

A Work Project, presented as part of the requirements for the Award of a Master's degree in Finance from the Nova School of Business and Economics.

TEYA - EUROPEAN PAYMENTS MARKET REPORT 2023

Assessing the Efficiency of the European Consumer-to-Business Payments Market: Analysis of the Economic Costs of Payments.

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Work project carried out under the supervision of:

Professor Gonalo Sommer Ribeiro

19/12/2023

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Assessing the Efficiency of the European Consumer-to-Business Payments Market: European
Union Retail Payments Strategy

Assessing the Efficiency of the European Consumer-to-Business Payments Market: Analysis
of the European Market Dynamics

Assessing the Efficiency of the European Consumer-to-Business Payments Market: Analysis
of the Interchange Fee Regulation in the Card Payments Market

Assessing the Efficiency of the European Consumer-to-Business Payments Market: Analysis
of the Economic Costs of Payments.

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<i>Abstract.....</i>	<i>1</i>
<i>Chapter 1. Introduction.....</i>	<i>2</i>
<i>Chapter 2. Overview of EU C2B Payments Market.....</i>	<i>3</i>
2.1. Payment Instruments	4
2.2. Consumer Preferences.....	7
2.3. Merchant Preferences.....	9
2.4. Overview of Domestic C2B Payments Markets	11
2.4.1. Highly Digitalised Payments Infrastructures	12
2.4.2. Moderately Digitalised Payments Infrastructures.....	15
2.4.3. Highly Cash-based Payments Infrastructures	17
<i>Chapter 3. European Central Bank Retail Payments Strategy</i>	<i>20</i>
3.1. Contents of ECB Strategy	21
3.2. Deployment of pan-EU instant payments.....	22
3.3. European-grown pan-EU solutions for retail payments at POS	25
3.4. Support for innovation, digitalisation, and financial inclusion	28
<i>Chapter 4. Assessment of IFR in the Card Payments Market.....</i>	<i>30</i>
4.1. EU Card Payments Market	31
4.1.1. Card Schemes.....	31
4.1.2. Economics of Setting Fees in the Four-party Scheme	35
4.2. Assessment of IFR's Implementation and Scope	39
4.2.1. Positive Factors	40
4.2.2. Contested Factors.....	43
4.2.3. Long-Term Factors.....	47
4.3. Challenges for Competition and Innovation in the Current Payments Market	49

4.3.1. Mastercard and Visa Dominance Hindering Competition	49
4.3.2. Transparency of Fees Hindering Competition	50
4.3.3. Must-Take Status of Mastercard and Visa	51
Chapter 5. Economic Costs of the European C2B Market.....	52
5.1. Cost Concepts.....	56
5.2. Social Costs in Europe	58
5.2.1. Social Costs in Europe by Stakeholder	60
5.2.2. Social Costs per Unit	63
5.2.3. Drivers and Barriers for Cost-Efficiency in Europe	70
5.3. Non-European Benchmark Cases	76
5.3.1. Brazil – Pix	76
5.3.2. India – UPI.....	80
Chapter 6. Social Cost Model.....	81
6.1. Index.....	83
6.2. Linear Interpolation	89
6.3. Model Output	92
Chapter 7. Conclusion.....	99
References.....	102
Appendix	118

Abstract

The "Teya – European Payments Market Report 2023" provides a comprehensive analysis of the European consumer-to-business payments market. Centred on the notable growth of payment cards and Alternative Payment Methods, the report assesses market dynamics, regulatory strategies, and social costs to unveil operational efficiencies and insights across various EU markets. Introducing an innovative model to estimate social costs, the report emphasises existing data gaps, the lack of transparency, and the need for future research. This systematic exploration significantly advances the understanding of the complex dynamics underpinning the efficiency of the European C2B payments market.

Keywords

C2B Payments

Digital Payment Trends

Digitalisation

Regulations

Social Costs

Payment Efficiency

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Chapter 1. Introduction

This thesis delves into a thorough examination of the European consumer-to-business (C2B) payments market, a specific segment within the broader payment landscape wherein transactions flow from individual consumers to businesses. This focused scope excludes other transaction types like business-to-business (B2B) or consumer-to-consumer (C2C). By narrowing our scope to the C2B relationship, this thesis seeks to address a significant gap in existing literature, aiming to analyse the specific dynamics characterising this relationship and assess its efficiency and cost-effectiveness in Europe. Moreover, the transition from traditional cash transactions to digital payment methods, particularly the dominance of payment cards and the emergence of Alternative Payment Methods (APMs), serves as the contextual backdrop for our analysis.

Following the introduction, the second chapter conducts a broad analysis of European C2B market dynamics, evaluating prevalent payment instruments, consumer and merchant preferences, and the extent of digitalisation across selected countries. Our emphasis lies in discerning disparities in operational efficiencies and cost savings linked to digital payment systems within the diverse domestic markets of the European Union (EU).

Subsequently, the third chapter scrutinises the regulatory landscape at the EU level, with a specific focus on the European Central Bank's (ECB) retail payment strategy, which primarily targets innovation and standardisation. While acknowledging some successes, this analysis identifies gaps in the strategy's impact, necessitating a critical evaluation of its constituent components.

Chapter 4 extends the examination to the regulatory approach addressing competition, primarily through the Interchange Fee Regulation (IFR). This regulatory intervention is assessed in light of the notable dominance of major card schemes, analysing their business models and the

Group Part

effectiveness of the IFR in fostering competition and innovation. Despite notable advancements, our findings reveal challenges and potential areas for improvement.

Having elucidated the complexities of the C2B market, the fifth chapter examines the social costs incurred in payment transactions, providing a nuanced understanding of cost-effectiveness and identifying areas for improvement. Country-specific analyses, along with a breakdown across stakeholders and payment instruments, reveal the efficiencies diverging digital payment systems produce, establishing benchmarks for further insights into factors driving and hindering such developments.

In the concluding chapter, we present a novel model for estimating social costs, addressing severe data gaps through an index-based approach and linear interpolation. This innovative method not only offers insights into countries lacking social cost information but also highlights the need for future research improvements. Therefore, this thesis contributes to the academic discourse by providing a systematic exploration of the efficiency landscape of the European C2B payments market.

Chapter 2. Overview of EU C2B Payments Market

This chapter aims to provide a comprehensive analysis of the C2B EU payments market, exploring payment instruments, consumer preferences, and merchant preferences. Unlike recurring payments, which usually occur monthly, non-recurring payments at the point-of-sale offer distinct insights into consumer behaviour. They continuously require re-evaluation of choice in payment methods, allowing us to capture technological trends and discern real-time shifts in payment patterns. Therefore, this chapter will focus on capturing the economic effects of these transactions. Firstly, by analysing the distribution of payment instruments, the chapter illustrates which payment methods are central to facilitating the flow of transactions in the European economy. Secondly, shifting to consumer preferences and habits, the chapter delves

Group Part

into the major trends transforming the choices of payment instruments. These trends manifest differently across point-of-sales (POS), impacting the degree of online and in-store payments which, in turn, influences the selection of payment instruments. Lastly, the chapter examines merchant preferences and the complexities of navigating the competitive and regulatory landscape. By analysing the interplay between different players in the market, this chapter seeks to illustrate the intricate dynamics shaping payment habits within the EU C2B payments market.

Methodology: The analysis of data in this chapter, derived from the ECB's SPACE study, recognises key methodological considerations. The SPACE (2022) survey, covering all euro area countries, employed a random sampling methodology to ensure representativeness, aligning closely with SPACE (2019) for time-series analysis. However, some variations in data collection methodologies occurred in Germany and the Netherlands, where independent studies were conducted. Furthermore, the use of one-day diaries to capture payment behaviours, while providing a comprehensive snapshot, introduces a higher degree of uncertainty compared to longer-duration methods. This uncertainty is particularly noticeable in smaller sample sizes, cautioning the interpretation of POS and online payment values.

On a positive note, the survey's multi-round approach throughout the year captures seasonal variations in payments behaviours. This involves conducting interviews and surveys in two rounds, enabling a detailed understanding of payment trends across different periods. The emphasis on minimising bias through extensive cleaning, editing, and inflation adjustments, further contributes to the robustness of the SPACE 2022 data. While this enhances the reliability of findings, potential limitations must be considered in cross-country or subgroup comparisons.

2.1. Payment Instruments

Traditional Payment Methods: Once the overwhelmingly predominant payment method, cash transactions have experienced a substantial decline, particularly over the last decade (McKinsey 2022). Despite this downward trend, cash transactions remain significant, constituting approximately 60% of total payments at the POS in the EU, underscoring their enduring importance for European consumers (ECB 2022b). Simultaneously, debit and credit cards have emerged as dominant players in the digital transactions landscape, comprising 34% of total payments at the POS in the EU (ibid.) (Figure A 1). The speed, convenience, and security of card transactions have fuelled widespread adoption, particularly during the COVID-19 pandemic, leading to a notable increase in card payments (Statista 2021). Given this trend, companies facilitating card payments, such as Visa and Mastercard, have experienced significant profitability (ibid.).

In response to the evolving landscape, traditional banks, which have historically been central to cash circulation, are actively partnering with such card companies. This strategic collaboration allows them to leverage established networks and offer enhanced digital payment methods. Such proactive efforts reflect the banks' commitment to staying relevant and profitable in the rapidly changing payments market.

Alternative Payment Methods (APMs): In addition to the rise in card payments, regulatory changes (discussed in Chapter 3) and technological advances have enabled FinTechs to reshape the availability of new payment options, introducing innovations that redefine how payments are conducted. While this presence is felt across all facets of payments, as discussed in other relevant sections of the thesis, the transformative influence of technology is particularly noticeable in the rise of APMs. Currently, they constitute the remaining 6% of total payments at the POS in the EU (ECB 2022b). However, despite their relatively low share, APMs are gaining traction in the EU payments market, particularly in the realm of e-commerce (Figure A

2). Although payment cards are still the preferred method within the e-commerce segment, innovative payment methods such as Account-to-Account (A2A), digital wallets, and Buy-Now-Pay-Later (BNPL) systems are experiencing notable adoption (Figure A 3).

A2A instant transactions allow consumers to transfer funds directly between bank accounts without intermediaries, providing a swift and efficient electronic payment method. These transactions, often facilitated through mobile apps and QR codes, are offered by both traditional banking institutions (Swish in Sweden) and FinTech innovators like iDeal in the Netherlands (FIS 2023). The appeal lies in lower acceptance costs compared to cards (for merchants), coupled with enhanced fraud and cybersecurity measures, streamlined processes, and instant transaction settlement. Moreover, the incorporation of smartphones and QR codes enhances the ease of use and convenience for end-users, contributing to the growing popularity of this payment method.

Digital wallets, facilitated by major players like Apple Pay, Google Pay, and Samsung Pay, have become the most widely used APM (ECB 2022b). These systems, which securely store payment credentials (e.g., credit card details) on a mobile device or online platform, enable convenient and swift payments without the need for physical cards or cash. The evolving payments landscape underscores the growing importance of alliances between financial institutions and tech giants. These collaborations are crucial, given the vast financial and technological resources, as well as the extensive customer bases of tech giants, positioning them as potential competitors in the EU payments market.

BNPL transactions, offered by key players like Klarna, AfterPay, and Affirm, allow consumers to make instant purchases and postpone payments over a designated period, often with minimal or no interest (Statista 2023a). In this model, FinTechs act like facilitators, extending credit to consumers without the need for a traditional credit card (FIS 2023). This extension of credit is a distinctive feature of BNPL services, allowing users to spread the cost of their purchases over

time (ibid.). The appeal of these transactions lies in their fundamental similarity to credit cards, offering comparable convenience but with more favourable terms.

Conclusion: The EU payments market displays a mix of traditional and emerging payment methods. Cash remains the most significant at 60%, while card transactions account for over 34% of total payments in the EU at the POS (ECB 2022b). Moreover, emerging APMs like A2A transactions, digital wallets, and BNPL systems are gaining popularity, especially in e-commerce. The rise of APMs reflects not only technological advancements but also the disruptive influence of FinTechs in reshaping the payments landscape, prompting traditional financial institutions to adapt and innovate. This evolving landscape reflects the shifting preferences of end-users towards innovative digital payment methods, which will be discussed further in the following section.

2.2. Consumer Preferences

Building upon the evolving landscape of payment instruments and the transformative impact of FinTech, a closer examination of the EU C2B payments market reveals trends that indicate changing consumer behaviours across POS categories, namely online and in-store.

Online payments have substantially increased their share of total EU payments volume, from 6% in 2019 to approximately 17% in 2022, reflecting the recent surge in e-commerce (ECB 2022b). This underscores the increasing preference for online transactions, fuelled by technological advancements and societal changes driven by the pandemic. In addition to volume, online payments now constitute 28% of total EU payments value, doubling from its 2019 figure (ibid.) This remarkable growth highlights the growing significance of digital channels in facilitating economic transactions of larger amounts (**Figure A 4**).

While online payments are experiencing promising trends in term of total EU payments volume and value, there are also interesting takeaways regarding APMs. Digital wallets, in particular, emerge as the most popular APM, accounting for roughly 29% of both the total value and volume of online payments (ECB 2022b). Moreover, A2A solutions and BNPL transactions are making notable strides in the online segment, despite currently holding relatively lower shares of volume, at 18% and 10%, respectively (ibid.). In contrast, though payment cards are still the predominant payment method in online payments, accounting for roughly half of total value and volume, they have been trending downwards during the 2019-2022 period (ibid.). These trends indicate a shift among consumers towards more convenient and quick digital payment solutions in the e-commerce space (**Figure A 5**).

Conversely, while in-store payments have experienced a downward trend over the review period, they still command a substantial 80% share of total EU payments volume (ECB 2022b). This trend is similarly reflected in cash usage at POS, as the share of cash payments in terms of total EU payments volume has declined from 79% in 2016 to 59% in 2022 (ibid.). Despite the decline, cash payments still hold the largest share of total EU payments volume. However, cash payments no longer lead in share of total EU payments value, as payment cards (46%) surpassed cash payments (42%) for the first time (ibid.). This shift indicates a significant growth in acceptance and use of digital alternatives for in-store payments among consumers and merchants, particularly regarding transactions with larger amounts (**Figure A 6**).

Conclusion: The EU payments market is undergoing a significant shift influenced by the rise of FinTech and changing consumer preferences. The surge in online payments, driven by technological advancements, indicates a shift in consumer preferences toward digital transactions. Digital wallets lead among APMs, while traditional payment cards still dominate but show a slight decline in the online segment. While in-store payments are still substantial,

they have been decreasing, as reflected in the decline of cash usage. Accordingly, the shift towards digital alternatives, especially for larger transactions, signals a significant change in the payment landscape in the EU. This dynamic environment suggests a clear movement towards digital alternatives among consumers, driven by convenience and efficiency. Consumer preferences continue to be shaped by the ongoing growth of FinTech, providing more convenient, efficient, and cost-effective payment solutions.

2.3. Merchant Preferences

The shifting EU C2B payments market is marked by the interplay of consumer preferences, technological innovations, and regulatory initiatives. As we consider the dynamics of this evolving market, it is crucial to assess the criteria guiding merchants in their evaluation of accepting payment methods. According to the ECB (2022b), key considerations include payment security, method reliability, overall acceptance costs, ease, and speed, as well as consumer preferences. These considerations are reflected in the acceptance rates of available payment methods. In 2021, cash payments were the most widely accepted, noting a 96% acceptance rate among merchants (ibid.). Following closely were credit cards at 87%, contactless cards at 82%, and debit cards at 80%, while mobile payments lagged behind with a modest 30% acceptance rate (ibid.) (**Figure A 7**).

Merchant Perception: Delving deeper into the context of these acceptance rates, 24% of merchants rank cash payments as their most preferred payment method, citing the immediacy, quickness, and reliability of these transactions (ECB 2022b, Kantar 2022) (**Figure A 8**). However, these merchants are also aware of the potential forgery risks and the inconvenience of having to deposit funds, acknowledging these shortcomings. In contrast, cards as a whole, encompassing both contactless and regular card payments, collectively account for 53% of

preferences, notably surpassing the preference for cash payments. Within this category, contactless payment cards emerge as the preferred choice for 20% of merchants, closely followed by debit PIN cards and credit PIN cards, at 17% and 16%, respectively (ibid.). Herein, a distinction is drawn between the quickness and convenience of contactless payments compared to the slightly longer processing time and manual input required for regular payment cards, given the need for a PIN code. Despite recognising that cards offer enhanced security and convenience compared to cash payments, these merchants also highlight challenges, including high acceptance costs and the lack of instant settlements. Turning to the growing online segment, merchants rank PayPal as their preferred online payment provider (Kantar 2022). This preference is attributed to the platform's ease of use, reliability, and the brand trust built-up over time.

In addition to these preferences, insights from another study shed light on merchants' aspirations for improved payment methods, particularly those targeting addressing transaction speed, lower fees, transaction tracking, and seamless integration (ECB 2022b, Kantar 2022). This is particularly reflected in the desire for reliable A2A instant payment solutions, which offer the convenience and security of card payments but at a lower cost and ensure instant settlement of cashflows (ibid.). However, despite preferences and desired improvements, merchants recognise the competitive and legal constraints limiting their choice of preferred payment methods. While the former restricts the ability of merchants to reject certain payment methods due to the risk of potentially losing customers, the latter restricts the ability to surcharge expensive payment methods or incentivise cost-effective methods (ibid.). These conditions compel merchants to align with consumer preferences irrespective of the possible shortcomings associated with their chosen payment methods.

Conclusion: Amid increased digitalisation and expanded availability of payment methods, merchants' preferences have shifted, influenced by security concerns, cost considerations, and technological reliability. Balancing the preferences of both merchants and consumers, within the constraints imposed by the competitive landscape and regulatory framework, will be instrumental for legislative bodies in fostering efficiency and innovation in the EU payments market.

2.4. Overview of Domestic C2B Payments Markets

The preceding section delved into the multifaceted landscape of C2B payments across the EU, exploring payment instruments, consumer, and merchant preferences on a European level. In this chapter, our focus narrows to examine how these overarching trends manifest at the national level within select EU countries. We aim to categorise these nations along a spectrum, ranging from highly digitalised payment markets to those with a pronounced reliance on cash, aiming to form a representative 'sample'. Recognising the significant variations among Member states, this analysis seeks to shed light on how cultural preferences, economic conditions, and regulatory environments influence the adoption of payment instruments (**Table A 1**). This exploration will serve as a crucial supplement to our earlier examination, offering insights into the intricacies that define payment behaviours in specific national contexts.

Methodology: Relying extensively on GlobalData's country reports, it is essential to consider potential limitations in the employed methodology throughout this chapter. While the underlying approach is comprehensive, relying on secondary sources like central bank statistics could introduce incomplete or outdated data. Moreover, its forecasting methodologies, which combine in-house models with insights from primary research, face inherent challenges in

predicting dynamic market changes. However, despite these limitations, the transparency of GlobalData's methodology and adherence to industry standards enhance report credibility.

