mainly due to their lack of technical support.

4.2 Limitations of the study

The main limitation is the scarcity of empirical research papers on the topic of innovations in retail payment systems due to the apparition of positive network effects caused by standardisation processes in digital payments (and corresponding available time series).

The reason for this shortage of empirical research is the novelty of the harmonization in the European payments market, so the continuation of present study is suggested towards (a) the statistical reports about investments in new equipments, encouraged by the high expectations of payment systems providers and retail businesses, raised due to the final size of the harmonized SEPA payments network (total EU population of 513 million inhabitants), and (b) qualitative surveys on consumer retail payment habits and the actual value they obtain from the recent payment innovations they use, mostly mobile apps, because of interoperability and convenience.

4.3 Further research directions

Nature of the study: The nature of the suggested empirical research following the present exploratory analysis would be longitudinal, regarding the innovations in SEPA payments systems, appeared because of standardisation of payments infrastructures and harmonization of EU payments market after the entering into force of the PSD-2 directive (2018), the SCT Inst scheme (2017) and the launching of the TIPS service (2018) for instant payments, and their influence on the enhancement of social wellbeing.

Measurement model: The validity of the aggregated constructs will be performed by means of the principal components analysis. Its reliability, as stated by the Cronbach-alpha coefficient, will be checked following the paper in the literature review written by Rodríguez-Ardura, I., & Meseguer-Artola, A. (2010).

Analytical model: As far as the analytical model is concerned, it would follow the next sequence of steps:

- In the first place, the nomological validity of the constructs will be checked, following for instance the paper by Rodríguez-Ardura, I., & Meseguer-Artola, A. (2010), which develops a scale validation. Another information source can be found online: Research Methods Knowledge Base > 'The nomological network' (Cronbach, L. and Meehl, P. (1955) ⁴⁰
- Test of correlation between independent variables, checked by means of Pearson p-values.
- Selection of the analytical model, according to the behaviour of the dependent variable, as described in the paper Rodríguez-Ardura, I., & Meseguer-Artola, A. (2010). In this paper, the dependent variable displays an exponential growing, therefore the authors choose a semi-logarithmic (semi-log) analytical model, applying a natural logarithm to the initial equation in advance.

⁴⁰ Source: Social Research Methods <http://www.socialresearchmethods.net/kb/nomonet.php>

- Multiple regression analysis for the set of time series data of the chosen period. The paper from Rodríguez-Ardura, I., & Meseguer-Artola, A. (2010) begins on December 1996 (t1) and finishes on December 2005 (t109) and the analysis results are the following:
 - R2 variance
 - F, rho
 - Test of normality Anderson-Darling test of the error term
 - SQR/2 heteroskedasticity Breusch-Pagan test
 - Auto-correlation in the error term Durbin-Watson test
 - Multicollinearity VIF variance inflation factors
 - Contribution and confirmation of refutation of hypothesis: coefficients of the indicators contribute significantly to the dependent variable, rho, positive or negative sign of the indicators.

5. References

These references correspond to the literature review, state of the art and general research methodology sections.

1. Akerberg, D.A., Gowrisankaran, G. (2006). Quantifying equilibrium network externalities in the ACH banking industry. *The RAND Journal of Economics*; Autumn 2006; 37, 3; ProQuest Central, pg.738.
2. Au, Y. A., & Kauffman, R. J. (2008). The economics of mobile payments: Understanding stakeholder issues for an emerging financial technology application. *Electronic Commerce Research and Applications*, 7(2), 141–164. <http://doi.org/10.1016/j.elerap.2006.12.004>
3. Avadanei, A. (2010). Single Europayments Area and its Implications on the European Small and Medium-Sized Enterprises. *CES Working Papers*, II, (3), 2010.
4. Beijinen, C., Bolt, W. (2008). Size matters: Economies of scale in European payments processing. *Journal of Banking & Finance* 33 (2009) 203 - 210.
5. Bolt, W., & Humphrey, D. B. (2007). Payment network scale economies, SEPA, and cash replacement. *Review of Network Economics*, 6(4), 453–473. <http://doi.org/10.2202/1446-9022.1129>
6. Calabrese, A., Gastaldi, M., Iacovelli, I., Levialdi, N. (2010). New Technologies in the Payment System Industries: The SEPA Project. *American Journal of Economics and Business Administration* 2 (4): 384-394, 2010.
7. Carton et al. (2014). 'Framework for Mobile Payments Integration', *Electronic Journal Information Systems Evaluation*, Volume15, Issue 1.
8. Gao et al. (2007). A Study on the Interaction between Network Effects and Standardisation. 2007 International Conference on Management Science & Engineering (14th), August 20-22, 2007. Harbin, P.R. China.
9. Gowrisankaran, G., & Stavins, J. (2004). Network Externalities and Technology Adoption: Lessons from Electronic Payments. *RAND Journal of Economics* (2004) Volume: 35, Issue: 2, Pages: 260-276