2.4.1. Highly Digitalised Payments Infrastructures

Table 1: Share of Traditional and Alternative payment

Country	Payment Instruments (2022)				
	Cards ⁽¹⁾	Cash ⁽¹⁾	Digital Wallet ⁽²⁾	BNPL ⁽²⁾	A2A ⁽²⁾
<u>Highly Digitalised Payment Countries</u>					
Denmark (DK)	49.10%	12.90%	29%	12%	7%
Sweden (SE)	44.80%	8.50%	21%	24%	20%
<u>Moderately Digitalised Payment Countries</u>					
Germany (DE)	21.20%	32.30%	29%	23%	27%
Poland (PL)	38.90%	37.70%	15%	2%	67%
<u>Highly Cash-Based Payment Countries</u>					
Portugal (PT)	32.10%	58.30%	-	-	-
Italy (IT)	20%	67.70%	35%	6%	13%

(1) Total Market Transaction Volume (In-Store and E-commerce) **Source:** GlobalData 2023

(2) E-commerce transaction value **Source:** FIS Report 2023

Sweden has witnessed a significant shift in its payment landscape, with the share of total payments attributed to cash transactions dropping from 18.5% in 2021 to approximately 8.5% in 2022 (GlobalData 2023a). In contrast, payment cards now constitute around 45% of total payments volume, reflecting a 6% increase from the 2021 figure (ibid.) (**Figure A 9**). This notable transformation underscores the increasing preference for digital payment methods, driven by regulatory support, technological advancements, and evolving consumer choices. Estimates suggest that this trend will persist, fuelled by the emergence of APMs and the expanding e-commerce segment (ibid.).

The primary driver behind Sweden's digitalisation of the payment market is the growing use of payments cards, especially contactless ones. This surge is fuelled by consumer preferences, a well-developed payment infrastructure, and a wide acceptance network among merchants (GlobalData 2023). Mastercard and Visa dominate both debit and credit card segments,

accounting for nearly all card-based transactions in Sweden due to the absence of a domestic card scheme (Statista 2023c).

In addition to the preference for cards, the central bank's promotion of the Swedish A2A payment system, Swish, has significantly contributed to the adoption of APMs. Supported by RIX-INST, a 24/7 real-time gross settlement system, Swish enables instant payments for both consumers and businesses (Swish 2023). With 8.5mn users, exceeding 80% of the total Swedish population, Swish has seamlessly integrated into the domestic payment market, particularly through interoperability between partner banks (ibid.).

The emergence of the Swedish BNPL system, Klarna, in the growing e-commerce segment further propels the rise of APMs. Klarna's advantages, i.e., the ability to defer payments at minimal interest rates, have resonated positively with consumers, resulting in a 75% penetration rate among Swedish web-shops (GlobalData 2023a). Its success extends beyond domestic markets, making Klarna one of the preferred BNPL providers in the EU (ibid.).

While the increased adoption of card payments and APMs has undoubtedly led to a decline in cash usage (**Figure A 10**), this trend is further amplified by the central bank's regulatory approach. Specifically targeting tax evasion and undergoing a systematic overhaul of banknotes and coins, these initiatives aim to curtail illicit financial activity and redesign the physical currency infrastructure, collectively playing a significant role in steering the nation away from cash transactions (RinksBank 2022) (**Table 1**).

Denmark has also made significant strides towards a cashless payment market, with card payments holding the largest share of total payment volume, at 49.1% (GlobalData 2023b). Conversely, cash transactions only constitute 12.9% of total payments, signalling a pronounced shift in consumer preferences towards digital payment methods (ibid.). This trend is notably influenced by Denmark's 84% banked population, indicating widespread consumer penetration

in banking services and fostering an environment conducive to increased adoption of new and innovative payment methods (GlobalData 2023b) (**Figure A 11**).

Similar to Sweden, the primary driver behind Denmark's increased digitalisation is the growing use of payment cards. Dankort, the domestic debit card, dominates with a 93% share of total card payment value in 2022, but is expected to face challenges from international debit card players, namely Mastercard and Visa (ibid.). Credit card usage is growing, especially for high-value transactions, further reflecting the diverse transaction types made with payment cards, and forecasts suggest a continued preference for these trends (ibid).

Beyond in-store payments, the e-commerce segment is witnessing growing preferences for APMs, despite debit and credit cards collectively accounting for 49% of total payment value in this segment (FIS 2023). Of these APMs, digital wallets emerge as the preferred payment method, constituting 29% of e-commerce transaction value (FIS 2023). Notably, MobilePay, launched by the Danish central bank in 2013, dominates the digital wallet landscape despite international presence of players like PayPal and Apple Pay (ibid.). Factors such as wider merchant acceptance, convenience, and a preference against carrying cards or cash contribute to the popularity of mobile wallets (GlobalData 2023b). The prevalence of mobile wallets is expected to persist, with payment service providers and banks actively promoting such payment methods in Denmark (ibid.). Overall, the country's highly digitalised status, reflected in a 98.1% internet penetration rate, creates a favourable environment for the adoption of cashless payments (ibid.). In addition, Denmark's relative share of card payments and mobile payment transactions are the highest in the EU, cementing its position as one of the most digitally advanced payment systems (ibid.) (**Table 1**).

Conclusion: Both Sweden and Denmark exemplify the profound shift towards highly digitalised payment markets, driven by robust infrastructures and changing consumer preferences. In Sweden, the surge in card payments and APMs, propelled by Swish and Klarna, reflects a deliberate regulatory and technological push. In Denmark, the dominance of card transactions, especially through Dankort, and the growing influence of digital wallets like MobilePay underscore a similar trajectory. The notable digitalisation in both nations, reflected in high card payment shares and innovative payment methods, positions them at the forefront of Europe's digital payment evolution.

2.4.2. Moderately Digitalised Payments Infrastructures

Germany maintains a persisting preference for cash transactions, with shares of digital payment methods being distinctly lower compared to the Nordic countries. Cash remains predominant, comprising 32.3% of total transaction volume (GlobalData 2023c). In contrast, payment cards constitute 21.2%, while digital wallets make up a minimal 0.3% (ibid.). This inclination reflects a strong cultural desire for payment privacy and security, contributing to a relatively slower adoption of cashless payment methods.

Nonetheless, a growing trend in card usage emerges, fuelled by the expanding e-commerce sector, improved payment infrastructure, and greater financial inclusion (GlobalData 2023c). Notably, debit cards, especially the domestic Girocard, drive this surge, constituting 73.2% of total card payment value in 2022 (ibid.). The anticipated increased adoption of Girocard is facilitated by reduced processing costs under the IFR (discussed in chapter 4) and a broader acceptance network for contactless payments (ibid.).

Conversely, credit cards, historically less favoured due to cultural aversions to debt, are gaining traction through incentivisation by card companies offering enhanced value-added features, such as cashbacks, discounts, and reward systems (ibid.). For instance, strategic partnerships,

such as Visa's collaboration with the FinTech company Pliant, aim to boost credit card usage with improved digital card management tools and attractive benefits (ibid.). The growing e-commerce industry is expected to further contribute to this uptake in credit card usage (ibid.). In addition to card payments, Germans display a favourable attitude towards BNPL services in the e-commerce segment, constituting around 23% of transaction value in 2022 (FIS 2023). This trend is driven by factors such as rising internet and smartphone penetration, increased confidence in online transactions, and a growing awareness of flexible payment (ibid.). Leading providers like PayPal and Klarna are at the forefront of BNPL offerings in Germany (ECDB 2023) (**Table 1**).

Poland's payment landscape presents a mix of traditional and digital preferences. Notably, the use of cash remains significant, accounting for 37.7% of all transactions (GlobalData 2022d) (**Table 1**). This persistent reliance for cash is rooted in various factors, including the comfort and familiarity associated with physical currency, and a perceived sense of security against digital fraud (ibid.). On the other hand, card usage, representing 38.9% of all transactions, signals a gradual shift towards digital payment methods, highlighting Poland's transitional phase where traditional practices coexist with emerging technologies (ibid.). Notably, as is the case in Sweden, both debit and credit card segments are dominated by Mastercard and Visa, accounting for nearly all card-based transactions in Poland due to the absence of a domestic card scheme (Statista 2023c).

The e-commerce sector in Poland, however, is showing a stronger trend towards APMs. In particular, A2A payments, commanding a 67% share of transaction value, have experienced a remarkable 58% increase from the previous year, underscoring a transformative shift (FIS 2023). Consumer insights indicate a growing preference for A2A payments due to perceived higher security, ease of use, faster transaction speeds (ibid.). At the heart of this digital

transformation is the BLIK app, a versatile payment method, allowing for easy and instant payments 24/7. Notably, it boasts widespread adoption, with 12mn active users and 3.5mn daily transactions (FIS 2023). Developed through collaboration with major Polish banks and global payment providers, strategic partnerships have played a pivotal role in enhancing customer experience and fostering trust in this innovative payment method (GlobalData 2022d).

Conclusion: Overall, both countries show a mix of traditional and modern payment preferences, indicating a transitional phase in the payment landscape. Especially, Germany's payment landscape shows a shift away from strong biased preference for cash towards digital payments. However, while digitalisation is evident, access to cash remains crucial, requiring a balanced approach. The impact of these trends emphasises the importance of strategically adapting digital payments as an additional payment option to enable a sustainable transition towards a more digitalised payment landscape. In addition, the adoption of digital payments in these countries is mainly driven by increasing familiarity with digitalisation and the rise of e-commerce sector, reflecting a gradual but significant move towards more diversified and digital payment options. Furthermore, the increasing importance of e-commerce and the central role of domestic applications in shaping payments trends is shown by the rapid growth of A2A payments in Poland. Generally showing an inclusive approach that acknowledges the diversity of consumer needs and ensures that advancements in digital payments do not compromise accessibility to traditional payment methods.

2.4.3. Highly Cash-based Payments Infrastructures

Italy, historically characterised as a slow adopter of digital payments, heavily relies on cash, constituting 67.7% of total transactions (GlobalData 2023e). Despite this, recent regulatory initiatives aimed at curbing cash usage in favour of digital payments have contributed to a

gradual decline in the cash share (ibid.). Payment cards, now accounting for 20% of total transactions, have gained traction with regulatory support to enhance card acceptance networks and promote of digital payments (ibid.). Nonetheless, lingering structural and cultural barriers, especially concerning tax evasion, continue to impede a more significant shift from cash usage in Italy.

Italy stands out in the digital payments landscape, emerging as one of the most developed contactless card markets globally, with nearly 8 in 10 consumers possessing contactless cards (GlobalData 2022e). The perceived convenience of digital payments, coupled with a robust payment infrastructure and a growing e-commerce segment, has fuelled market growth, evidenced by a 16.9% Compound Annual Growth Rate (CAGR) in card payment volume from 2018-2022 (ibid.). Government-led initiatives to expand acceptance networks among merchants have further supported this trend, reflected in a 9.7% CAGR in number of POS terminals during the same period (ibid.).

However, despite promising developments in the digital payment market, Italy grapples with a persistent reliance on cash payments (ibid) (**Table 1**). Challenges related to tax evasion, merchant reluctance to accept cards payments, and a limited response to government incentives hinder the widespread adoption of digital payment methods (ibid.). Additionally, Italy faces obstacles in digital familiarity, with only 46% of the population possessing basic digital skills, coupled with an 86.1% internet penetration rate, falling below the North-European countries' average of 97.3% (European Analysis Report 2022). Nonetheless, a decreasing trend in cash usage suggests a gradual shift towards more digitalised payments (**Table 1**).

Portugal's payment landscape also displays a significant reliance on cash, constituting 58.3% of transactions by volume in 2022, reflecting a traditional preference for cash (GlobalData 2023f). Nevertheless, this trend is gradually evolving as improvements in banking

infrastructure, the adoption of contactless payments, and the growth of e-commerce prompt shifts in consumer and merchant behaviour (ibid.). Payment cards emerged as the second most used payment method, capturing a 32.1% share in transaction volume (ibid.) (**Table 1**). Central bank measures, such as the National Strategy for Retail Payments, have played a pivotal role in encouraging the transition to cashless payments by mandating merchants to offer at least one cashless payment method (ibid.).

Within the payment card landscape, the debit card market in Portugal is expanding, driven by a near 45% increase in the number of bank accounts from 2020-2022 (Banco de Portugal n.d). This trend is expected to continue, with banks adopting digital onboarding and offering a growing number of debit cards (ibid.). In contrast, credit cards constituted only 4.7% of the total number of card payments in 2022, primarily used for high-value purchases (ibid.). Similar to Germany, credit cards are growing in popularity due to value-added benefits and the introduction of new cards targeting a broader consumer base (ibid.) (**Table 1**).

MB WAY, a domestic digital wallet launched by Multibanco, stands out as a notable player in Portugal's APMs, facilitating convenient and timesaving in-store and online payments through a mobile app (ibid.). The popularity of MB WAY is evident, with over 4.28mn users in 2022, and more than 33% of consumers designating it as their preferred online payment method (Statista 2023b). However, similar to Italy, Portugal faces challenges in digital familiarity, with only 55% of the population possessing basic digital skills, well below the average in North-European countries, limiting the extent of digital adoption (European Analysis Report 2022).

Conclusion: Italy and Portugal, both characterised by historically high cash reliance, are undergoing gradual shifts towards digital payments. Regulatory initiatives in Italy have curbed cash usage, with payment cards gaining traction, notably in the contactless segment. Despite

digital advancements, Italy faces hurdles like cultural barriers and limited digital familiarity. In Portugal, improvements in banking infrastructure and central bank measures propel the transition to cashless transactions, with debit cards expanding. However, challenges in digital skills persist, reflecting a slow but evolving digital landscape in both nations. Their unique challenges, stemming from cultural, regulatory, and digital literacy factors, contribute valuable insights to the broader category of highly cash-dependent economies seeking a balance between tradition and digital transformation.

Chapter 3. European Central Bank Retail Payments Strategy

The EU exhibits diverse payment landscapes, ranging from highly digital to moderately digital and highly cash-reliant economies. This diversity presents multifaceted challenges and opportunities that underscore the need for the ECB to adopt a tailored approach in formulating an EU-wide retail payment strategy (EC 2020a). Recognising the differences within Member States, the ECB's approach should balance fostering innovation and promoting financial inclusion to ensure a harmonised and efficient retail payment ecosystem across the Internal Market.

However, the increasing prevalence of card payments may actually generate an impediment on the ECB's ability to harmonise payments and promote innovation across the Internal market (EC 2020a). Accelerated by the pandemic, card payments have become particularly prevalent, almost exclusively facilitated by major non-EU providers. Since domestic providers (both card-based and account-based) often lack the infrastructure to support cross-border payments, global players such as Visa and Mastercard have fully captured the intra-EEA cross-border payments segment (EC 2020a). This has led to a fragmented market where European consumers are increasingly reliant on few payment platforms, raising concerns about market concentration, competition, and efficiency (ibid.).

Given such market conditions, the ECB's regulatory approach consists of two distinct initiatives that influence the European C2B payments market: the ECB retail payment strategy and the IFR. While the former aims to harmonise retail payments across the EU by fostering innovation and efficiency, the latter addresses market concentration and anticompetitive concerns in the card payments market (EC 2020a). This chapter will first examine the ECB retail payment strategy, while the next chapter will critically analyse the EU card payments market and the impact of the IFR. This dual regulatory approach addresses the unique challenges posed by diverse payment landscapes and sets the groundwork for a comprehensive analysis of the ECB's strategies in the subsequent chapters.

3.1. Contents of ECB Strategy

The ECB strategy aims to create a standardised and innovative retail payments market, which provides a broad range of safe and efficient payments solutions for consumers and merchants (EC 2020a). This strategy encompasses a range of regulatory initiatives and financial support measures aimed at supporting innovation and digitalisation, improving efficiency, and ensuring strategic autonomy (ibid). The main elements of the ECB strategy can be categorised as follows:

1. Deployment of pan-EU (i.e., encompassing all Member States) instant payments:
 - **SEPA**: standardised set of rules for electronic payments.
 - **TIPS**: instant payments settlement infrastructure to reinforce SEPA.
2. European-grown pan-EU solutions for retail payments at POS:
 - **EPI**: European-grown pan-EU payments solution.
 - **Digital euro**: complements the retail payment strategy, fostering innovation, ensuring privacy, and enhancing the efficiency of digital payments.
3. Support for innovation, digitalisation, and financial inclusion:

- **PSD2**: open up the banking system and fuel the development of innovative payment services by FinTech companies.
- **Inclusion strategy**: promoting access to payments for all citizens, whether by protecting cash availability or making digital payments more easily accessible.

Through these interconnected initiatives addressing concerns in the EU payments market at both operational and end-user levels, the ECB retail payments strategy aims to achieve its overarching goal of promoting efficiency, innovation, and competition in the EU payments market, while fostering the Internal market (EC 2020a).

3.2. Deployment of pan-EU instant payments

1. Single European Payment Area (SEPA) is an initiative and framework that aims to create a single and integrated market for euro-denominated payments within the EU and certain non-EU countries (ECB 2023). It was created in response to the challenges inherent in the fragmented landscape of cross-border payments within the EU (ECB 2019). Before its introduction, different countries had widely varied systems, making cross-border payments challenging due to incompatible formats, security measures, and identification methods (ibid.). This resulted in inefficient and prolonged transaction processes, thereby increasing the associated costs. As a response, SEPA aims to simplify and standardise electronic payments, ensuring that participating financial institutions adhere to a uniform approach when transferring funds cross-border (ibid.). This standardisation facilitates efficient and reliable cross-border transactions, as all parties involved follow the same protocols (ibid.).

The SEPA initiative encompasses several standardised payment formats for both credit transfers and direct debits, providing common rules for such electronic payments. It promotes the use of standardised identifiers, such as the International Bank Account Number (IBAN) and Bank Identifier Code (BIC), to identify accounts and financial institutions, respectively (EC 2020).

These elements collectively aim to streamline payment processes and enhance interoperability across participating banks and financial institutions (ibid).

While the initiative has undeniably introduced standardised practices, leading to improved efficiency and reduced transaction times, the extent of cost savings has been variable. Some financial institutions have realised notable savings through streamlined operations, while others have encountered challenges in adapting legacy systems to SEPA standards, incurring additional costs (Jetson 2023). This, alongside varying degrees of technological readiness, explains the uneven market response as certain regions or sectors have exhibited a slower adoption rate (Dr. Berger 2021). Nonetheless, the general uptake of SEPA has been substantial, with a significant number of businesses and financial institutions embracing the standardised payment instruments (European Payments Council 2022).

2. *TARGET Instant Payment Settlement (TIPS)*, a real-time gross settlement infrastructure, offers a new system that supports instant transferal of funds in real time (24/7), representing a significant advancement in the landscape of cross-border payments within the EU (ECB 2023a). Building upon the foundation laid by the SEPA initiative, TIPS was specifically designed to tackle two significant challenges: the emerging fragmentation caused by the proliferation of A2A national solutions across the EU (as discussed in Chapter 2) and the persistent issues of delays, inefficiencies, and high costs associated with cross-border payments, despite the introduction of SEPA.

The risk of fragmentation, arising from the proliferation of diverse A2A national solutions such as Swish and BLIK within Member states, is primarily attributed to their lack of support for cross-border payments (Bundesbank 2023). To address this challenge and ensure broader connectedness within the EU, TIPS provides a unified and interconnected service. This service

allows seamless access for participating institutions in the EU, connecting different A2A systems and supporting instant bank transfers across the region (ibid.).

Similar to traditional payment systems, the TIPS platform receives a transaction request from the originator's bank, validates it, forwards the request to the beneficiary's bank for acceptance, and upon confirmation, promptly settles the transaction. Going beyond conventional systems, however, TIPS builds upon a recently innovated instant settlement system, facilitating end-to-end transaction settlement in real-time (ECB 2023b). Leveraging the existing SEPA network, this real-time settlement service extends to both cross-border and domestic transactions within the EU. While this service can generate substantial improvements for credit transfers and direct debits, it is (currently) inherently limited to such A2A transactions (EC 2020). This inability to support other retail payment methods for POS purchases may impact its appeal in specific C2B market segments (ibid.).

Despite these dual advancements, the uptake of TIPS has fallen below initial expectations, as reported by the ECB (ECB 2023c). A deeper examination reveals challenges that extend beyond infrastructure, including issues related to widespread availability, end-user attractiveness, pan-European functionalities, and overcoming barriers such as high rejection rates linked to Anti-Money Laundering and Terrorism Financing Screening (ibid.). Recognising these challenges is essential for the ECB to strategically address them, fostering an environment where TIPS and instant payments become widely used for cross-border transactions across the EU.

Conclusion: Having examined the instant payments layer of the ECB strategy, this section discussed the critical elements that shape the settling and clearing of electronic account-based payments in the EU. Led by the SEPA and TIPS initiatives, this well-established infrastructure holds potential for seamless transactions in the European C2B payments market. Despite the robust foundation, it is acknowledged that the uptake of these initiatives remains limited. A

closer examination reveals that, while the infrastructure is well-built and provides immense value, challenges persist. The current usage, primarily limited to credit transfers and direct debits, coupled with the lower-than-expected adoption rates among consumers and businesses, prompts a revaluation of its roll-out strategy on behalf of the ECB in its pursuit of pan-EU deployment of instant payments.

3.3. European-grown pan-EU solutions for retail payments at POS

1. *European Payments Initiative (EPI)*: endorsed by the ECB, this market-led initiative seeks to establish an A2A system, named Wero, functioning through a mobile app (EPI 2023a). In contrast to existing domestic A2A systems, Wero is uniquely designed to integrate with existing pan-EU settlement systems like TIPS, providing intrinsic support for cross-border payments. This interoperability extends to both in-store and online transactions, as well as cash withdrawals (Atzler 2023). EPI's recent acquisitions of iDeal and Payconiq, two prominent domestic A2A systems, signal that it has consolidated the essential front-end technology needed to execute its strategy (Walker and Storbeck 2023). Coupled with reliance on existing back-end processing infrastructures like TIPS, this positioning sets Wero on a promising trajectory in the EU CB2 payment market.

However, critical questions emerge regarding its market attractiveness and entry strategies (ibid.). Despite ambitious goals, the EPI must clearly communicate its unique value proposition to entice users away from established payment methods (EPI 2023a). Moreover, success depends not only on technological advancements but also on seamless onboarding processes, ensuring a user-friendly experience that encourages widespread adoption (You 2020). Previous failures of similar market-led initiatives backed by major financial institutions, as seen in the case of the Nordics' P27 system, further highlight the importance of a well-established implementation strategy (EPI 2023c).

As the EPI navigates the competitive landscape, practical considerations about implementation and interoperability with existing systems become crucial. Addressing these factors is essential for the EPI to fulfil its ambitions and establish itself as a leading payments solution in the EU market, emphasising the need for a tailored approach to both technology and strategic positioning across stakeholders.

2. *Digital Euro:* The ECB, in partnership with national central banks, is actively working on the development of the digital euro – a retail central bank digital currency (CBDC). This digital currency will serve as a virtual counterpart to physical euro banknotes and coins, constituting a form of central bank money in the digital realm (ECB 2023a). Its purpose is to complement physical cash and existing electronic money like bank deposits (ibid.). The digital euro is designed to be easily accessible to both individuals and businesses, facilitating seamless daily transactions (ibid.).

In the context of C2B payments, the ECB's stance on the digital euro reflects an approach that acknowledges the evolving landscape of digital payments in the euro area. By emphasising that the digital euro would coincide with the rise in digital transactions, the ECB indicates its intention for the digital euro to integrate with the current payment environment (ECB 2023d). This strategic alignment aims to ensure that other pan-EU solutions for retail payments at the POS continue to thrive, undeterred by the introduction of the digital euro (ibid.).

Notably, the ECB positions the digital euro not as a replacement but as a complementary element to traditional physical currency (ECB 2023b). It aims to maintain a balance, preserving the availability of both private and public means of payments for consumers and businesses, catering to diverse preferences (ibid.).

Moreover, the ECB's preference for using existing infrastructures and technologies, such as TIPS, in implementing the digital euro serves multiple purposes (ECB 2023c). Firstly, it aims

to ensure a smooth and efficient integration of the digital euro into the existing payment infrastructure (ibid). Secondly, it is a strategic move to contain overall investments within the European retail payments industry (ibid.). By doing so, the ECB seeks to minimise disruptions and streamline the adoption process, fostering a more cost-effective transition to digital currency.

However, while the ECB promotes the digital euro as a valuable addition to existing digital payments, there could be operational challenges, including integration issues and uncertainties around the scale of required investment (EC 2023b). For example, enhancing efficiencies and avoiding the necessity of establishing new settlement systems could be achieved through the utilisation of existing infrastructures like TIPS. However, the actual integration process may pose considerable challenges. Moreover, concerns about data privacy and security might impact user adoption, and businesses might face additional costs for system adaptation (ECB 2022c). While the fundamental necessity of the digital euro could also be subject to scrutiny, given existing systems addressing comparable use cases, it is already slated for introduction. Therefore, stakeholders in the EU C2B payments market should prepare for necessary adjustments accordingly.

Conclusion: Analysing the European retail payment initiatives section of the ECB retail payment strategy, particularly the EPI and the digital euro, reveals a dual landscape of potential and challenges. The EPI's ambition, supported by the ECB, seeks to fill a critical gap with a comprehensive pan-EU payment solution. However, questions arise regarding market reception and implementation processes. Similarly, the digital euro, aligned with existing methods, reflects the ECB's inclusivity commitment but may face operational challenges and privacy concerns. As these initiatives continue to be developed, the ECB needs to address such challenges, ensuring their success and effective contribution to establishing a comprehensive

pan-EU payment solution, particularly amid the overreliance on non-EU payment infrastructures.

3.4. Support for innovation, digitalisation, and financial inclusion

1. Payments Service Directive 2 (PSD2) emerged as a regulatory response to identified challenges within the EU payments market, addressing issues of limited competition, consumer protection, and electronic transaction security (ECB 2018). Before its introduction, the market exhibited limited competition, with traditional financial institutions dominating and inhibiting innovation (DeNederlandscheBank n.d.). Additionally, concerns about the security and resilience of electronic transactions necessitated regulatory intervention (ibid.).

Open Banking: PSD2 comprises key elements designed to address these identified issues. It introduces open banking, allowing third-party providers to access customer account information with explicit consent through APIs, facilitating direct payments and aggregating financial data between multiple accounts (BBVA 2023). This shift towards open banking fosters competition and innovation, offering alternative, secure, and potentially more cost-effective payment methods (EC 2023c). However, third-party providers must comply with regulatory standards similar to traditional institutions, potentially hindering widespread adoption (Bundesbank 2019).

Strong Customer Authentication (SCA): PSD2 also introduces SCA, a pivotal measure requiring the use of two authentication factors for enhanced security in online and app-based bank operations (Bundesbank 2019). This heightened security is targeted at addressing previous vulnerabilities in payment processes, aiming to combat fraud and unauthorised access (BBVA 2023). However, the implementation of SCA requires significant adjustments for banks,

presenting challenges in adapting authentication elements and resolving technological infrastructure issues, particularly related to APIs (ibid.). This complexity has led to banks hesitating to invest in supporting these interfaces, primarily due to concerns about costs and technological complexities, impeding the overall adoption of PSD2 (Genova 2016). Overcoming these challenges is crucial for PSD2 to achieve its objectives of fostering competition, innovation, and increased security in electronic payments.

PSD3 proposal: In response to these challenges, the PSD3 proposal aims to refine and enhance the EU's regulatory environment for payments. The proposal proposes explicit technical requirements for banks, eliminates obstacles to open banking, and streamlines the complex system established by PSD2. To combat payment fraud, PSD3 introduces additional measures to strengthen security and authentication in electronic payments (Dr. Huertas 2023). Aside from enhancing the current PSD2 challenges, it also empowers non-bank payment service providers by allowing direct access to clearing and settlement systems (Mallick 2023). Previously restricted to banks, this change eliminates the need for non-bank providers to connect indirectly through sponsor banks, reducing transaction times and costs while fostering competition and innovation in the market (Gallo and Nair 2023, Nelson et al. 2023).

2. Financial Inclusion: The ECB's emphasis on financial inclusion within its retail payment strategy addresses the pressing issues arising from the continual reduction of bank branches and ATMs, accompanied by a decline in the acceptance of cash by certain retailers and public administrations in certain European countries (EC 2023b). This trend raises alarms about the potential exclusion of more vulnerable individuals, including the unbanked, underbanked, and those less proficient with digital payments, to effectively conduct transactions (ECB 2022a). While the ECB's proposed legislation on the legal tender status of euro cash is a step toward

ensuring cash remains widely accepted as a means of payment, the effectiveness of such measures in ensuring widespread acceptance and accessibility requires critical scrutiny. In addition, the ECB's commitment to investigating usability – defined as access to payments for all citizens – reflects an acknowledgment of the broader societal impact of digital transformation (ECB 2022a). However, assessing the success of these initiatives demands a closer examination of their practical outcomes. Recent studies highlight that accessibility to digital payments poses a challenge to a much wider portion of the population than previously thought (ibid.). In light of these findings, central banks are poised to play a crucial role, actively supporting initiatives that promote broader accessibility to digital means of payment (ECB 2023b). This approach aligns with the ECB retail payment strategy's overarching objective of fostering financial inclusion. However, continuous monitoring and additional actions are necessary to ensure long-term sustainability.

Conclusion: In summary, PSD2 addresses EU payment challenges, promoting competition through open banking. However, balancing innovation and regulation remains a challenge. PSD3 proposal aims at refinement and improved security, emphasising direct access for non-bank providers. Moreover, the ECB's financial inclusion efforts address declining cash use, but practical outcomes require scrutiny. Therefore, ongoing commitment and adaptability are essential for these initiatives to navigate the dynamic EU C2B payment market sustainably.

Chapter 4. Assessment of IFR in the Card Payments Market

Having delved into the intricate landscape of EU retail payments across the EU and the ECB's strategic approach to foster innovation and efficiency, our focus now shifts to a crucial aspect of the regulatory framework – the IFR. As we transition from the ECB retail payment strategy, we enter the segment dominated by card payments, where the challenges of market

concentration and reliance on non-European entities take precedence. This chapter delves into the intricate structure of the EU card payments market, discussing the roles of key players and the economic dynamics that shaped its landscape before the introduction of the IFR. Through a critical assessment, it will evaluate the impact of the IFR on the market from diverse perspectives. This analysis will then extend to the present, evaluating the current state of the card payments market years after the implementation of the IFR. The primary objective is to ascertain whether the intended objectives of the regulation – enhanced competition, innovation, and lower prices for both consumers and merchants – have endured over time, considering the dominance two major international card schemes within the broader EU C2B payments market.

4.1. EU Card Payments Market

4.1.1. Card Schemes

As mentioned in Chapter 2, card payments have emerged as the dominant method of cashless transactions in the EU and play a pivotal role in the functioning of its economy. In the EU, card payments operate through two main business models: three and four-party card schemes. This chapter will primarily focus on the four-party scheme, given the negligible presence of three-party schemes in the EU. These schemes serve as complex platforms that facilitate card transactions by providing a network that brings together the following key stakeholders (**Figure B 1**).

- ***Cardholder***: the individual or business who owns and uses the payment card for making purchases.
- ***Merchants***: the business or entity that sells goods or services and accepts card payments.
- ***Acquirer***: the financial institution or payment processor that partners with merchants to facilitate card transactions (PSR 2021). Acquirers provide services to merchants, such as managing merchant accounts and authorising/settling transactions on their behalf (ibid.).

Individual Part: Itai Tacq

- **Issuer:** banks or other financial institution that issues the payments cards to the cardholder (ibid.). The issuer pays the acquirer the money the merchant is owed for the transaction and debits the cardholder's account (ibid.).
- **Operators** of card payment schemes: these organisations, like Visa and Mastercard, provide the infrastructure (card scheme) through which acquirers and issuers process and settle card payments (ibid.). They also establish the overarching rules that govern the participation of all stakeholders within their specific card payment scheme (ibid.).

Within these four-party schemes, the following cost relationships dictate the interplay of the participants:

- **Interchange fees:** these fees represent the compensation acquirers pay to issuers for each transaction initiated by cardholders. It forms a crucial component of the revenue flow within the card payment ecosystem.
- **Scheme and processing fees:** these fees are paid by acquirers and issuers to the operators of the scheme in exchange for the services and infrastructure they provide (PSR 2023a).
- **Merchant service charge (MSC):** these fees are the total amount merchants pay to acquirers for card-acquiring services. It comprises interchange fees, scheme fees, and acquirer net revenue. The latter includes additional costs incurred by the acquirer for providing services, along with the acquirer's profit margin (PSR 2021).
- **Cardholder fees:** while less common, cardholders may be subject to fees payable to issuers.

Card Scheme Operators, such as Visa and Mastercard, offer the back-end infrastructure through which card payments are processed. They also establish the fundamental guidelines known as scheme rules that govern the operations of transactions within their respective card

schemes (the infrastructure). These rules cover various aspects, including fee structures, authorisation and clearing procedures, and compliance standards (PSR 2021). Enforcing these rules is crucial, and operators ensure that all stakeholders within their schemes comply with these established guidelines (ibid.). In addition to rule enforcement, operators provide optional supplementary services that are integral to facilitating transactions within the scheme, such as anti-fraud features and mobile payment integration (PSR 2023a). These added features not only strengthen the security and efficiency of transactions but also contribute to the overall value proposition of the card scheme (ibid.). Issuers and acquirers benefit from these services, as they enrich their respective product offerings in the process. In return, both parties are required to pay scheme and processing fees directly to the card scheme operators for utilising their platform, adhering to scheme rules, and obtaining additional services (PSR 2021)

Apart from the major international payment schemes, namely Visa and Mastercard, several countries have their national card schemes, such as GiroCard (Germany), Bancontact (Belgium), and Cartes Bancaires (France). These schemes typically hold the largest shares in their respective domestic markets and support cross-border payments through partnerships with Visa or Mastercard (EY 2020). However, in all other markets without domestic card schemes, and across the landscape of cross-border payments, the two major international payment schemes dominate the market for consumer cards (Statista 2021). This dominance stems from the lack of infrastructure to support cross-border payments among domestic schemes and the absence of a pan-European digital payment solution that enables cross-border transactions (EC 2020). These conditions have allowed Visa and Mastercard to capture the entire intra-EU cross-border payments market (ibid.).

Acquirers and Merchants: Beyond operators, the remaining stakeholders also provide and procure services. Merchants must purchase card-acquiring services (constituting the MSC)

from acquirers or payment facilitators, the latter of which act as intermediaries between acquirers and merchants (PSR 2021). Acquirers oversee the entire process of accepting card payments, from providing the necessary hardware and software solutions to managing the complex back-end processes that make transactions possible. While these services were traditionally offered by banks, changes in the regulatory environment, mergers and acquisitions, and new market entries have expanded the types of active firms in this space (ibid.). Notably, some of the largest acquirers in the EU payments market in terms of processed transactions are Nexi, WorldPay, Worldline, Adyen, and Barclays (Statista 2022a).

Issuers and Consumers/Cardholders: Consumers, on the other hand, must obtain a payment card from their bank (issuer) to engage in card transactions. Banks with the largest number of customers across the EU, such as Santander, Lloyds Banking Group, Barclays, BNP Paribas, and HSBC, tend to dominate this segment (Statista 2022b). These issuing banks handle the back-end payment processes for consumers, ensuring that the amount payable is transferred to the acquiring organisation of merchants (PSR 2021). In return for enabling this transfer, issuing banks charge interchange fees to the acquiring organisations. These interchange fees typically cover the costs associated with processing transactions and mitigating risks (ibid.). Notably, while the structure and amount of interchange fees may vary, they are usually set by the operator of the scheme (as part of the scheme rules), despite not being the organisation that directly collects this fee. The rationale for doing so is explored in the next section.

Having explored the dynamics of the four-party card scheme, the following section will delve into the economic considerations behind setting fees within this framework. This discussion takes place within the dynamic landscape of the two-sided market and precedes the introduction of the IFR.

4.1.2. Economics of Setting Fees in the Four-party Scheme

Economists characterise card schemes as marketplaces operating in a two-sided market, wherein two distinct user groups interact (i.e., merchants and consumers), and the value of the scheme is dependent on the interaction between these two groups – creating a network effect (Bolt and Chakravorti 2008). This network effect dictates that the more consumers use payment cards, the more attractive it becomes for merchants to accept those cards, and vice versa (Armstrong 2006). Given such characteristics, the operator has an incentive to structure the fees across the two sides of the market so as to maximise the number of cardholders and merchants that join the scheme (Börestam and Schmiedel 2011). By doing so, the operator enhances the overall value across both sides of the market, as well as strategically maximises its own profits (ibid.). In order to optimise these network effects, operators use interchange fees as the main pricing mechanism for their two-sided card schemes. As discussed earlier, interchange fees are charges from issuers to acquirers for transferring funds from consumers to the acquirer, which then forwards the amount to its merchant. Therefore, interchange fees constitute costs for acquirers and revenues for issuers.

Determinants of Interchange Fee Level: Operators determine the optimal level of interchange fee by weighing the pricing dynamics on both sides of the card scheme. On the acquiring side, interchange fees are considered costs, influenced by merchant price elasticity (Prager et al. 2009). Despite card payments being relatively expensive, commercial pressures to meet consumer preferences effectively forces merchants to accept these payment instruments (ibid.). In this competitive environment, rejecting card payments is unviable as merchants are unwilling to risk losing customers to other retailers (ibid.). Moreover, local regulations may prevent merchants from using surcharging methods, such as imposing card-specific charges or

incentivising alternative, cheaper payment methods (European Commission 2015). Under these market conditions, card schemes can impose higher interchange fees without facing a substantial reduction in merchant demand.