10. Herbei, M. (2009). The Single Euro Payments Area (SEPA) - The Pan-European Market for the European Integration. *Journal Finance - Challenges of the Future*, Year VII, No. 8/2008. Accesible online http://www.financejournal.ro/fisiere/revista/1588727502FPV08_09.pdf
11. Kalemli-Ozcan, S., Papaioannou, E., & Manganelli, S., Peydró, J.L. (2008). Financial Integration and Risk Sharing: The Role of the Monetary Union. Prepared for the 5th. European Central Banking Conference on The Euro at Ten: Lessons and Challenges. October 2008.
12. Popovici, M. C. (2014). Framework for Mobile Payments Integration, CES Working Papers - Volume VI, Issue 3
13. Popovici, M. C. (2016). The Implementation of Single Euro Payments Area in Romania and the Effects on Efficiency, SEA - Practical Application of Science, Volume VIII, Issue 1(7) / 2015
14. Rodríguez-Ardura, I., & Meseguer-Artola, A. (2010). Toward a Longitudinal Model of e-Commerce: Environmental, Technological, and Organizational Drivers of B2C Adoption. *The Information Society*, 26(3), 209–227. <http://doi.org/10.1080/01972241003712264>
15. Sammut - Bonnici, T. (2010). Network Strategy in the Digital Economy. Sammut-Bonnici, T., & McGee, J. (2010). Network Strategy in the Digital Economy. In J. McGee, H. Thomas & D. Wilson (Eds.), *Strategy: Analysis and Practice* (2nd ed.,). UK: Maidenhead: McGraw-Hill.MPRA Munich Personal RePec Archive Paper No. 50620, posted 29 October 2013. Online at <https://mpa.ub.uni-muenchen.de/50620>.
16. Srinivasan, R., Lilien, G. L., & Rangaswamy, A. (2004). First in , First out? The Effects of Network Externalities on Pioneer Survival, 68 (January), 41–58.
17. Torrent-Sellens, J. (2012). Knowledge Products and Network Externalities: Implications for the Business Strategy. *Journal of the Knowledge Economy*..
18. Yashodhan, M., Vidya, T. (2015). Developing Research Manual for the Effective Maintenance of Research Data. *Research Dimensions*, Vol VI; Issue: II December 2015, pp. 24-36.