Conversely, on the issuing side, consumers demonstrate high price elasticity owing to the multitude of available payment methods (Prager et al. 2009). In this context, sufficiently high levels of interchange fees, which constitute revenue for issuers, serve as an incentive for these issuing organisations to actively promote card adoption among consumers. The revenue generated from interchange fees is then utilised to subsidise improved product offerings or waive cardholder fees (European Commission 2015). The more transactions are made by payment cards among consumers, the greater the revenue received by issuing organisations (ibid.). These market dynamics empower operators to set interchange fees that maximise revenue for issuers, who are then motivated to increase card uptake among consumers.

Considering the price elasticities on both sides of the market, the upper bound of the interchange fee is therefore set as high as merchants perceive the costs to still be acceptable. This positioning allows the interchange fee to function as a pivotal tool for subsidising and enticing consumers on the opposing side of the market. The primary objective is to maximise card adoption among consumers while ensuring that merchants remain motivated to actively participate in the card scheme. This equilibrium maximises the revenue generated for issuers, creating a symbiotic relationship where higher costs on the acquiring side translate into increased revenue on the issuing side.

Economic Consequences of High Interchange Fees: Relying on such a pricing mechanism that maximises the level of interchange fee can generate distinct adverse economic consequences that impact stakeholders in the four-party scheme. These include:

1. As discussed, regulatory and commercial constraints prevent merchants from directly passing on interchange fee costs to card-paying consumers. Consequently, they raise prices for all consumers, irrespective of the payment method used (Börestam and Schmiedel 2011). This results in all consumers subsidising the high costs of card payments, even if they opt for non-card payment methods (ibid.). This distortion carries significant economic consequences, as consumers may unknowingly use expensive payment cards, generating negative externalities for both merchants and non-card-using consumers in the EU payments market.
2. Another adverse economic consequence emerges from the pass-through rate of interchange fees. Issuers typically allocate only a small fraction of interchange fee revenue to subsidise improved product offerings or lower cardholder fees, retaining the substantial remainder as revenue (European Commission 2015). In contrast, acquirers often pass on the full interchange fee costs to merchants through the MSC (ibid.). This asymmetry in the pass-through rate of interchange fees reinforces the rationale for imposing high interchange fees as it ensures that neither issuers nor acquirers suffer from reduced profit margins, ultimately to the detriment of merchants who bear the brunt of these costs.
3. Since interchange fees constitute revenues for issuers, they are naturally inclined to favour participation in a card scheme that sets the highest possible level of interchange fees (European Commission 2015). Therefore, the competition among card schemes to persuade issuers to adopt their respective card brands, such as between Visa and Mastercard, leads to the imposition of higher interchange fee levels (Börestam and Schmiedel 2011). This not only perpetuates the aforementioned negative effects but also creates a substantial barrier to entry for other payment providers. That is, new entrants face the challenge of setting high interchange fees during their inception when no customer base has been established (ibid.). The upper bound of the interchange fee, where merchants perceive the costs as still acceptable, is consequently much lower for new providers compared to established card schemes, as merchants derive minimal

benefit from a small customer base. High interchange fee levels can thereby impede competition and innovation, fostering an environment where negative economic effects persist within the card payment market.

4. The setting of interchange fees at a minimum threshold serves as a constraining factor on the competitiveness among acquirers, who fully pass these costs on to merchants. This minimum threshold effectively establishes a minimum floor for fees charged to merchants, as operating below this fee level could result in financial losses for acquirers (European Commission 2015). As a result, acquirers find it challenging to negotiate lower MSCs with merchants, contributing to a situation where the floor set by interchange fees restricts competition among acquirers (ibid.). This constraint on fee negotiation creates an environment where acquirers, unable to operate below the established threshold, face increased challenges in providing competitive pricing to merchants, ultimately resulting in higher costs for merchants and consumers.

Introduction of Regulation: In response to the aforementioned concerns regarding the economic consequences of high interchange fees and anticompetitive practices in the payments market, the European Parliament introduced the IFR in 2015. The IFR's main objective is to foster competition and innovation in the EU card payment market by harmonising laws and addressing perverse business practices in four-party schemes (European Commission 2020). It caps high interchange fees for consumer debit and credit cards in the EEA at 0.2% and 0.3% respectively, as well as introduces business rules to eliminate barriers to the Internal Market, such as restrictions on cross-border acquiring and limitations on consumer/merchant choice of payment brands (ibid.). The IFR complements the PSD2 initiative by facilitating the entry of pan-European card schemes and preventing merchants from imposing surcharges on certain payment instruments.

Conclusion: The EU card payments market is intricately structured, with four-party schemes playing a central role. The economics of fee setting have historically faced challenges, leading to the intervention of the IFR. As we delve deeper into its impact in the following chapters, the need for a regulatory framework to ensure fair competition and consumer benefits becomes evident. The question remains whether the IFR intervention successfully curbed anticompetitive behaviour and effectively addressed the distorted economics of fee setting in four-party card schemes.

4.2. Assessment of IFR's Implementation and Scope

As mentioned in the preceding section, the European Parliament's IFR was introduced to address anticompetitive practices in the EU card payments market. This section provides an extensive analysis of the IFR's implementation and its impact on various stakeholders, focusing on key elements that significantly impact C2B payments. These elements fall into three distinct categories:

1. **Positive Factors:** examining aspects such as the market overview, cardholder fees, and potential circumvention of the IFR, we assess the positive outcomes attributed to the regulation.
2. **Contested Factors:** delving into scheme fees, price transparency, interchange fee levels, and unregulated fees, we explore areas where differing viewpoints and concerns arise among stakeholders.
3. **Long-term Factors:** considering the separation of scheme and processing functions, as well as cross-border acquiring, we evaluate aspects that may require additional time for their full impact to materialise.

Throughout this section, particularly in the 'Contested Factors' category, we will consider varying perspectives and concerns raised by different stakeholders. A study on the IFR's

implementation and scope, conducted by EY on behalf of the Commission, highlighted significant positive outcomes (European Commission 2020). The study, while encountering challenges in certain aspects of assessment, concluded that no major issues were identified during the review period (ibid.). However, it is important to acknowledge concerns raised by stakeholders such as EuroCommerce, the principal organisation representing retailers in the EU, and CMSPI, a leading payments consultancy. EuroCommerce (2020) expressed several concerns about the effectiveness and potential circumvention of the IFR during its review, a viewpoint echoed by CMSPI (2020). It is crucial to critically analyse these differing perspectives to gain insights into the regulatory landscape of the EU card payments market.

Limitations: Before delving into EY's study on the IFR, it is important to acknowledge potential limitations in the surveying methodology it employed. Surveys can be challenging to administer and interpret, as evidenced by the low overall response rate of approximately 11% and the underrepresentation of smaller merchants in the sample (EY 2020). Moreover, the study's short review period (2015-2017) could have affected its ability to accurately assess the impact of the IFR, potentially introducing biases in the study's findings. These factors could raise concerns about the reliability of the data presented in the EY study. On the other hand, throughout the Commission's review of the EY study on the IFR, it references and challenges the evidence provided by EuroCommerce (and CMSPI), labelling it as anecdotal rather than being based on scientific and empirical methods (European Commission 2020). By relying on personal accounts or isolated circumstances, anecdotal evidence suggests a lower level of robustness compared to other research methods, despite potentially providing valuable insights (ibid.).

4.2.1. Positive Factors

Market Overview: The implementation of the IFR has undoubtedly generated positive outcomes, prominently reflected in the reduction of merchant costs and a significant surge in the total volume and value of card payments within the EU market (European Commission 2020). This positive trend underscores the increased willingness of merchants to accept card payments, a shift at least partially attributed to the lowered interchange fees mandated by the IFR (ibid.). While major players like Visa and Mastercard continue to dominate the market, the impact of reduced interchange fees is evident in the stabilisation of market shares for smaller domestic schemes, such as Bancontact and GiroCard (EY 2020). Historically, high interchange fees, serving as a revenue source for issuers, posed a barrier for smaller schemes, leading to their struggle to compete and ultimately exit from the market.

Moreover, the acquiring segment of the market has experienced increased competition (EY 2020). Concentration levels among acquirers have risen, potentially resulting in long-term savings for merchants due to increased competition exerting downward pressure on MSCs. In addition, the Commission (2020) recognises that the entrance of APMs is affecting the competition dynamics within the card payments market. Despite such payment methods primarily relying on card rails to execute transactions, some of these firms (such as Apple and Google) could leverage their large existing customer bases and financial resources to become large players in the payments market and introduce new competitive pressures.

Cardholder Fees: One of the concerns associated with the IFR revolves around its impact on issuer revenue sources. Prior to the IFR, uncapped interchange fees were particularly high, averaging 0.65% per transaction for consumer payment cards across the EU (CMSPI 2020). The subsequent reduction to 0.2% and 0.3% for debit and credit cards, respectively, represents a substantial decrease that could significantly impact issuers' revenues (European Commission 2020). In response to these reductions, issuers might have explored alternative strategies to

offset these losses, such as increasing cardholder fees or reducing loyalty programs, which would harm consumers in the EU card payments market. Despite these concerns, the EY study has not found a causal link between reductions in interchange fees and a systematic increase in cardholder fees (EY 2020). Moreover, there has been no reduction in the number of cards issued or a slowdown in innovation in card payments (ibid). This lack of correlation suggests various possibilities: the new interchange fee levels might still constitute a considerable source of revenue for issuers despite the reduction, or it could indicate that issuers are receiving other forms of rebates and financial incentives to offset the losses induced by the IFR, potentially suggesting a circumvention of the IFR.

IFR Circumvention: That being said, investigating the circumvention of IFR caps through rewards or benefits with equivalent effect as interchange fees presents complex challenges. As previously noted, the underlying motive behind such circumvention is to create additional revenue streams for issuers, aiming to offset the loss in interchange fee revenue. This becomes particularly crucial from the card scheme's perspective, as a decline in revenue might disincentivise issuers to actively promote card adoption among consumers. Such a shift in dynamics would impede network effects within the scheme, influencing the overall uptake and utilisation of the card. Member states are responsible for enforcing non-circumvention and are allowed to request extensive information from card scheme participants for their investigations (European Commission 2020). However, not every member state possesses the human and financial resources required to thoroughly assess each revenue flow to issuers within its distinct commercial and contractual context, to determine whether it constitutes remuneration with equivalent effects as interchange fees. Notably, despite these inherent complexities, the Commission did not receive any reports of circumvention during its review (ibid.). While this absence of evidence provides a positive indication, it underscores the challenges associated

with investigating IFR circumvention, necessitating continued data gathering and consistent enforcement of existing rules.

Conclusion: The Positive Factors section reveals encouraging trends in the EU card payments market under the IFR. Reductions in merchant costs, increased card acceptance, and market diversification signify positive impacts. Moreover, despite initial concerns about cardholder fees, evidence suggests adaptability within the industry. The absence of reported circumvention is a further positive sign. However, ongoing vigilance and rule enforcement are essential to navigate potential challenges in the evolving landscape. With these positive developments in mind, the subsequent section will delve into Contested Factors, exploring diverse viewpoints and concerns within the EU card payments market.

4.2.2. Contested Factors

Scheme Fees: EuroCommerce (2020) expresses concerns that the increases in unregulated scheme fees, particularly on the acquiring side, could erode the intended benefits of the IFR. These concerns stem from the fact that acquirer scheme fees, when increased substantially, form a substantial portion of the MSC, which is the cost borne by merchants for accepting card payments. Such increases could pose significant issues, as any expected reduction in the MSC resulting from capped interchange fees could be nullified by a similarly sized increase in acquirer scheme fees. This scenario would effectively push the MSC back to pre-IFR levels, undermining the efforts to create a more competitive and cost-effective environment for merchants and consumers (CMSPI 2020).

Moreover, this increase in costs on the acquiring side can be strategically used to reinstate optimal network effects in the two-sided card payments market. Unlike interchange fees, which were a source of revenue for issuers, scheme fees directly contribute to card scheme operators’

revenues. These fees may be leveraged to subsidise incentives and rebates for issuers, effectively offsetting the loss in interchange fee revenue and recalibrating the optimal network effects (EuroCommerce 2020). This perspective challenges the Commission's assertion of no observed IFR circumvention in the market and suggests a potential alteration in the pricing mechanism used in four-party card schemes. While not identified by the Commission, this shift would align with commercial motivations for card schemes to use such pricing mechanisms to maximise their profits within the regulatory framework.

Despite the Commission's assertion that increases in acquiring scheme fees have been marginal, contrasting observations suggest otherwise (European Commission 2020). Estimates indicate substantial increases, primarily occurring outside of the EY review period, with CMSPI suggesting combined fee increases of approximately €1.46bn, potentially erasing almost half of the savings generated by the IFR (CMSPI 2020). The Commission, however, maintains that there is no statistically significant relationship between interchange fee reductions and acquirer scheme fee increases (EY 2020). Additionally, despite acquirer scheme fee increases, the Commission argues that the IFR generates savings for consumers ranging from €864mn to €1.93bn per year (ibid.).

Interchange Fee Levels: EuroCommerce (2020) also believes that capped interchange fee levels, based on the Merchant Indifference Test (MIT), remain too high. The MIT aims to set interchange fees at a level that makes it equally expensive for merchants to accept card payments and non-card payments. To determine this level, the MIT compares the marginal cost to accept cash with the marginal cost to accept payment cards and lowers the interchange fee component of the latter until both costs are equal (European Commission 2015). However, applying the MIT to updated card acceptance costs shows that the interchange fee level is still too high compared to the cost of accepting cash, particularly for credit cards (EuroCommerce

2020). This discrepancy may widen further due to increases in other payment card costs, such as acquirer margins and acquirer scheme fees. Under such a view, EuroCommerce (2020) contends that the IFR falls short in effectively achieving a balanced cost comparison between accepting card payments and non-card payments as intended by the MIT.

Commercial and Three-party cards: An additional concern arising from the IFR is the exclusion of commercial cards and three-party card schemes from its scope. These were excluded due to their relatively low transaction volumes and the banning of several scheme rules that previously forced merchants to accept such cards (European Commission 2020). However, this could allow issuers to levy excessively high interchange fees on such cards, generating revenues to offset losses incurred by the capped consumer cards. In such a case, increases in both transaction volume and value could potentially erode more of the savings generated by the IFR.

Commercial cards are specifically issued to companies for various business-related transactions and commercial use. Their volume has increased substantially following the IFR's introduction, with the number of transactions increasing by over 12% during EY's review period of 2015-2017 (EY 2020). While the Commission notes that interchange fee levels remain relatively unchanged (around 1.6%), the concern lies with the aggregate cost increases (ibid). Given the higher acceptance costs of unregulated commercial cards, the increased volume and value of such transactions will inevitably partially erode the IFR-generated savings. CMSPI (2020) estimates that capping commercial cards at rates similar to consumer cards can generate €3.46bn in annual savings for European merchants. Nonetheless, the Commission contends that no systematic substitution was found between consumer cards and commercial cards, whose limited market share remained relatively stable (EY 2020).

Similarly, unregulated three-party scheme cards have reportedly seen an increase in volume (EuroCommerce 2020). Contrary to four-party schemes, the same entity performs the operating, issuing, and acquiring functions in three-party schemes, creating a non-competitive that allows operators to set high interchange fees (around 1.3%) without any constraints (**Figure C 1**). EuroCommerce (2020) believe that three-party schemes should be mandated to outsource the acquiring functions to independent entities. This, much like four-party schemes, would allow merchants to choose from a variety of acquirers, inducing competition and putting pressure on the acquirer margin portion of the MSC. Such intervention would seem ever relevant amid the increases in the volume of three-party scheme card transactions.

Price Transparency: The Commission's examination of the IFR reveals a dual impact on the card-acquiring market. On one front, merchants experience enhanced price transparency concerning the MSC composition. The IFR mandates acquirers to provide unblended fee structures and transparent information, empowering merchants with specific details on fees related to card brands and types (European Commission 2020). This increased transparency not only strengthens merchants' bargaining power but also fosters heightened competition among acquirers. Merchants opting for the unblended fee structure have seen more cost-efficient MSCs, according to the Commission's findings (ibid.). However, the benefits are more pronounced for larger merchants, as smaller ones often lack the resources and knowledge to navigate complex fee structures, resorting to relatively more expensive blended fee structures (EY 2020). On the other end, despite the overall savings of approximately €2.7bn for acquirers generated by the IFR, concerns arise regarding the distribution of these benefits (EY 2020). Only €1.2bn of this sum has been passed on to merchants in the form of reduced MSCs, indicating that acquirers retain around 50% of the IFR-induced savings within the acquiring market (ibid.). This is reflected in increased acquirer scheme fees and net acquirer margins,

resulting in MSCs that are higher than pre-IFR levels, according to CMSPI (2020). The uneven distribution of IFR-induced savings underscores the need for continued monitoring and data collection, especially in understanding the impact on smaller merchants who may face challenges navigating the complexities of fee structures.

Conclusion: The Contested Factors surrounding the IFR reveal a complex landscape with concerns spanning scheme fees, interchange fee levels, and card type exclusions. While some positive outcomes are evident, such as enhanced price transparency benefiting larger merchants, the uneven distribution of IFR-induced savings and potential IFR circumvention emphasises the need for ongoing monitoring and regulatory scrutiny. As we transition to Long-Term Factors, it is essential to acknowledge the evolving dynamics that necessitate time for a comprehensive assessment.

4.2.3. Long-Term Factors

In certain aspects, the IFR needs more time to produce its full impact, primarily due to constraints that limit uptake. Of these aspects, the separation of scheme and processing functions, and cross-border acquiring are likely to have the greatest potential to generate benefits once the IFR produces its full effect (European Commission 2020).

First, the ongoing implementation of the Regulatory Technical Standards (RTS) supporting the IFR aims to enhance competition among processors by decoupling card schemes from payment processing functions (European Commission 2020). This results in card schemes no longer being able to promote their preferred processing entities through mandatory scheme rules or bundled services, which is particularly relevant in domestic schemes with a single processing entity (ibid.). However, limited uptake in independent processors and low switching rates

Group Part

currently impede the realisation of these associated benefits, requiring further data collection over extended periods to assess compliance and identify potential barriers. (ibid.).

Second, despite the increase in cross-border acquiring facilitated by the IFR, its overall uptake remains relatively limited (European Commission 2020). Previously blocked by card scheme rules, the IFR now enables acquirers to contract with merchants whose POS originates from a different member state (ibid.). This enables merchants to contract with any acquirer across the EU, intensifying competition among acquirers and creating downward pressure on the MSC. This could streamline payments for merchants operating cross-border by eliminating processes like reconciling payment settlements. Despite increased concentration and the emergence of pan-EU acquirers in the acquiring market, uptake is relatively low and limited to larger merchants (ibid.). This is likely due to smaller merchants' lack of bargaining power and low demand for cross-border acquiring services in domestic markets. Moreover, contract agreements may ban renegotiations in the shorter term, further contributing to the exclusion of smaller merchant, suggesting the need for an extended period for market adaptation.