Annex 1. General references on SEPA payments

- Accenture (2016) ‘Accenture Payment Services’
https://www.accenture.com/t20160215T024119_w_us-en_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Industries_5/Accenture-Payment-Services.pdf
- Accenture (2014) ‘SEPA Payments. Further challenges to come and further opportunities’
https://www.google.es/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0ahUKewjF_ZzxpjnMAhVL1RQKHeALAbAQFggrMAE&url=https%3A%2F%2Fwww.accenture.com%2Ft20150523T024839_w_%2Fus-en%2F_acnmedia%2FAccenture%2FConversion-Assets%2FDotCom%2FDocuments%2FGlobal%2FPDF%2FDualpub_2%2FAccenture-SEPA-Competitive-Edge-in-Payments.pdf&usg=AFQjCNHh5YdELInSYxfsDwtI7FEMcybmnA
- Deloitte ‘Banking Industry Outlook’
<http://www2.deloitte.com/us/en/pages/financial-services/articles/banking-industry-outlook.html>
- Deutsche Bundesbank Eurosystem (2013). ‘Outlook for European retail payments’. *Monthly Report DBB*, (December), 27–39.
https://www.bundesbank.de/Redaktion/EN/Downloads/Publications/Monthly_Report_Articles/2013/2013_12_retail_payments.pdf?blob=publicationFile
- ECB Eurosystem (2009) ‘Eurosystem’s SEPA expectations’
<https://www.nbb.be/doc/ts/products/paymentsystems/sepa/eurosystemsepaexpectations200903en.pdf>
- ECB (2009) ‘Retail Payments – Integration and Innovation’
<https://www.ecb.europa.eu/pub/pdf/other/retailpaymentsintegrationinnovation200912en.pdf?4dc4039bb63bc0aeb0339655ffa54d3e>
- ECB (2009) ‘Financial Integration in Europe, April 2014’ Chart 34, page 156.
<https://www.ecb.europa.eu/pub/pdf/other/financialintegrationineurope201404en.pdf>
- ECB Eurosystem (2015). ‘Fourth report on card fraud’, (July), 29.
https://www.ecb.europa.eu/pub/pdf/other/4th_card_fraud_report.en.pdf
- ECB Statistical Press releases, Payments Instruments and Systems (2012-2017),
Last release: 14 September 2018 (Charts and PDFs):
<https://www.ecb.europa.eu/press/pr/stats/paysec/html/index.en.html>
ECB, Press releases, Speech by Yves Mersch, Member of the Executive Board of the European Central Bank (ECB): “Strengthening the European financial industry amid disruptive global challenges” at the European Institute of Financial Regulation (EIFR), Paris, 3 September 2018, <http://www.ecb.europa.eu/press/key/date/2018/html/ecb.sp180903.en.html>
- “Digital transformation of the retail payments ecosystem” at the Joint ECB and Banca d’Italia conference, Rome, 30 November 2017: <https://www.ecb.europa.eu/press/key/date/2017/html/ecb.sp171130.en.html>
- EPC (2016) ‘EPC List of SEPA Scheme Countries’ version 2.3 – February 2016. *This document lists the countries and territories which are part of the jurisdictional scope of the Single Euro Payments Area (SEPA) Schemes.*
<http://www.europeanpaymentscouncil.eu/index.cfm/knowledge-bank/epc-documents/epc-list-of-sepa-scheme-countries/epc409-09-epc-list-of-sepa-scheme-countries-v23/>
- EPC (2016) ‘Map of SEPA Scheme Countries and Territories’
<http://www.europeanpaymentscouncil.eu/index.cfm/knowledge-bank/epc-documents/map-of-sepa-scheme-countries-and-territories/>
- EPC (2013) ‘First SEPA Migration Report, March 2013’. Charts 1,2 and 3, pages 8-9.
<http://www.europeanpaymentscouncil.eu/index.cfm/knowledge-bank/other-sepa-information/european-central-bank-first-sepa-migration-report-march-2013/european-central-bank-first-sepa-migration-report-march-2013pdf/>

- EPC (2013) 'Second SEPA Migration Report, October 2013'. Charts 1,2 and 3, pages 9-10.
https://www.ecb.europa.eu/pub/pdf/other/secondsepa_migrationreport201310en.pdf
- ING Direct, 'Blog En Naranja'
<http://www.ennaranja.com/economia-facil/que-es-y-para-que-sirve-la-sepa/>
- Interview with M. Steinbach: 'Time to Unearth the Gold of SEPA: The Future of Banking'
<http://www.equens.com/Images/Interview%20M.%20Steinbach%20Future%20Banking28-20130.pdf>
- UniCredit (2014). 'Customer Information SEPA. Single Euro Payments Area – The standard European bank transfers system', 9th Edition Status as of: January 2014.
https://www.hypovereinsbank.de/content/dam/hypovereinsbank/unternehmerbank/pdf/SEPA/SEPA_Kundeninfo_en.pdf
- UniCredit member Bank Austria: SEPA – Single Euro Payments Area
<http://www.bankaustria.at/en/corporate-customers-cash-management-und-payments-payment-transactions-und-account-sepa.jsp>
- S€PA, Zona Única de Pagos en Europa
Listado de países, con enlaces para acceder a la web SEPA de cada uno
http://www.sepa.es/sepa/es/secciones/enlaces/Listado_de_paise/

Annex 2. Other References

Statistical and Econometrical Software Tools:

- GRET (GNU Regression, Econometrics and Time-Series Library) open source, free download:
<http://gretl.sourceforge.net/>
- Open MX SEM Advanced Structural Equation Modeling, open source, free download:
<http://openmx.psyc.virginia.edu/>
- Java-NNS Java Neural Network Simulator, open source, free download:
<http://www.ra.cs.uni-tuebingen.de/software/JavaNNS/>
- Bank of Spain (Banco de España) free tools (warning: neither maintained nor evolved), for statistical analysis of time series- Eurosisistema > 'Programas estadísticos y econométricos':
http://www.bde.es/bde/es/secciones/servicios/Profesionales/Programas_estadi/Programas_estad_d9fa7f3710fd821.html

General sources of financial statistical data:

Links to data sources have been collected from several papers in the literature review, especially Antonides, G., Amesz, H. B., Hulscher, I. C. (1999), Gowrisankaran, G., Stavins, J. (2002), Kalemli-Ozcan, S., Papaioannou, E., Manganelli, S., Peydró, J.L. (2008) y Torrent-Sellens, J. (2012). Other links pointing to data sources have been found from the UOC Virtual Library videos:

- BDE Banco de España (Bank of Spain) > Statistics
 - <http://www.bde.es/bde/es/areas/estadis/>
- UOC Virtual Library (Biblioteca Virtual UOC) "Com es poden trobar dades estadístiques"

- <https://youtu.be/xRtvTS9Bqz8> (catalá)
- <https://youtu.be/0T7UhKFc938> (english)
- BIS Bank for International Settlements (www.bis.org)
 - BIS International Locational Banking Statistics Database
www.bis.org/statistics/bankstats.htm
 - BIS Payment, Clearing and Settlement Statistics
www.bis.org/statistics/payment_stats.htm
 - BIS Statistical Bulletin March 2016-03-16
<http://www.bis.org/statistics/bulletin1603.htm>
 - BIS Statistics Explorer
<http://stats.bis.org/statx/toc/LBS.html>
 - BIS Statistics Warehouse
<http://stats.bis.org/bis-stats-tool/org.bis.stats.ui.StatsApplication/StatsApplication.html>
- BIS – CPMI Committee on Payments and Market Infrastructures
 - <https://www.bis.org/cpmi>
 - <http://www.bis.org/cpmi/index.htm?m=3%7C16>
 - Payment, Clearing and Settlement Statistics
http://www.bis.org/statistics/payment_stats.htm
 - About the CPMI (Updated 10 February 2016) <http://www.bis.org/cpmi/info.htm>
 In September 2013, in the light of the Committee's standard-setting activities and the associated greater public scrutiny, the CPSS reviewed its mandate. The new mandate was approved by the Global Economy Meeting, which has also endorsed the renaming of the CPSS as CPMI, Committee on Payments and Market Infrastructures. Both changes became effective as of 1 September 2014.
 - CPMI - Red Book: CPMI Countries http://www.bis.org/list/cpmi/tid_57/index.htm
 - Statistics on payment, clearing and settlement systems in the CPMI countries – Figures for 2014 (December 2015). (.pdf, .xls)
<http://www.bis.org/cpmi/publ/d142.htm>
 - Statistics on payment, clearing and settlement systems in the CPMI countries – Figures for 2013 (December 2014). (.pdf, .xls)
<http://www.bis.org/cpmi/publ/d116.htm>
- Bureau of Labor Statistics (.csv)
Directorio [<http://stats.bls.gov/>]
- CIS Centro de Investigaciones Sociológicas
 - [<http://www.cis.es/cis/opencms/ES/enlaces.html>]
 - [http://www.cis.es/cis/opencms/ES/10_contactar/]
- EACHA, European Automated Clearing House Association
 - <http://www.eacha.org/index.php>
- EBA Clearing
 - www.ebaclearing.eu
- EBA European Banking Association
 - www.abe-eba.eu
 - Knowledge and Research <https://abe-eba.eu/knowledge-and-research>
- ECB European Central Bank
 - ECB Statistics
<https://www.ecb.europa.eu/stats/html/index.en.html>

- Research & Publications > Publications by activity > Statistics > ECB Publications on Statistics
<http://www.ecb.europa.eu/pub/pub/stats/html/index.en.html>
- Payments & Markets > Retail payments > Payment integration SEPA > Migration indicators
<https://www.ecb.europa.eu/paym/retpaym/paymint/indicators/html/index.en.html#payments>
- Payments & Markets > Retail payments > Payment integration SEPA > Migration indicators > Migration of credit transfers
https://www.ecb.europa.eu/paym/retpaym/paymint/indicators/html/migration_credit_transfers.en.html
- Payments & Markets > Retail payments > Payment integration SEPA > Migration indicators > Migration of direct debits
https://www.ecb.europa.eu/paym/retpaym/paymint/indicators/html/migration_direct_debits.en.html
- Payments & Markets > Retail payments > Payment integration SEPA > Migration indicators > Migration of card payments
https://www.ecb.europa.eu/paym/retpaym/paymint/indicators/html/migration_card_payments.en.html
- Statistics > Monetary and Financial Statistics > Payment services and systems > Payment services, large-value and retail payment systems
<https://www.ecb.europa.eu/stats/money/payments/paym/html/index.en.html>
- ECB Monetary and Financial Statistics > Monetary Statistics (csv format, seasonally adjusted data and not seasonally adjusted data)
<https://www.ecb.europa.eu/stats/money/aggregates/aggr/html/index.en.html>
- ECB Euro Area Statistics
<https://www.euro-area-statistics.org/?cr=eur&lg=en&page=0>
- SEPA Single Euro Payments Area
<https://www.ecb.europa.eu/paym/retpaym/paymint/html/index.en.html>
- STEP Short-Term European Paper
<https://www.ecb.europa.eu/stats/money/step/html/index.en.html>
- TARGET Trans European Automated Real-Time Gross Settlement Express Transfer System
 - TARGET 2
<https://www.ecb.europa.eu/ecb/legal/1003/1349/html/index.en.html>
 - TARGET 2 – Securities (T2S) Project
www.ecb.int/paym/t2s/html/index.thml
- ECB Statistical Press releases, Payments Instruments and Systems (2012-2017), last release: 14 September 2018 (Charts and PDFs):
<https://www.ecb.europa.eu/press/pr/stats/paysec/html/index.en.html>
- ECB Statistical Data Warehouse (SDW)
<http://sdw.ecb.europa.eu/>
 - Economic concepts > Payments and securities trading, clearing, settlement > Payments <http://sdw.ecb.europa.eu/browse.do?node=2746>
- EITO, European IT Observatory
 - Directory [<http://www.eito.com/>]

- Methods and definitions (.pdf)
[http://www.eito.com/epages/63182014.sf/?ObjectPath=/Shops/63182014/Categories/Market_Reports/%22Methods%20and%20definitions%22]
- EMV (Europay, MasterCard and Visa), technical standard and name of the chip
 - <https://en.wikipedia.org/wiki/EMV>
- EPC, European Payments Council
 - www.europeanpaymentscouncil.eu
 - An introduction to SEPA www.europeanpaymentscouncil.eu/index.cfm/video-audio/an-introduction-to-sepa
 - 'List of SEPA Scheme Countries v2.3' and 'Map of SEPA Scheme countries and Territories' <http://www.europeanpaymentscouncil.eu/index.cfm/knowledge-bank/epc-documents/epc-list-of-sepa-scheme-countries/>
 - Other SEPA Information:
<http://www.europeanpaymentscouncil.eu/index.cfm/knowledge-bank/other-sepa-information/>
 - EPC Documents:
<http://www.europeanpaymentscouncil.eu/index.cfm/knowledge-bank/epc-documents/epc-list-of-sepa-scheme-countries/>
- Equens SE, European Payments Processor
 - <http://www.equens.com/index.jsp>
 - 'Time to unearth the gold of SEPA'
<http://www.equens.com/Images/Interview%20M.%20Steinbach%20Future%20Banking28-20130.pdf>
- Eurosistema - Eurosyst
 - <http://www.bde.es/bde/es/secciones/eurosistema/>
 - https://www.ecb.europa.eu/ecb/orga/escb/html/mission_eurosyst.es.html
- EUROSTAT (.tsv)
 - [<http://ec.europa.eu/eurostat>]
 - [<http://ec.europa.eu/eurostat/data/database>]
- European Commission
 - SEPA Single Euro Payments Area
http://ec.europa.eu/finance/payments/sepa/index_en.html
 - FSAP Financial Services Action Plan
http://ec.europa.eu/finance/general-policy/actionplan/index_en.htm
http://ec.europa.eu/internal_market/finances/index_en.html
- Federal Reserve, Bank of Boston
 - Research and Data > National Data and Regional Data > Survey of Consumer Payment Choice Data
<http://www.bostonfed.org/economic/data.htm>
 - Research Papers and Publications
<http://www.bostonfed.org/economic/respubs.htm>
 - Consumer Payments Research Center
<http://www.bostonfed.org/economic/cprc>
- FOBSIC (Fundación Observatorio para la Sociedad de la Información en Cataluña)
 - <http://www.idescat.cat/pec/2011-2014/?f=org.201&paae=2011&lang=es>
- Iberpay