With these factors in mind, it becomes evident that the true impact of these measures will unfold over time, requiring ongoing observation and assessment.

Conclusion: This thorough examination of the IFR dissects its impact on the EU card payments market, categorising the analysis into Positive, Contested, and Long-Term Factors. Positive impacts include reduced merchant costs, increased card payment volume, stable cardholder fees, and no evidence of circumvention. Contested factors, such as scheme fees and price transparency, highlight complexities, necessitating ongoing scrutiny. Long-term considerations like the separation of scheme and processing functions need time for their full impact, with challenges related to limited uptake requiring attention. Balancing positive shifts, contested issues, and long-term considerations, ongoing vigilance and rule enforcement are crucial in this

ever-evolving regulatory landscape. The next section will assess whether the intended objectives of the IFR, particularly regarding competition and innovation, are sustained in today's post-IFR card payments market.

4.3. Challenges for Competition and Innovation in the Current Payments Market

To assess the post-IFR card payments market concerning competition, price transparency, and the must-take status of Visa and Mastercard, this section relies on insights from the 2023 Payment Systems Regulator (PSR) studies on scheme and processing fees. It is important to note that this review is limited to the UK, and findings are derived from working papers. Therefore, caution is advised in concluding preliminary findings, considering limitations in regulatory data and the lack of direct comparison.

4.3.1. Mastercard and Visa Dominance Hindering Competition

From the perspective of card schemes, the current payments market is dynamic and competitive, driven by a multitude of options across the value chain. They emphasise the importance of their role in coordinating payment activities and managing relationships for fostering efficient payments (PSR 2023b). Therefore, they believe that high scheme fee structures reflect the value their services provide (ibid.). However, despite the competitive landscape, the persisting dominance of major players, particularly Mastercard and Visa, could stifle innovation and competition. Market entry strategies adopted by competitors suggest that direct competition with Mastercard and Visa is not always preferred.

Most APMs predominantly target the front-end consumer segment, relying on back-end card schemes to facilitate transactions. These methods, often led by technology giants like Apple and Google, actually reinforce the market position of Mastercard and Visa by substantially increasing the number of transactions made with their respective card brands. On the other

Group Part

hand, FinTech entrants typically aim to disrupt the back-end infrastructures, for example, by creating A2A instant payment solutions that operate on alternative payment rails. However, these APMs have not substantially disrupted card payments, as they have struggled to gain widespread traction across the EU (FIS 2023).

Nonetheless, Visa and Mastercard contend that their pricing structures and commercial strategies are constrained by competitive pressures (PSR 2023b). They argue that the availability of alternatives, both existing systems and potential new entrants, plays a significant role in determining (excessive) pricing for scheme and processing fees (PSR 2023c). However, this assertion could be met with scepticism considering the continued dominance and influence exerted by these major players.

4.3.2. Transparency of Fees Hindering Competition

Another major continued impediment to competition in the EU card payments market stems from complex and non-transparent scheme and processing fees, despite the implementation of the IFR (PSR 2023a). Such lack of clarity hinders participants in the card scheme value chain from comparing prices, anticipating costs, and making informed decisions (ibid.).

The complexity of card scheme fees has several adverse effects on market competition (PSR 2023a). Non-transparent incentive and rebate programs can distort competition among payment providers. This makes it challenging for competitors to offer comparable payments to issuers, as they strive to convince issuers to promote their respective payment methods (PSR 2023d). Moreover, inaccurate fee structures can result in higher costs for merchants (PSR 2023a). When acquirers cannot anticipate costs, they often set excessively high margins to avoid potential losses. Such fee structures are typically embedded in the MSCs that merchants pay to acquirers, making it challenging for merchants to negotiate lower fees (PSR 2023d). Additionally, the lack of transparency in scheme fees also create obstacles for new entrants, particularly other card

Group Part

schemes or A2A systems, attempting to compete against established card schemes (PSR 2023d). Without access to detailed information about fees, new entrants find it difficult to develop competitive and well-priced products and services. This difficulty may impede their uptake among merchants and consumers, as the inability to price their offerings effectively could limit adoption.

4.3.3. Must-Take Status of Mastercard and Visa

The must-take status of Mastercard and Visa has remained largely unchanged despite the implementation of the IFR. This persistent dominance is driven by both commercial and regulatory factors, as merchants are often compelled to accept these card brands, and acquirers must offer both networks to remain competitive. The lack of substitutability has empowered Mastercard and Visa to impose high fees, largely unconstrained by competition from APMs or regulatory interventions (PSR 2023a).

While the IFR introduced some optionality along the card scheme value chain, such as the separation of scheme and processing functions, Mastercard and Visa have effectively leveraged their must-take status to extract profits in other areas (PSR 2023d). For example, they maintain control over essential services such as transaction processing, security and fraud prevention, and authentication services, which remain unavoidable costs for issuers and acquirers (ibid.). Card schemes often frame these services as necessary for the maintenance and development of the payments market (PSR 2023b). However, the ability to impose high fees on these services suggests that competitive constraints are relatively weak. Moreover, card schemes can indirectly increase fees by changing participation requirements or levying penalties for non-compliance, further solidifying their dominant position (PSR 2023d).

This dominant position and profit extraction capability are evident in the robust financial performances of major card schemes. In 2022, Visa and Mastercard reported net revenues of

Group Part

€29.3mn and €22.2mn, respectively, contributing to net profits of 44.6% for Visa and 54.7% for Mastercard, effectively showcasing their relatively strong performance (Visa 2023, Mastercard 2023). This reinforcing nature of Mastercard and Visa's must-take status poses a challenge to the development of innovation and competition, as new entrants may struggle to gain traction in a market where incumbents enjoy such a strong competitive advantage.

Conclusion: In summary, this chapter analyses the contemporary card payment market, drawing insights from the 2023 PSR studies on scheme and processing fees. Focused on post-IFR innovation and competition, it highlights the enduring dominance of Mastercard and Visa, challenges faced by APMs, and the impact of non-transparent fees. The must-take status of major players persists, impeding the development of alternatives. As we navigate these challenges, the need for regulators to explore approaches to address the over-reliance on card payments becomes evident, as it impedes innovation, competition and efficiency in the EU C2B payments market.

Chapter 5. Economic Costs of the European C2B Market

In the preceding chapters, our exploration centred on regulatory measures aimed at enhancing efficiency, promoting innovation, and fostering competition within the dynamic European payments market. This chapter marks a shift, broadening our perspective to evaluate economic costs of the current C2B market at a societal level, we aim to explore implications beyond individual stakeholders and assess collective economic effects within the broader societal framework.

This chapter critically examines the costs of retail payments relative to GDP across five distinct European countries – Denmark, Hungary, Italy, Portugal, and Poland. These countries were chosen because available data allows for investigation of the impact of changing payment

Group Part

habits, increasing digitalisation and regulatory changes on the efficiency of retail payment markets – as explained in Chapters 2, 3 and 4. The focal points include an in-depth examination of the trends influencing shifts in social costs, coupled with an exploration of how these costs are distributed across the payment value chain for both stakeholders and payment instruments. This can provide important insights for key economic entities' decisions, allowing central banks to incentivise the preference for cost-efficient and secure retail payment markets.

Building on this examination, the chapter will delineate the benchmark case for a cost-efficient payment infrastructure within the EU, shedding light on the obstacles preventing other countries from attaining comparable levels of cost savings. Additionally, our exploration will extend beyond the EU borders, considering benchmark cases from other jurisdictions.

Methodology: In navigating the myriad of studies on retail payment costs in the EU, this chapter adopts a strategic approach to ensure a focused and comparable analysis. Given the considerable variations in scope, payment instruments, methodologies, and stakeholders across existing studies, our analysis is confined to studies that share key commonalities. This selective criterion facilitates a meaningful evaluation of retail payment costs across Europe, particularly focusing on social cost development in C2B transactions.

This methodological approach is guided by several specific restrictions, each contributing to the precision and relevance of our study. Firstly, each selected study is required to provide data from two different time points, allowing for an analysis of trends in the figures and capturing dynamic developments over time. Moreover, our examination centres on key payment instruments integral to C2B transactions (as outlined in Chapter 2), specifically cash, debit/credit cards, credit transfers, and direct debits. While Chapter 2 focuses primarily on non-recurring POS methods, our analysis in this chapter extends this scope to include all methods

Group Part

used in the C2B context, encompassing credit transfers and direct debits typically used for recurring payments.

In addition to the selected payment instruments, the studies also need to have collected data on the main relevant stakeholders in the C2B segment, namely banks, retailers, and consumers. It should be noted that Italian national study under consideration excludes consumers, and in the case of Portugal, consumers are only factored in more recent studies. The imposition of strict requirement to include consumers strictly would significantly limit the scope to merely three national studies, which is why these studies were further considered to maintain a broad perspective.

Furthermore, each study is mandated to consider, at a minimum, data on social costs (as defined in the next section), enhancing the wider understanding of retail payment methods on societal level. The broadened focus ensures that our analysis considers the multifaceted dynamics of the retail payment landscape.

Consequently, our analysis is exclusively directed towards five countries: Denmark, Hungary, Italy, Portugal, and Poland. This deliberate selection of the scope aims to uphold methodological consistency, ensuring relevance, and establishing a robust foundation for a comprehensive understanding of retail payment costs within the specified parameters. It is important to note that the information relies on national reports from these countries. An overview of the detailed methodology of each national study is available in **Table C 1**, providing additional and specific context to our selection criteria.

As highlighted in Chapter 2, the significance of these methodological restrictions becomes evident, especially considering retrieving information and underlying data from diverging national reports. This further indicates the importance of a nuanced and specific approach in achieving the defined goals of this chapter.

Group Part

Limitations: While our selective scope offers a focused lens for analysis, it is essential to acknowledge certain limitations inherent in our approach. The deliberate restriction of our analysis to specific countries, stakeholders, payment instruments, and types of costs may limit the generalisability of findings to the broader EU context.

Beyond these considerations, additional limitations also arise within the individual studies selected for our analysis. Diverging methodologies within the national studies, complicate cross-country comparisons and render them difficult and inconclusive (Junius et al. 2022). In cases where such analyses are made, careful interpretation of the insights is warranted. Given the constraints posed by the varying methodologies, our analysis is predominantly restricted to in-country comparisons. This approach allows for meaningful insights while acknowledging the inherent complexities associated with cross-country comparisons.

Secondly, the inability to distinguish between different types of payment relationships, i.e., B2B or C2C, may be seen as a constraint, given the exclusive focus of our report on C2B transactions. However, the inclusion of diverse payment relationships does not deter the main objective of the report as we capture the overarching trends that broadly apply to C2B payment relationships.

The different time points of the studies introduce additional complexities. For instance, the Italy study collects data from 2009-2016, while the Hungary study extends its review period further, from 2009-2019. This discrepancy introduces the potential of more recent studies incorporating later developments impacting significantly upon social costs, as consumer habits and digitalisation can change substantially even over short periods of time (Junius et al. 2022).

Recognising these limitations is crucial for interpreting the findings accurately and understanding the contextual boundaries of the analysis. Looking ahead, future research may explore a broader scope, incorporating a wider array of countries and common methodologies, to provide a more comprehensive overview of retail payment costs in the EU.

5.1. Cost Concepts

Private and Social Costs: In an effort to accurately capture the retail payment costs relative to GDP, the five studies we analyse employ a methodology categorising costs into private and social domains. Private costs denote the expenditures incurred by individual stakeholders, including both the resources utilised by the participant itself (internal costs) and the payments made to other participants for services rendered along the payment chain (external costs). Examples of the former include wages, equipment costs, IT costs and fraud-related costs for both banks and retailers, or in the case of consumers, the time required to conclude payment processes and cash withdrawals. On the other hand, external costs involve payments made to other stakeholders along the payment value chain for services, such as scheme and interchange fees. A visualisation of these concepts in the three-party model can be found in **Figure C 1**.

In contrast, social costs provide a holistic perspective by considering all resources utilised by parties engaged in the payment process. These costs aggregate the internal private costs of individual stakeholders participating in a payment but exclude the external private costs. This exclusion is necessary as, in some instances, costs incurred by one party may translate into revenue for another. To prevent overestimating the aggregate social cost figure, reciprocal costs of this nature are deliberately excluded. Since the aim of the chapter is to present a comprehensive view of the societal impact of payment transactions generated by the C2B market segment, the analysis intentionally only focuses on social costs.

As we navigate through the upcoming analysis, it becomes evident that social costs serve as an effective tool for understanding the evolving dynamics of retail payment markets. Expressing these costs relative to GDP allows us to discern their broader economic implications and capture ongoing shifts. Through this lens, we can illustrate the transformative impact of changes, whether generated by technological advancements or regulatory measures, and assess their influence on the efficiency of retail payment markets.

Fixed and Variable Costs: Costs within the payment landscape can be further classified into fixed and variable costs, each exhibiting distinct characteristics. Fixed costs remain constant regardless of the frequency of utilising a specific payment instrument, while variable costs fluctuate in tandem with the number or value of payments processed. The distinction between fixed and variable costs serves a dual purpose: firstly, economic entities consider the implications and distribution of these costs when deciding which payment instrument to promote (Ilyés and Varga 2016). Secondly, it aids our understanding of how changing preferences in payment methods influence the level and distribution of these costs, subsequently impacting social costs (ibid.). This distinction allows for assumptions to be made regarding changes in social costs amid shifts in payment behaviour (ibid.).

More specifically, the frequency of using a payment instrument directly influences the potential return on the fixed investment (Junius et al. 2022). For instance, instruments like debit and credit cards often incur substantial fixed costs due to resource-intensive investments in infrastructure, such as IT systems and card terminals (ibid.). However, once the initial investment is made, additional costs associated with processing payments tend to be minimal (ibid.). Conversely, cash transactions typically exhibit a higher proportion of variable costs, stemming from labour-intensive manual handling and raw material expenses for printing, albeit requiring smaller infrastructure investments (ibid.). These distinct differences in fixed and variable costs among payment instruments and the related number of transactions will affect social costs differently (ibid.).

Moreover, the distinct differences in fixed and variable costs among payment instruments play a crucial role in influencing unit costs. Payment methods with higher fixed costs experience more substantial reductions in unit costs with increased usage, compared to those with a higher proportion of variable costs (Ilyés and Varga 2016). Therefore, it can be assumed that a slight

substitution of cash by card payments results in a temporary increase in total social costs due to the initial investment required for card payments (ibid.). Subsequently, after the transition, actual savings can be realised, and these savings may increase exponentially with further substitution, leading to lower social costs for card payments compared to cash payments (ibid.). It is essential to recognise, in evaluating these variations, that the stage of an investment's lifecycle plays a crucial role in determining the extent to which economies of scale have manifested.

Conclusion: In summary, the dynamic interplay between fixed and variable costs underscores the economic implications of changing payment patterns, shedding light on the differential effects on unit costs associated with various payment instruments. Moreover, the consideration of social costs provides a holistic understanding of the broader societal impact, offering valuable insights into the economic consequences of evolving payment behaviours. Having analysed the different types of costs, the following section will analyse the differences observed in social costs across the selected countries.

5.2. Social Costs in Europe

The realm of social costs within European retail payment systems is currently undergoing a shift. This section provides a high-level analysis, offering insights into the overarching trends observed in selected European countries: Denmark, Italy, Hungary, Poland, and Portugal, unveiling a consistent trend of diminishing social costs shaped by macroeconomic changes.

Table 2: Overview on Social Cost Development

National Study	Stakeholder	Social costs / GDP	Stakeholder	Social costs/GDP
Denmark	Total (2009)	1.00%	Total (2016)	0.53%
	Banks	0.31%	Banks	0.18%
	Retailers	0.46%	Retailers	0.22%
	Households	0.23%	Households	0.13%
Hungary	Total (2009)	1.49%	Total (2019)	1.75%
	Banks	0.83%	Banks	0.63%
	Retailers	0.48%	Retailers	0.88%
	Households	0.18%	Households	0.24%
Italy	Total (2009)	0.90%	Total (2016)	0.80%
	Banks	0.44%	Banks	0.38%
	Retailers	0.46%	Retailers	0.42%
	Households	-	Households	-
Poland	Total (2015)	1.27%	Total (2018)	1.21%
	Banks	0.74%	Banks	0.68%
	Retailers	0.46%	Retailers	0.46%
	Households	0.07%	Households	0.07%
Portugal	Total (2007)	1.38%	Total (2017)	0.99%
	Banks	0.79%	Banks	0.41%
	Retailers	0.59%	Retailers	0.48%
	Households	-	Households	0.10%

In our examination of Denmark, Italy, Hungary, Poland, and Portugal, a discernible trend emerges. Denmark experienced the most notable decrease in social costs to GDP, dropping from 1.00% in 2009 to 0.53% in 2016, nearly halving during this timeframe (Danish Payments Council). Italy similarly witnessed a decline from 0.90% to 0.80% (Banca d'Italia 2020). Poland observed a decrease from 1.27% to 1.21% between 2015 and 2018, and Portugal's social costs declined from 1.38% to 0.99% between 2009 and 2017, as illustrated in **Table 2** (Przenajkowska et al. 2020) (Banco de Portugal 2019). Several factors contributed to these changes, including shifting consumer preferences towards more cost-effective digital payment methods, digitalisation, improved efficiency in cash handling, regulatory interventions, and technological advancements (Junius et al. 2022) – as discussed more detailed in the next section. Conversely, Hungary exhibited opposing results with an increasing social cost to GDP ratio from 1.49% to 1.75% between 2009 and 2019 (Deák et al. 2022). The rise in the cost ratio was predominantly influenced by heavy investments in the payment infrastructure, necessitated by regulatory mandates compelling merchants to offer digital payment alternatives (ibid.). Consequently, this has led to a requirement for merchants to invest in POS terminals (ibid.). Despite the increased social costs, Hungary is expected to continually experience rapid growth

in card transactions with already a fivefold increase over the last decade, eventually resulting in lower unit costs compared to cash through the realisation of scale effects (ibid.).

The upcoming section delves into a more detailed exploration of these high-level trends, assessing the distribution of social costs among key stakeholders – banks, retailers, and households. By examining specific reasons for changes and fluctuations for each stakeholder, we aim to illustrate the unique factors driving the evolution of social costs across the considered countries. This granular approach will provide a more detailed understanding of the dynamics influencing social costs in the European C2B payments market. An overview of the specific developments on stake-holder level can be found in **Figure C 2**.

5.2.1. Social Costs in Europe by Stakeholder

Banks, on average, have witnessed a 0.17% reduction over the considered period, resulting in an overall average of 0.46% in social costs for banks across the five national studies. This decline is attributed to their strategic emphasis on enhancing operational efficiency and adopting improved payment technologies, leading to more streamlined processes (Junius et al., 2022). Furthermore, the increasing usage of digital payments allows banks to digitalise internal processes while reducing the amount of resource-consuming processes related to cash payments (ibid.). Notably, Portugal stands out with a substantial decrease of 38 basis points in banks' social costs to an overall of 0.41% (Banco de Portugal, 2019). Such improved business processes are propelled by measures such as digitalising internal operations and improving coordination among financial entities contributing to the reduction in the social cost footprint of their banks (ibid.). Additionally, investments in outsourcing cash handling operations play a crucial role, favouring social costs in Denmark and Italy (Junius et al. 2022). These external service providers often leverage economies of scale and specialised expertise to process cash more efficiently, alleviating the overall social cost burden on banks (ibid.).

In summary, the distinct instances of adopting improved payment technologies, internal process streamlining, and reduced cash handling operations for banks across the analysed countries result in significantly lower social costs for them.

Retailers and Non-Financial Companies: Examining retailers and non-financial companies across the selected studies reveals an average social cost decrease by 10 basis points, resulting in an overall average social cost of 0.40% (excluding Hungary). This decline is attributed to the standardisation of payment processes and strategic investments in digital payment infrastructure coupled with increasing usage, leading to increasing realisations of scale-effects (Junius et al. 2022).

One key factor influencing the reduction in social costs for retailers is the shifting preference towards more efficient digital payment methods. The growing adoption of card payments and electronic transfers streamlines payment processes and reduces the need for manual cash handling (Junius et al. 2022). This shift is particularly noticeable in Denmark, thanks to its well-integrated and widely adopted card payment systems such as Dankort (Danish Payments Council 2018). These systems have harmonised payment processes, minimised transaction periods, reduced resources, and mitigated risks of errors associated with cash transactions (ibid.). Consequently, Denmark has seen the most significant reduction in social costs among retailers, with a reduction of more than half in their social costs, resulting in overall rate of 0.22% (ibid.). Furthermore, Italy's case illustrates additional benefits for retailers resulting from savings in payment management, particularly in direct debit costs initiated by SEPA (Banca d'Italia, 2020). The adoption of SEPA standards has harmonised and made direct debit transactions more efficient across European countries, reducing complexity and associated costs for retailers (as discussed in Chapter 3).

Conversely, Hungary stands out with a 40 basis point increase in overall costs, resulting in 0.88% social costs for retailers. This is primarily due to state interventions mandating the presence of online checkouts and POS terminals (Deák et al. 2022). Therefore, this substantial increase is associated with widespread investments in digital payment infrastructure (ibid.). However, as noted previously, these fixed costs are expected to result in lower social costs over time as scale effects manifest with rising numbers of digital transactions (ibid.). This indicates that Hungary is at a different phase in its investment timeline compared to other countries, already experiencing the advantages of increased technological adoption and the economies of scale that come with it (ibid.).

In summary, the reduction in social costs for retailers is influenced by the increasing usage of digital payments, which is facilitated by the widespread adaptation of retailers to such developments as well as standardisation of payment processes. These factors contribute to lowering social costs and enhancing the efficiency of payment-related operations for retailers across the analysed countries – a trend that can also be anticipated to emerge in Hungary.

Households have experienced a decline by 2 basis point across the national studies, leading to an overall average of 0.14%. This marginal decline is attributed to two regional trends: Denmark demonstrating a significant reduction with 10 basis points, contrasting with Hungary's increase of 6 basis points in social cost.

For Denmark, the time taken for both cash and card payments decreased to around 12 seconds on average in 2016, compared to an average of 14.6 seconds for cash and card payments in 2009 (Danish Payments Council 2018). This reduction in transaction time is indicative of the broader trend toward more efficient, faster, and convenient payment methods reducing social costs for households (ibid.). That being said, Hungary presents a unique case with a 6 basis points increase in social costs compared to 2009, attributed to a rise in wages and inflation

(Deák et al. 2022). The evolving situation in Hungary suggests that these factors are negating the effect of rising digital payments (ibid.). Thus, falling social costs for households could also be assumed in the absence of inflation and wage increases (ibid.).

Overall, the social cost footprint for households is largely influenced by factors such as the time and effort invested in concluding a payment transaction, which is expected to further decrease with ongoing digitalisation – ultimately decreasing social costs for households.

Distribution among Stakeholders: To gauge the distribution of these costs among the players, the relative share of social costs for each stakeholder is calculated compared to the total cost for each country. This generates the proportion of costs borne by each stakeholder per country. On average, banks and retailers carry the largest share of social costs, averaging 42% and 45%, respectively, owing to substantial operational expenses and technological adoption. In contrast, households bear a smaller share, averaging only about 13%. Competitive market dynamics and regulatory constraints, as discussed in Chapter 3, limit banks and retailers from passing on more social costs to households. Overall, a downward trend is evident for all parties, driven by increasing adoption and usage of digital payments (Junius et al., 2022).

5.2.2. Social Costs per Unit

Table 3: Social Unit Costs

National Study (Data Collection)	Instruments (unit costs)				
	Cash	Debit card	Credit card	Credit transfer	Direct debits
Denmark (2009)	1.08	0.53	3.13	5.24	1.97
Denmark (2016) ¹	0.60	0.34	1.90	2.77 ³	0.55 ⁴
Hungary (2009)	0.23	0.62	-	0.83	0.31
Hungary (2019)	0.32	0.72	-	1.11	0.51
Italy (2009)	0.33	0.74	1.91	2.27	0.94
Italy (2016)	0.35	0.59	1.10	1.63	0.49
Poland (2015)	0.33	0.43	0.54	0.17	0.64
Poland (2018)	0.32	0.33	0.49	0.19	1.12
Portugal (2007)	0.42	0.47	2.12	0.68	0.35
Portugal (2017)	0.34	0.38	1.88	0.39	0.27

Building on the overview of social costs and their distribution among key stakeholders, this section delves into a detailed analysis of individual payment instruments and their associated social costs. Within the context of fixed and variable costs, we explore how payment habits closely connect with the expenses linked to specific payment methods. This connection is evident in the frequency of transactions, directly influencing the unit costs of each payment method. The unit cost is derived by dividing total costs by the number of transactions, providing a metric that reflects the average social cost per transaction for each payment instrument. An overview on the dynamics within social unit costs is illustrated in **Table 3**.

Cash: The unit costs for cash transactions exhibit distinct dynamics, influenced by a combination of economic factors, strategic measures adopted by stakeholders, and the prevailing payment habits within a specific country, all of which contribute to scale effects.

Traditionally considered the most cost-efficient method, cash experienced only a slight average decrease of 5% across countries where it remains predominant, such as Italy, Poland, and Portugal (Junius et al. 2022). In these countries, cash transactions usually have lower unit costs compared to countries where electronic payment methods are more widely used (ibid.). This is because the number of payment transactions influences the average unit costs of different payment methods, as evident in the fact that the average unit cost for cash in these countries is

around €0.34, whereas in Denmark, it averages at €0.60 (ibid.). Denmark contrasts the traditional paradigm, presenting an intriguing case where cash has long been surpassed by card payments (Danish Payments Council 2018). Despite the further decrease in cash usage, Denmark has seen a remarkable reduction in unit costs by around 44% compared to 2009 due to proactive measures aimed at enhancing cash handling (ibid.). Danish retailers and banks strategically outsourced cash handling to CIT companies in recent years, leveraging the specialised expertise of these companies to manage cash more efficiently and cost-effectively (ibid.). Therefore, as the general decline in the use of cash would conventionally lead to an increase in unit costs, the successful implementation of outsourcing and other efficiency measures helped offset the potential rise in unit costs associated with reduced cash usage (ibid). This highlights the pivotal role of strategic measures in mitigating the impact of changing payment habits on social costs.

In Hungary, despite cash being the most widely used payment method, unit costs increased by 41% to €0.32 which is primarily due to the impact of inflation, wage increases and decrease in cash usage (Deák et al. 2022). These factors contribute to a notable increase in the social costs for both financial institutions and retailers, impacting both fixed and variable costs associated with cash usage.

In essence, Denmark proves to be a pioneer among the countries analysed, having successfully reduced its unit costs despite experiencing a decline in cash usage. This could serve as a signal to other countries for implementing similar measures to achieve similar reductions in unit costs.

Debit Cards exhibit varying trends in unit costs across different countries, with each country shaped by distinct factors influencing the cost efficiency of this payment method. Overall, the increasing usage of debit cards substantially contributes to the reduction of unit costs, as these transactions increasingly benefit from scale effects, thereby closing the gap in unit costs to cash.

In Denmark, the decline in unit costs by 36% to €0.34 for debit cards is due to the vastly increasing economies of scale realised by Dankort (since 2009) as well as enhanced process streamlining of banks and retailers through outsourcing and centralisation (Danish Payments Council 2018) – as mentioned in the stakeholder chapter. Dankort had already registered over 3mn users by 1999, underscoring its early adoption and the prolonged time horizon benefiting from scale effects (ibid.). This is consistent with findings from Schmiedel et al. (2012) highlighting a correlation between a higher frequency of debit card uses combined with a lower volume of cash transactions per capita and lower social unit costs.

On the other hand, cash payments in Italy, Poland, and Portugal have historically enjoyed lower unit costs than debit cards. However, a notable shift has occurred over time as the unit costs of debit card transactions decreased to a stronger extent than those for cash (Junius et al. 2022). A reduction of around 21% for these countries has been observed over the considered time span, resulting in an average social unit cost of €0.43 for debit cards. This reduction is closely tied to the increasing prevalence of digital payments, impacting both fixed costs (e.g., infrastructure maintenance) and variable costs (e.g., transaction processing fees) associated with debit card usage (Banco de Portugal, 2019). The shift reflects a broader societal movement toward digital transactions, contributing to a convergence of the cost difference between cash and debit card payments (Junius et al., 2022).

In Hungary, the observed increase of 16% to €0.72 per debit card transaction is primarily attributable to the high fixed costs incurred by retailers as they expanded the necessary infrastructure for debit cards (Deak et al. 2022). These fixed costs temporarily impact unit costs. However, the anticipation of scale effects suggests a potential future scenario where increasing transaction volumes could lead to a decrease in unit costs for debit card payments (Deák et al. 2022). The scale effects become a crucial determinant in Hungary's trajectory, illustrating the expectation of enhanced cost efficiency with the growth of digital payment adoption (ibid.).

In summary, Denmark's early adoption of Dankort has generated low unit costs for debit cards. Other countries are now starting to follow this trend, significantly narrowing the gap between debit card and cash unit costs as they debit cards are increasingly adopted.

Credit Cards are commonly known for incurring some of the highest unit costs. However, there have been downward-trending shifts influenced by increased payment volume and the IFR.

Credit cards typically entail high unit costs due to the substantial fixed costs borne by banks in assessing customer creditworthiness (Junius et al. 2022) – €1.34 on average for the considered countries. These fixed costs include expenses related to credit checks, fraud prevention measures, and maintaining the necessary infrastructure of secure credit card transactions (ibid.). Such complex processes of evaluating and managing credit risk significantly contributes to the overall high unit costs. However, the overall increase in payment volume, as well as the externalities generated by the IFR (i.e., increased competition and innovation across the payment value chain), lead to an average decline of 26% in unit costs associated with credit cards (ibid.). As previously explained, the rise in transaction volumes spreads the fixed costs across a larger base, leading to a more efficient utilisation of resources across Denmark, Italy, Portugal, and Poland. That being said, Hungary's study excludes credit cards and can therefore not be analysed.

This increase in payment volume reflects a growing preference for credit card payments, emphasising the need for financial institutions to balance the societal benefits of digital transactions against the associated social unit costs.

Credit Transfers: The unit costs for credit transfers have seen significant changes across Europe, influenced by various strategic and regulatory developments. This situation particularly highlights the potential of targeted strategic initiatives to yield societal benefits.

In countries like Denmark, Italy, and Portugal, a notable decrease of 39% in unit costs to an average of €1.60 is observed. This is closely linked to the adoption of faster and more streamlined payment systems, with SEPA playing a pivotal role (as mentioned in Chapter 3). SEPA has significantly simplified cross-border transactions between Member states, reducing processing times, minimising errors, and enhancing overall efficiency (ECB 2019). This is amplified further by the ECB's aim to introduce instant A2A transactions across the EU, which would substantially lower the unit costs of credit transfers. However, unit costs for Hungary have increased by 33% to €0.28, primarily due to the decreasing usage of credit transfers amid a shift towards debit card payments (Deák et al. 2022). Notably, Poland's unique landscape positions credit transfers as its most cost-effective payment instrument, driven by strategic efforts of Polish banks in the 1990s (Przenajkowska et al. 2020). The focus on developing an efficient settlement system for credit transfers during this period increased their attractiveness to customers (ibid.). Subsequently, the growing popularity of credit transfers, especially for regular payments to large creditors such as utility companies, has contributed to economies of scale (ibid.). However, despite the strategic development of efficient systems and the sustained popularity of credit transfers, there has been a slight increase in its unit costs, requiring further research to understand the underlying cause of this trend (ibid.).

In conclusion, the significant reduction in unit costs for credit transfers is attributed to the implementation of efficient systems like SEPA and early banking initiatives in Poland. Again, this demonstrates the effectiveness of strategic regulations in shaping payment systems' efficiency.

Direct Debits: The unit costs of direct debits are showing a decreasing trend, becoming more cost-efficient due to their growing use, especially driven by a surge in online transactions.

In Portugal, direct debits emerge as the cheapest payment method with unit costs of €0.27, benefitting substantially from their high usage (Banco de Portugal, 2019). The increase in online payments, where direct debits have recorded the highest average annual growth relative to other payment methods, contributes significantly to their cost-effectiveness (ibid.). Furthermore, due to the growing importance of online payments, Denmark and Italy's unit costs for direct debits have decreased substantially by 60%, to an average of €0.50. On the other hand, Poland presents a unique case where direct debits incur the most expensive unit costs out of all its available payment methods. These high costs are primarily attributed to the recent growing popularity of direct debits, only gaining traction in 2018 (Przenajkowska et al. 2020). At the time of the Polish national study, economies of scale had not yet been fully realised, contributing to higher unit costs (ibid.). Due to a similar lack of scale effects, Hungary witnessed a 33% increase in unit costs to €0.51 (ibid.).

Overall, due to the increasing prevalence of online transactions, a further rise in the usage of direct debits is anticipated. Hence, this potentially further decreases unit costs of direct debits suggesting a more cost-efficient landscape as the adoption continues to expand.

Conclusion: To conclude, our observations underscore the transformative impact of digital payments on cost efficiency. Traditional cash, once the predominant method, exhibits only marginal improvements in cost efficiency through enhanced cash handling processes. In contrast, the unit costs for debit cards are on a declining trajectory as their usage increases, narrowing the gap between cash and debit card unit costs. This overarching trend across the countries is observed for all digital payments, suggesting decreasing social unit costs driven by the continuous development and growing embrace of digital transactions.

Among the studies, Denmark stands out with the most notable efficiency gains regarding social costs. It is an excellent example of high-cost efficiency and sets a benchmark for other EU

countries striving to minimise costs generated by their respective payment markets. Building upon this, the next section will analyse the specific elements in Denmark that have resulted in these efficiency gains. Importantly, it will explore potential obstacles hindering similar advancements in other countries, providing valuable insights for creating effective strategies to enhance cost efficiency in payment systems across the European C2B payments market.

5.2.3. Drivers and Barriers for Cost-Efficiency in Europe

In the following section, we delve into the core elements that have propelled Denmark to the forefront of cost efficiency in payment systems. A closer examination reveals that the interplay of payment habits and payment infrastructure has been instrumental to Denmark's success. By understanding these key factors, we gather insights into Denmark's efficiency gains as well as potential pathways for other countries seeking to optimise their payment markets.

Denmark's Payment Habits: Payments habits among consumers and merchants substantially influence the degree of efficiency in Denmark's payment systems. Driven by an early preference for rapid and convenient payment methods, Danish consumers favour digital payments over cash payments for a long time (Junius et al. 2022). This is particularly evident in the widespread acceptance of Dankort, which had become the most widely used payment method already by 2009 (ibid.). In addition, Denmark was found to have the lowest number of cash payments in Europe with around 12.9% of total transaction volume, further illustrating the shifting payment habits towards digital payment methods (Ilyés and Varga 2016).

Aside from consumer preferences, one of the key enablers of Dankort's rapid uptake among retailers and banks is the relatively low proportion of fixed costs the domestic debit card carries, especially when compared to alternative international debit cards (Junius et al. 2022). While Dankort's fixed costs constitute 45% of the total associated costs (including fix and variable

costs), a figure comparable to the cash cost distribution in Denmark, international debit cards carry fixed costs of around 60% (ibid.). This suggests that upfront investment requirements are considerably lower for retailers and banks, explaining the rapid uptake and wide acceptance of Dankort in the Danish C2B payments market (ibid.).

Moreover, recent trends in the Danish market towards online and mobile payments will likely lead to a further uptake of such efficient payment systems, where redundant and resource-intensive processes of cash are minimised (Danish Payments Council 2018). This, coupled with the early and widespread adoption of efficient digital payment methods, has allowed Denmark to benefit from economies of scale for years, resulting in relatively low social costs per GDP compared to other European countries.

Denmark's Payment Infrastructure: Beyond payment habits, the digitalisation of Denmark's retail payment systems has substantially improved the speed and cost-effectiveness of processing payments, further reinforcing the uptake of digital payments among consumers, merchants, and banks. Key components of the Danish payment infrastructure include:

1. Kronos System (2001): Introduced by Danmarks Nationalbank, Kronos serves as a real-time gross settlement system (RTGS) exclusively for the Danish krone. Focused on high-value and time-sensitive payments, Kronos forms the foundation of secure and efficient interbank settlements. This system is vital for facilitating transactions such as large-scale credit transfers, ensuring swift and reliable financial operations (Danmarks Nationalbank 2012).

2. Express Clearing (2014): Operated by Mastercard Payment Services, Express Clearing specialises in processing instant bank transfers, handling transactions of up to DKK 500,000 (roughly €67,000). This system operates seamlessly on a 24/7 basis, providing a rapid and continuous channel for immediate fund transfers. Express Clearing significantly contributes to

the efficiency of time-sensitive payments, offering a crucial service for various financial activities requiring instant processing (Danmarks Nationalbank 2022).

3. Intraday Clearing (2013): Launched in 2013, the Intraday Clearing system manages same-day transfers without imposing an upper limit on transaction amounts. Operating on weekdays, this system plays a pivotal role in facilitating transactions such as salary payments and online banking transfers. Its ability to handle a broad spectrum of same-day transfers enhances the overall efficiency of Denmark's payment ecosystem, meeting the demands of diverse financial activities (Danmarks Nationalbank 2022).

4. Sum Clearing (2013): Introduced in the same year as Intraday Clearing, Sum Clearing focuses on processing various payments, including direct debits and Dankort payments, on the next working day. This system ensures the timely clearing of a wide range of transactions, contributing to the smooth flow of payments in Denmark's financial landscape. Sum Clearing complements other systems by addressing payment needs that extend beyond immediate processing, offering a well-rounded solution for different payment scenarios (Danmarks Nationalbank 2022).