- <https://www.iberpay.es/Home.aspx>
- IDESCAT (.xls)
 - <http://www.idescat.cat/es/>
- IMF International Monetary Fund
 - IMF Data www.imf.org/en/Data
 - IMF eLibrary Data data.imf.org
 - CPIS Coordinated Portfolio Investment Survey
<http://data.imf.org/?sk=B981B4E3-4E58-467E-9B90-9DE0C3367363>
 - Available Datasets Listed Alphabetically
<http://data.imf.org/?sk=7CB6619C-CF87-48DC-9443-2973E161ABEB&sid=1420495318386>
- INE: INEBASE / Ciencia y Tecnología / Nuevas tecnologías de la información y la comunicación (pc-axis px)
 - <http://www.ine.es/>
 - <http://www.ine.es/inebmenu/indice.htm#28>
 - http://www.ine.es/inebmenu/mnu_tic.htm
 - Encuesta de Población Activa (EPA) [http://www.ine.es/prensa/epa_prensa.htm]
- INE Instituto Nacional de Estadística, PC-Axis download
 - http://www.ine.es/ss/Satellite?L=es_ES&c=Page&cid=1254735116596&p=1254735116596&pagename=ProductosYServicios%2FPYSLayout
 - <ftp://www.ine.es/pcaxis/pcasetup2008.rar>
 - Video tutorial PC Axis [<https://www.youtube.com/watch?v=akgdwOLYNd4>]
- IPFA International Payments Framework Association
 - <http://www.ipf-a.org/>
- ITU, International Telecommunication Union (.xls)
 - ICT Statistics homepage [<http://www.itu.int/en/ITU-D/Statistics/Pages/default.aspx>]
 - Statistics [<http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>]
- NBER, National Bureau of Economic Research (.xls)
 - Directory [<http://www.nber.org/>]
- OECD / OCDE, Organisation for Economic Cooperation and Development
 - Entrepreneurship and business statistics [<http://www.oecd.org/std/business-stats/>]
 - The OECD-Eurostat Entrepreneurship Indicators Programme (EIP): background information [<http://www.oecd.org/std/business-stats/theentrepreneurshipindicatorsprogrammeeipbackgroundinformation.htm>]
 - Productivity Statistics [<http://www.oecd.org/std/productivity-stats/>]
- OECD / OCDE, Organisation for Economic Cooperation and Development (.csv)
 - Productivity Statistics (Database) [<http://dx.doi.org/10.1787/pdtvy-data-en>]
 - [http://www.oecd-ilibrary.org/employment/data/oecd-productivity-statistics_pdtvy-data-en]
 - [http://stats.oecd.org/viewhtml.aspx?datasetcode=PDB_LV&lang=en]
- UNdata (online visualization)
 - <http://data.un.org/>
 - Spain [<http://data.un.org/CountryProfile.aspx?crName=Spain>]
- SEPA Zona Única de Pagos en Euros

- www.sepaesp.es/sepa/es
- SEPI (ESEE) Sociedad Estatal de Participaciones Industriales
 - Micro Data Access
www.fundacionsepi.es/investigacion/esee/en/svariables/indice.asp
- STATISTA
 - www.statista.com
- SWIFT Society for Worldwide Interbank Financial Telecommunication
 - swift.com
- UN Data United Nations Statistics Division (.csv)
 - <http://unstats.un.org/unsd/>
 - COMTRADE [<http://comtrade.un.org/data/>]
 - Databases [<http://unstats.un.org/unsd/databases.htm>]
- World Bank's Open Data Initiative (.csv)
 - <http://www.worldbank.org/>
 - <http://data.worldbank.org/>

This work is licensed under a [Creative Commons Attribution – Non Commercial – No Derivatives 4.0 International License](https://creativecommons.org/licenses/by-nc-nd/4.0/).