This efficient system starts at payment initiation, which sends a transaction to be processed through one of the three different clearing systems (Danmarks Nationalbank 2021). Once processed, the payments converge into the Kronos, the final settlement point ensuring the secure and efficient completion of all transactions (ibid.). The interconnected nature of these systems ensures comprehensive coverage of Denmark's payment requirements, addressing various payment types with specialised and efficient processing mechanisms (ibid.). A visual representation illustrating the process can be found in **Figure C 3**. Furthermore, recent upgrades, such as Kronos 2, have enhanced functionality with features like instant payments and improved security (Danmarks Nationalbank 2021). Additionally, future plans involve the

Group Part

transition to TARGET systems in 2025, enabling pan-EU instant payments and increased connectivity (as explained in Chapter 3) (Danmarks Nationalbank 2020).

While Denmark's payment systems offer significant advantages, it is also crucial to maintain a critical perspective when assessing these developments. The efficiency-focused metrics do not capture financial inclusion and privacy concerns, which could impact C2B stakeholders. Furthermore, the potential over-reliance on debit card payments echoes the two-sided market and underlines cautions against assuming perfection within the payment landscape, as discussed in Chapter 5. Therefore, it is essential to view the analysis critically since it focuses mainly on the efficiencies of payment transactions, with further in-depth considerations falling outside the scope of this report. Taking these concerns into consideration is essential.

Overall, the structural elements implemented in Denmark and strong market demand for streamlined digital systems have effectively positioned the country for substantial efficiencies and cost-effectiveness – reflected in Denmark's relatively low social cost per GDP rate.

Non-Denmark Payment Habits: In Portugal, Italy, Poland, and Hungary, the continued prevalence of cash has a substantial impact on the overall cost efficiency of payment systems, presenting a notable contrast to Denmark's digital payment dominance. The slower uptake of digital transactions in these countries hinders the realisation of economies of scale, a key advantage enjoyed by Denmark. Despite cash being the most efficient method in these nations, its unit costs are inherently limited in their ability to reach comparable levels of unit costs achieved by cards and digital payments (Junius et al. 2022). This limitation is attributed to the resource-intensive nature of handling cash, combined with the scale effects inherent in card and digital payment methods (ibid.). Cultural factors, privacy concerns, and the perceived advantages of cash for tax evasion collectively act as barriers, impeding the widespread adoption of digital payments (as discussed in Chapter 2). These elements not only hinder a more

Group Part

efficient payment infrastructure but also limits the potential for cost savings and broader economic benefits that Denmark has been able to achieve through its early embrace of digital payment solutions.

Non-Denmark Payment Infrastructures: The sustained reliance on cash in Portugal, Italy, Poland, and Hungary, in contrast to Denmark's advanced digital payment landscape, presents an environment that significantly impacts payment infrastructure. Various factors contribute to the intricacies observed in each of the considered countries.

The deficiency in acquiring infrastructure stands out as a significant impediment to the broader adoption of digital payments in these countries, particularly in Portugal (Oliveira et al. 2016). This shortage is characterised by a limited number of well-developed POS terminals and a lack of service providers (i.e., acquirers) specialising in this crucial area (ibid.). The insufficiency of these elements is detrimental to the widespread acceptance of digital payments, hindering the evolution towards more efficient payment systems.

Furthermore, the local regulatory environment serves as another critical factor in shaping the payment landscape. Denmark's success can be attributed, in part, to a regulatory framework that actively supports the expansion and security of digital payments (Danmarks Nationalbank 2021). In stark contrast, the other countries grapple with challenges in their regulatory structures, often having to address underlying structural problems before implementing efficient initiatives conducive to the shift towards digital payments (Junius et al. 2022). A prime example is the need to combat issues like tax evasion, as seen in Italy, which presents a significant hurdle to fostering a supportive regulatory environment (ibid.).

Another pivotal factor influencing payment infrastructure is the economic development of a country. Denmark, with its relatively high GDP, is well positioned to make substantial investments in efficient payment technologies. This investment creates more sophisticated

Group Part

payment infrastructures, which also serves as a reinforcing incentive for widespread adoption, given the benefits generated throughout the payment value chain. The symbiotic relationship between advanced payment systems and increased adoption underscores the self-reinforcing nature of economic investment in payment technologies (Musabeh et al. 2020). In contrast, countries with lower GDPs, such as Hungary and Portugal, may face challenges in allocating sufficient resources for similar infrastructural investments (ibid.). These limitations can impede the uptake of digital payment methods, preventing the realisation of associated benefits from both efficiency and cost-effectiveness perspectives (ibid.). This discrepancy further illustrates the central role that economic development plays in shaping the payment landscape of a country.

In addition to economic factors, digital literacy emerges as an important factor in shaping a country's payment landscape (Lo Prete 2021). Denmark stands out with its population exhibiting a notably high level of digital literacy, with around 68% of individuals possessing basic or above basic overall digital skills (Eurostat 2023). This high level of digital literacy not only facilitates adoption but also contributes to the seamless integration of innovative digital payment methods, laying out the necessary foundation for the widespread adoption of digital payment methods (Lo Prete 2021). In contrast, varying levels of digital literacy in Portugal, Italy, Hungary, and Poland, with an average of around 48%, introduce an additional layer of complexity to their payment infrastructure challenges (Eurostat 2023). That is, the lack of awareness might serve as a significant impediment to uptake of digital payment methods (Lo Prete 2021). This poses a challenge as the lack of guaranteed uptake may deter the required investments to support such methods (ibid.). In essence, digital literacy influences the level of adoption, thereby impacting the decision to make necessary investments in technologically advanced payment systems.

Group Part

Collectively, these intertwined factors create a challenging environment for the European payment infrastructures we considered. The factors hindering such efficiencies are the persistent reliance on cash, limited acquiring infrastructure, regulatory obstacles, economic disparities, and variations in digital literacy levels. These multifaceted dynamic underscores the need for targeted interventions to change such environments and foster a more efficient and inclusive payment ecosystem in these countries.

5.3. Non-European Benchmark Cases

Examining cost-efficiency beyond the EU provides valuable insights into the development and impact of innovative payment methods. Brazil's Pix and India's UPI serve as exemplary models, illustrating how digital payment platforms can revolutionise financial ecosystems. These benchmarks offer essential learning points for European countries, especially in the context of reducing social and unit costs associated with payments. In Chapter 6, we will leverage these non-EU benchmarks to conduct scenario analyses, exploring potential efficiency gains in Europe. To maintain consistency with preceding sub-chapters, we will examine these approaches within the context of payment habits and payment infrastructure, analysing their impact on social and unit costs.

5.3.1. Brazil – Pix

Pix, introduced by the Brazilian government, stands as a pivotal force in transforming the payment landscape by significantly reducing reliance on cash and democratising access to the financial system. This A2A payment system's cornerstone lies in its ability to facilitate instant transfers around the clock, addressing diverse transaction needs seamlessly.

Group Part

Payment Habits: Since its launch in 2020, Pix has rapidly ascended to become Brazil's foremost payment method, facilitating transactions for over 71.5 million individuals who were previously excluded from digital transfers (IMF Western Hemisphere Dept. 2023). The system's unprecedented success is vividly illustrated by its payment volumes, now surpassing those of debit and credit cards combined by almost a factor of five, illustrating its rapid acceptance and transformation of payment transactions (ibid.). This not only highlights its rapid uptake but also underscores how Pix is transforming payment transactions, making digital payments accessible to everyone. Pix's allows users to transact using easy identifiers like phone numbers or emails, significantly lowering the barriers to digital payment adoption (ibid.).

Payment Infrastructure: At its core, Pix operates on a robust RTGS mechanism, allowing for instant and individual transaction processing – a paradigm shift from traditional batch processing methods prominently seen in European payment systems. The Central Bank of Brazil's centralised management ensures secure and traceable transactions (Governo do Brasil 2020). Notably, Pix's commitment to interoperability is a testament to its inclusivity, seamlessly integrating various financial institutions through a standardised framework and unique digital identification keys (ibid.).

Impact on Banks: Pix's introduction did pose initial challenges to banks, particularly in terms of elevated social costs stemming from the required infrastructure setup. However, a compelling long-term narrative unfolds as efficiency gains and digitalisation are poised to offset these costs (Mantovani and Lucas Jr 2022). Despite a temporary rise in wages, due to additional staff required for the implementation, improved system integration is anticipated to generate long-term reductions in social costs. Notably, Pix represents a decrease in the need for traditional physical banking infrastructure, such as ATMs and branches, as users increasingly opt for the convenience of digital transactions. Furthermore, Pix's digital nature contributes to diminishing

Group Part

equipment and IT costs. Additionally, its streamlined processes enhance operational efficiency as well as security, thereby mitigating fraud-related expenses for banks (ibid.).

Impact on Retailers: For retailers, Pix signifies more than just a novel payment method. Its implementation brings about substantial decreases in social costs, attributed to its cost-effective setup with minimal equipment requirements and streamlined processes.

Firstly, the low implementation costs of Pix represent a significant advantage for retailers, especially as it only requires a smartphone with internet access. This simplicity in adoption aligns with successful models seen in countries like Denmark, where the low fixed costs of Dankort facilitated widespread acceptance (Siciliani 2018). Pix's low barriers to entry make it an accessible and attractive option for retailers, ensuring that even small businesses can benefit from the efficiencies and cost savings offered by the digital payment system (ibid.).

Secondly, the digitalisation of Pix and streamlined processes not only reduce costs associated with cash handling but also enhance after-sales processes, contributing to a more efficient retail experience (ibid.). Pix's faster settlement times and simplified accounting and reconciliation processes significantly further contribute to decreasing social costs for retailers. The real-time nature of Pix transactions allows for quicker access to funds, reducing the need for extensive working capital and minimising financial uncertainties (ibid.). The simplified accounting and reconciliation associated with Pix transactions streamline financial processes for retailers, further reducing administrative burdens and facilitating better financial management (ibid.).

Impact on Households: Pix brings immediate benefits to households by significantly reducing payment times and the need for cash withdrawals (Mantovani and Lucas Jr 2022). Over the long term, as households become more accustomed to Pix transactions, the overall time spent on managing payments and financial transactions will continue to decrease. In addition, with increased adoption of Pix, the frequency and necessity of cash withdrawals are likely to continue diminishing, further decreasing social cost for households (ibid.). The simplicity and

Group Part

efficiency of Pix contribute to a shift in the way households engage with their finances, allowing a more convenient and streamlined approach which reduces social costs.

Private Costs: While Pix offers substantial advantages, it also carries private costs. The Central Bank charges a reimbursement fee for participating in Pix, which is designed to cover the operating costs of the system without generating profits (Mantovani and Lucas Jr 2022). For retailers, the cost of a Pix transaction is only 0.33% of the transaction amount (ibid.). This rate is significantly lower compared to traditional payment methods, such as debit cards at 1.13% and credit cards at 2.34% (ibid.). Additionally, authorities have mandated Pix to be free for individuals (ibid.). These features collectively contribute to reducing financial burdens for all stakeholders and reinforce Pix's role as an economically viable and inclusive payment solution. Further discussions on this topic are outside the scope of this report.

Limitations: Brazil's Pix system has brought about significant advancements in financial transactions, yet certain considerations warrant attention. One particular concern pertains to data privacy, given the widespread use of digital payment systems (Governo do Brasil 2020). There is a need for robust measures to safeguard personal and financial information against unauthorised access or data breaches. These security challenges arise from the reliance on mobile apps, emphasising the importance of protecting sensitive financial data (ibid.). Moreover, ongoing cybersecurity risks, such as hacking and phishing, demand continuous vigilance to maintain system resilience (ibid.).

Aside from data concerns, operational resilience is also essential to avoid potential disruptions caused by technical glitches or cyber threats (ibid.). This extends to user education, as ensuring individuals comprehend the system's features and associated risks is pivotal for responsible usage (ibid.). Addressing these concerns is vital for sustaining public trust and operational integrity in Brazil's evolving Pix system. Beyond this, it is also important to note that there is

no available data on the social costs of Pix. This lack of quantitative data impedes a comprehensive assessment to be made, indicating a gap that further research could fill.

5.3.2. India – UPI

Unified Payments Interface (UPI), launched in 2016, is an initiative of the National Payments Corporation of India (NPCI) under the management of the Reserve Bank of India. Mirroring Brazil's Pix, UPI is a transformative A2A payment system that enables real-time, 24/7 money transfers. UPI, like Pix, enhances customer engagement by offering low implementation barriers and consolidating multiple banking functions into a single mobile application.

Payment Habits and Impact: Since UPI's introduction, digital transactions in India have surged, transforming the customer experience by consolidating multiple bank accounts into a single mobile application. UPI's wide acceptance, even in urban and rural areas, is attributed to its low technological expertise requirement and its design making it accessible on basic mobile phones while requiring minimal data (Rastogi et al. 2021). India's record-breaking 48 billion real-time transactions in 2021, surpassing China's 18 billion, highlight UPI's substantial impact on making digital payments accessible and shows the wide adoption within the broad society (ACI Worldwide 2022).

Payment Infrastructure: UPI's infrastructure, akin to Brazil's Pix, operates in real time, facilitated by a secure digital platform managed by NPCI. This platform ensures secure and traceable transactions, using Virtual Payment Addresses (VPAs) as unique identifiers linked to users' bank accounts (NPCI 2016). VPAs simplify transactions by eliminating the need for bank account numbers or similar codes to conduct a financial transaction (ibid.). Furthermore, the streamlining of UPI has significantly increased efficiencies by bundling operational processes

Group Part

for banks and retailers, and by providing consumers with comprehensive financial interfaces, enhancing the overall ease and effectiveness of payment transactions (Rastogi et al. 2021).

Social and Unit Costs: UPI, similar to Brazil's Pix, has significantly reduced social costs in India. The introduction of UPI for banks and retailers decreased the need for expensive physical infrastructure, enhanced operational efficiencies through streamlining of processes and lowering social costs (Rastogi et al. 2021). For households, the time-saving effect of digital payment methods has led to a decrease in social costs (ibid.). While the overall leveraging of economies of scale in digital payment methods is evident, further research is needed to quantify these effects.

Conclusion: The success of Pix in Brazil and UPI in India has inspired global initiatives, such as the Pan-European Payment System Initiative (PEPSI) and the European Payments Initiative (EPI). These initiatives aim to integrate digital payments similar to Pix and UPI, offering potential benefits like faster settlement times, or streamlined payment processes. Chapter 6 delves into quantifying these potential savings and analyses how these innovative payment methods could reshape the European financial landscape and ultimately, decrease social cost of payments in Europe.

Chapter 6. Social Cost Model

In the rapidly evolving landscape of European C2B payment markets, understanding the economic implications and potential for optimisation is crucial. This chapter is centred around the construction of a model designed for estimating social cost figures in EU countries. Recognising the persistent challenge posed by severely limited high-quality data, our aim is to methodically develop an assessment of payment market efficiency across the EU.

Group Part

The foundation of our model is based on the creation of an index devised to evaluate a country's digital payment affinity. This index integrates three distinct factors, namely infrastructure, consumer knowledge, and payment habits, all of which reflect the degree of digitalisation in payment systems. Given the inherent relationship between digitalised payment systems and cost-effectiveness, as discussed throughout our report, the index emerges as an appropriate metric for gauging social costs generated by a country's underlying payment market. Subsequently, leveraging linear interpolation based on known social cost figures and the derived index, we extrapolate estimates for countries lacking such data.

Expanding on our foundational model, we conduct two scenario analyses to explore economic implications by manipulating input variables. One scenario mirrors Denmark's social cost growth rates across EU countries until 2030, providing insights into broader economic impacts. The second scenario considers EU-wide cost-effectiveness through a predominant reliance on A2A systems in 2022, known for their efficiency in social costs (Junius et al. 2022). This approach allows us to assess the robustness of our findings and broaden our scope to include potential cost savings through the widespread adoption of streamlined payment systems across the EU.

Throughout the construction of our model, we outline our methodologies, assumptions, and the inherent limitations in our analyses. However, the central challenge persists, i.e., the lack of high-quality data. This chapter inherently serves as a call for more comprehensive and robust data within this domain, as our ability to draw conclusive findings is impeded by the difficulty of building a statistically sound model. Therefore, aside from shedding light on potential cost savings, this chapter primarily aims to encourage further research, recognising that informed decision-making in the context of European C2B payments is contingent upon the availability of high-quality and extensive datasets.

6.1. Index

As discussed in Chapter 5, the metric of social costs relative to GDP is an important indicator for assessing the efficiency of payment markets in the EU. Unfortunately, only a handful of countries (Denmark, Portugal, Poland, Italy, and Hungary) have this data readily available in national studies. In addition, methodological disparities in the few studies that do compute social costs hinder direct comparisons, contributing to the persistent challenge of limited quality data.

Accordingly, our model emerges to address this issue by estimating social cost figures for countries lacking such information, thereby facilitating a meaningful assessment of payment market efficiency across the EU. Drawing inspiration from Mastercard's Digital Payment Index (DPI), the foundation of our model lies in the construction of an index comprising three principal categories, namely Infrastructure, Consumer Knowledge, and Payment Habits. These categories each include specific sub-elements, collectively reflecting the extent of digitalisation in payment systems. As discussed throughout our report, the underlying relationship between digitalised payment systems and cost-effectiveness positions the index as an appropriate metric for gauging the social costs generated by a payment market.

Notably, in navigating the challenges of limited data availability and methodological disparities, we opted for a concise approach within our index construction. By limiting the sub-elements per category to three, we aim to mitigate the margin of error while maximising representativeness, striking a necessary balance given the need to make numerous assumptions. While this implicitly carries limitations, the index is built as robust as possible within the constraints of data availability. In addition, transparent discussions regarding the limitations of assumptions are made when relevant.

Group Part

1) *The Infrastructure category* is designed to assess the capacity of existing payment infrastructures to support digital payments, contributing to overall efficiency and cost-effectiveness in the payment market.

- **Cards per Inhabitant** measures the number of consumer cards in circulation per capita within a country. Sourced from individual country reports by GlobalData, this metric measures card uptake among consumers, offering valuable insights into prevalent payment instruments and the degree of digitalisation within the payment system.
- **POS Terminals per 1,000 Inhabitants:** Derived from ECB Data Portal and World Bank, this indicator illustrates the extent of available infrastructure to support digital payments within a payments market at the merchant level.
- **Normalised GDP per Capita** evaluates the overall prosperity of countries based on their economic growth. Sourced from Eurostat, with the utilisation of purchasing power parities (PPSs) for cross-country comparability, it underscores the financial foundation required to support a digital payment infrastructure. While each payment-efficient EU country concurrently ranks high on the GDP per capita list, it is important to note that this metric alone may not accurately reflect the efficiency of payment infrastructures. For instance, Brazil holds a very efficient and cost-effective payment market despite having a relatively low GDP per capita. This underscores the importance of considering numerous factors, such as different sub-elements in each of our categories, when assessing the efficiency of payment systems within dynamic and diverse economic environments. However, due to data constraints, this model opts for this metric.

By considering these three sub-elements, we ensure a well-rounded assessment of the payment infrastructure, considering accessibility, acceptance, and the economic foundation of digital payments. This allows us to capture the interplay of factors shaping the efficiency and cost-effectiveness of payment infrastructures.

2) The Consumer Knowledge category aims to gauge consumers' understanding of digital payments and their overall proficiency in engaging with such payment methods. These elements are crucial in influencing the likelihood of adopting cost-efficient digital payment instruments.

- **Digital Skills** is a metric designed to measure how adeptly consumers handle digital payment methods. Sourced from Eurostat, it provides insights into the design requirements of innovative payment methods influencing uptake, shedding light on the ease with which consumers can adopt to digital payment solutions.
- **Consumers in E-commerce** quantifies the number of consumers actively making online purchases in the e-commerce segment. Derived from Eurostat, this indicator reflects the evolving sentiment regarding consumers' desire and ability to adapt to online payments and, consequently, digital payment instruments.
- **Percentage of Banked People** measures the share of total population with access to traditional banking services. Sourced from Eurostat, this indicator serves as a prerequisite for obtaining various digital payment instruments, laying the foundation for consumers to develop an understanding of digital transactions.

By examining these three sub-elements, we ensure a comprehensive evaluation of consumer knowledge in digital payments, covering the ease of handling digital methods, consumer behaviour in e-commerce, and the foundational role of traditional banking services. This approach captures the proficiency and adaptability of consumers, providing an indicator of their readiness to engage with and adopt cost-efficient digital payment instruments.

3) The Payment Habits category sheds light on different behavioural patterns associated with the usage of digital payments, considering the persistent prominence of cash payments and the gradual emergence of innovative digital payment methods.

Group Part

- **Share of Card Payments** measures the percentage of the total payment volume associated with consumer cards. Due to limited data availability, this metric was collected from two sources, i.e., GlobalData and the ECB. Accordingly, we acknowledge the potential negative impact of discrepancies in underlying methodologies. This indicator aims to offer insight into prevailing card usage and identifies opportunities for further growth in cashless payments within the broader context of increased efficiencies.
- **Share of Mobile Wallets** captures the percentage of the total payment volume associated with mobile-based payments. Similar to the first point, the data was sourced from both GlobalData and the ECB due to limited availability, potentially introducing negative impacts stemming from differences in underlying methodologies. This indicator aims to capture the growing emergence of mobile-based payment solutions, providing insights into shifting consumer preferences towards instruments with efficiencies surpassing even those of consumer cards (as described in Chapter 6).
- **Ratio of Card Payments to Cash Withdrawals** shows the primary purpose of cards by including the ratio of card payments to cash withdrawals, particularly indicating the volume and value of cash being withdrawn. Sourced from the ECB Data Portal, this metric is crucial in assessing the degree of digitalisation in current payment markets.

Through these metrics, we capture a nuanced picture of evolving payment habits, ranging from card usage to the rise of mobile wallets and the shift away from cash transactions. These insights offer a concise yet comprehensive overview of digitalisation trends and changing consumer preferences, thereby impacting the degree of efficiency and cost-effectiveness in the payment landscape.

Normalisation: In constructing our index, we face challenges of integrating diverse indicators with varying metrics and units, such as the number of cards per inhabitant and GDP per capita.

Group Part

To ensure a fair and standardised comparison, we employ min/max normalisation, allowing for proportional contribution and equal weighting across all sub-elements. This process involves transforming indicators to a common scale, between 0 and 1, making them comparable despite different measurement units. Further details on the specific formula used can be found in **Equation D 1**.

Equal-Weighting Approach: Following the normalisation process, the sub-elements are averaged to derive the overall figure for each principal category. Subsequently, in line with Mastercard's DPI, we opt for an equal weighting approach for each principal category. This decision stems from the absence of strong empirical basis for assigning different weights to specific components based on current published data and research. Furthermore, after a thorough evaluation of different weighting methods, it became clear that an equal weighting approach consistently provided the most accurate and realistic results.

It is important to recognise that equal weighting assumes equal importance and impact of each sub-element and category, which might not align with the real-world significance of these factors. Certain sub-elements may have a more substantial influence on the overall objective or may require more consideration due to their relevance or sensitivity. Recognising this, future research could benefit from incorporating empirical findings to assign weights, providing a more accurate representation of the factors contributing to our index.

Nonetheless, this composite index effectively reflects the degree of digitalisation in payment systems. Higher index values indicate more efficient payment infrastructures, sophisticated consumer knowledge, and payments habits favouring digital payment methods. Consequently, countries with higher index values are likely to experience lower social costs, given the positive relationship between highly digitalised payment systems and greater cost-effectiveness (as discussed throughout the report).

Group Part

Limitations: Following the construction of our index, it is imperative to address its inherent limitations, particularly considering the central issue of severely limited data availability. This gives rise to two primary concerns regarding our index, namely the data collection and the broader issue of representativeness.

As stated throughout its construction, numerous shortcomings are specific to the data collection associated with the index. The infrastructure category data, derived from reputable sources such as GlobalData, ECB Data Portal, and Eurostat, may face challenges due to variations in data collection methodologies across countries. Similarly, the consumer knowledge category data heavily relies on Eurostat surveys, introducing the possibility of biases such as inaccurate recall or social desirability. Furthermore, the payment habits category data combines two sources, namely GlobalData and the ECB SPACE study, to overcome limited availability. While such an approach is relatively common for reports on cost of payments, it introduces challenges in consistency and accuracy. The temporal variations between the two sources, i.e., 2023 and 2022 respectively, further emphasise the need for consideration regarding the data's ability to accurately capture shifts in payment habits.

In addition to these data collection limitations, the representativeness of the index also warrants consideration. Firstly, the aggregation of all aforementioned sources introduces the potential for inconsistent and unreliable data feeding into the index. Combining factors with different underlying assumptions, methodologies, scopes, time periods, and measurement units can be particularly complex, potentially affecting the integrity of the index. Moreover, the selection of sub-elements and principal categories is ultimately subjective, which might result in the exclusion of factors important to the assessment of payment efficiency. The same rationale applies to the equal weighting approach, as this might overlook certain indicators with more or less substantial impact on payment efficiency. These concerns collectively suggest that the

Group Part

index might be unable to account for all factors that could have an impact on the degree of digitalisation observed in the payments market.

Therefore, caution is advised when interpreting the results of the index, as underlying assumptions and limitations should be considered. This again emphasizes that the following serves as catalyst for further research and exploration, rather than providing definitive numerical conclusions.

6.2. Linear Interpolation

Once the foundation of our model has been constructed, we employ linear interpolation by leveraging known social cost figures for Denmark, Portugal, Poland, Italy, and Hungary, alongside the derived index, to extrapolate estimates for EU countries lacking such data.

Data Adjustments: Before delving into the linear interpolation process, we address a challenge arising from the temporal discrepancies in social cost figures for countries with available data. Given this method's assumption of consistent and linear progression between known data points, establishing a common timeframe is crucial for accurate estimations. To achieve this, we use the CAGR formula to standardise the social cost timeframe to the year 2022 (see **Equation D 2** for detailed formula). Implicit in the use of CAGR is the assumption that the metric changes at a steady rate each year, implying a smooth and continuous growth or decline without significant fluctuations. However, this assumption may overlook non-linearities, such as an inverted U-shape curve associated with economies of scale, underscoring the model's need for further research.

A clear example of this limitation arises in Hungary's recent substantial infrastructure investments, which presents challenges in applying a linear growth assumption. To address this, we consider an alternative metric, namely the average change in cash usage from 2019-2021,

Group Part

which equates to a decrease of 2.38% (GlobalData 2023). This metric is deemed an appropriate proxy for efficiency gains in social costs through increased adoption of digital payments while reducing cash payments (as observed in Chapter 5). However, it is important to note that using this metric remains an oversimplification and may not fully capture the complex dynamics of social cost decreases. Despite associated limitations, the use of CAGR remains relevant and pragmatic for the remaining countries, considering matching trends, limited data availability, and the imperative of standardisation.

These challenges further emphasise the importance of ongoing research and robust data collection in this area. Having made these adjustments, we now transition to the application of the linear interpolation method to estimate social costs for countries with unknown figures.

Application of Linear Interpolation Method: After standardising social costs to a common timeframe, we employ the linear interpolation method to estimate social costs for countries without explicit data. This method relies on available data and certain assumptions, and its accuracy is contingent on the quality and representativeness of the data used in constructing the index.

In the following, countries are categorised with known social costs as 'known' and those without as 'unknown' for clarity. The linear interpolation method operates by using two reference points, representing countries with known social costs, to establish a straight line. These reference points, along with their respective positions on the index, form the basis for estimating social costs for the unknown countries.

In practical terms, the interpolation involves identifying the nearest 'higher' and 'lower' known index values corresponding to the unknown index of each country. Once these reference points are determined, the relative position of the unknown index is used to interpolate the social costs to GDP. However, it is essential to approach this linear relationship critically, as it may not

Group Part

precisely capture the complexities of non-linear dynamics in social costs across countries, especially considering sudden shifts in payment habits or other external factors.

The accuracy of our estimates relies on the quality and representativeness of the data used to construct the index, which is a potential concern given substantial differences in methodologies employed by benchmark countries, as previously explained. Additionally, extrapolating from a small set of benchmark countries to the entire EU assumes a level of homogeneity and representativeness that may impact the reliability of estimated social costs. Another critical consideration arises from the sensitivity of the model to outliers, as extreme index values could impact the accuracy of extrapolated social costs. To mitigate this sensitivity, edge cases where an 'unknown' index value falls below or above the range of 'known' index values are addressed by selecting the next two closest values near the 'unknown' index for interpolation. Additionally, to maintain realistic estimates, a range of minimal social costs was defined, with minorisation limits set at 0.15% (upper limits not required as no outliers in that regard).

Despite these limitations, within the current methodological constraints, this approach stands as the most reasonable and practical choice. It provides valuable insights into social costs in the EU and enables scenario analyses, but it is essential to recognise the potential impact of data limitations and assumptions on the results.

Conclusion: In summary, the index, modelled in accordance with the DPI, captures essential factors influencing a country's social costs – infrastructure, consumer knowledge, and payment habits. Leveraging these indexes, we estimate social costs to GDP for targeted countries using the linear interpolation method. This forms the foundation for scenario analysis, which will be expanded on in the next section. Despite offering valuable insights, it is crucial to acknowledge significant limitations in data availability and assumptions, underscoring the urgent need for more comprehensive data collection in this area. However, within these constraints, the

conducted approach proves to be the most appropriate, providing valuable insights into the current state of social costs in Europe and enabling scenario analyses on the impact of different payment infrastructures on social costs of retail payments.

6.3. Model Output

Having constructed the model, the analysis now turns towards its output. This section discusses the main outcomes of the base model, as well as alternative scenarios in which the robustness of these findings is tested. This also illustrates the use case of this model, serving as a tool for gauging the potential impact of adopting different payment systems across the EU.

Base Outputs: The base model output presents the extrapolated social costs to GDP for each EU country. Notably, Bulgaria, Cyprus, Malta, and Romania are excluded due to data unavailability.

The aggregated figures equate to social costs of 0.65% relative to GDP for the entire EU in 2022, amounting to around €101bn. This indicates a significant decrease from 2012, when social costs were estimated to be around 1% of GDP, totalling €130bn (ECB 2012). Considering the substantial increase in EU GDP from 2012-2022, the percentage decrease in social costs to GDP may not precisely reflect efficiency gains in payment markets. Instead, focusing on the absolute decrease in social costs, which has reduced by roughly 22%, offers a more indicative measure of efficiency improvements. This substantial reduction in costs aligns with expectations, given the notable shift towards digital payment systems and advanced payment infrastructures across the EU. It also suggests that competition and innovation in the payments market effectively reduce costs, as underlying regulatory initiatives have contributed to substantial savings over the last decade. Moreover, this decreasing trend further reflects the gradual increase in total payments volume, which has enabled scale effects to manifest and

Group Part

reduce unit costs for heavily used payment instruments. Therefore, as a whole, the EU has been performing quite well in the context of reducing social costs through increased digitalisation and associated efficiencies. It is important to note that our sample excludes the four aforementioned countries, which may have resulted in an overestimation of the cost gap between the 2012 study and our current model.

At the country level, regional clusters emerge based on index scores and extrapolated social costs, revealing potential insights into payment market dynamics. While clustering is a complex process influenced by multiple factors, including the interplay of economic, cultural, and historical elements, some patterns emerge. Firstly, the Southern European cluster exhibits relatively high social costs to GDP, as observed in Greece (1.03%), Italy (0.81%), and Portugal (0.80%). Commonalities here, as explored throughout Chapter 2, include the predominant reliance on cash and limited efficacy in regulatory initiatives promoting the uptake of digital payment methods. For example, limited card acceptance infrastructure is severely impeding the adoption of consumer cards in Portugal, while cultural consumer preferences for cash payments persist in Italy despite available infrastructure to support digital alternatives.

Secondly, the Central and Eastern European cluster includes diverse performances, with Estonia (60%) and Austria (0.67%) showcasing lower social costs, while Poland (1.13%) experiences higher costs. The former aligns with a more balanced distribution between digital payment adoption and traditional cash payments. This is likely due to a greater preference for more efficient payment instruments among consumers, as well as supportive regulatory and commercial initiatives (FIS 2023). For instance, Poland's endorsement of BLIK demonstrates strong e-commerce adoption, with expectations for its use to increase in in-store payments over time to positively impact social costs (as discussed in Chapter 5).

Thirdly, the North and Western European cluster outperforms, featuring advanced and efficient digital payment systems in Sweden (0.38%), Denmark (0.31%), and Belgium (0.51%). As

Group Part

explored in Chapters 2 and 5, the Nordic countries exemplify efficiency through the widespread uptake of payment cards (and A2A payment methods among consumers. This, coupled with substantial investments in efficient payment infrastructure, has resulted in particularly low social costs. For instance, Denmark's multi-layered approach to efficient transaction processing generates an extremely low social cost figure, while Belgium also shows a strong domestic card scheme and A2A presence similarly contributing to a cost-effective payment market (FIS 2023). In summary, the observed figures align with general expectations, indicating that countries with well-established digital payment markets tend to exhibit lower social costs. However, it is crucial to underscore the importance of considering the limitations and assumptions inherent in our model when interpreting these results.

Alternative Outputs: Expanding upon our base model, the analysis incorporates two distinct scenario analyses. These scenarios enable us to explore the economic implications of manipulating input variables within our model, thereby simulating different circumstances. Firstly, we explore a scenario where each EU country experiences growth rates in social costs mirroring those of Denmark until 2030, providing insights into the broader economic impact of such efficiency gains. Secondly, we consider a scenario where EU countries generate cost-effectiveness from a predominant reliance on A2A systems in the year 2022, recognised as the most efficient payment method concerning social costs (Junius et al. 2022). This approach allows us to assess the robustness of our findings while broadening our scope to include potential cost savings through the widespread adoption of streamlined payment systems across the EU.

Notably, these alternative cases rely on distinct assumptions that are unlikely to reflect the real-world scenarios observed in the EU payment market. These will be explicitly mentioned to ensure transparency in the employed methods. Nonetheless, through these alternative scenarios,

Group Part

we aim to test the robustness of the base model's output and showcase the model's capacity to simulate potential cost savings under different market conditions.

A) Scenario 1 departs from the base model with a twofold adjustment. Firstly, the Denmark CAGR of -8.67% is applied to the social cost figures of the four other countries in our input variables, namely Hungary, Poland, Portugal, and Italy. This adjustment aims to simulate a scenario in which the current payment infrastructures of less advanced countries were to undergo similar strategies as Denmark, leading to long-term efficiency gains.

Secondly, the standardised social cost timeframe is intentionally shifted to the year 2030. This choice is grounded in the assumption that, in the short term, associated investments and scale effects introduce complexities that might impede an immediate and consistent decline in social costs. Initial years could even witness increases in social costs due to upfront investments, as illustrated in the unique case of Hungary. However, over an extended timeframe, the cumulative impact of efficiency improvements becomes more pronounced. Therefore, we select the year 2030 aiming to capture this effect. That is, while the initial years may not exhibit a CAGR of -8.67%, the subsequent years, with the realisation of scale effects, are anticipated to surpass this average. This twofold adjustment sets the stage for linear interpolation across our sample of missing data, enabling the estimation of these costs across the EU.

The model's output indicates significant efficiency gains and a notable convergence of social costs across individual countries in the simulated scenario. Applying Denmark's CAGR to less advanced countries results in a substantial narrowing of the gap between nations, leading a more homogenised landscape. At a country level, the average social cost to GDP ratio becomes 0.37%, a figure that would rank among the top 5 in the current market (generated by our base model). This reflects the potential for efficiency improvements, levelling the playing field among EU countries. Notably, the most remarkable impact is observed at the EU level, where

Group Part

the total social cost sees a reduction of over 50% (to €51bn) from the current figures (generated by our base model), significantly surpassing the model's earlier predictions for the 2012-2022 period (roughly 22% reduction). This substantial decrease underscores the potential benefits of widespread adoption of more efficient payment systems, reflecting the relatively recent and limited shift to digital payments at the current EU level.

These results suggest that with strategic investments and regulatory initiatives aimed at optimising payment infrastructures, assuming similar consumer preferences to Denmark, the EU could achieve substantial cost savings and enhance economic competitiveness. Further analysis and consideration of potential challenges, such as initial investment costs and regulatory complexities, would be crucial for a comprehensive evaluation of the feasibility and the implications of such a scenario.

While the results suggest significant efficiency gains and convergence of social costs, it is crucial to acknowledge the inherent limitations of this scenario. The assumptions of homogenous consumer preferences, linear interpolation, and application of Denmark's CAGR to diverse economic landscapes introduce simplifications that may not fully capture the intricacies of payment market dynamics. To assess the impact of variations in the CAGR assumptions, the Excel file "Master Scenario Analysis," specifically in the sheet "Scenario Analysis A (Denmark)" includes scenario outcomes with both an increase and decrease of 25% from the base Denmark CAGR value. In addition, the 2030 timeframe assumes a linear decline in social costs, overlooking potential disruptions or regulatory changes. Moreover, real-world challenges may impede the seamless realisation of efficiency gains and continuous scale effects. Collectively, these limitations highlight the need for caution in interpreting the figures.

B) Scenario 2 deviates from the base model by incorporating a predominant reliance on A2A instant payment systems. The objective is to simulate an environment where the cost-

Group Part

effectiveness of A2A systems is extended throughout the EU, assuming widespread uptake in 2022. To implement this adjustment, we refer to the Swedish National Bank's calculation of the social cost associated with its A2A system (Swish), in comparison to the prevailing social costs within its predominantly card-based payment market. At full-scale adoption (100%), A2A methods exhibit an approximate 17% reduction in current social costs, as they would effectively replace existing payment methods (Riksbank, 2023). Consequently, we apply a uniform 17% reduction in 2022 social costs across each of our five input variables. This adjustment aims to illustrate the potential savings that could be realised across the EU if instant payments were the exclusive payment method in 2022. While acknowledging the simplistic nature of this assumption, the model showcases substantial cost savings. Moreover, it is crucial to note the limitations posed by the scarcity of available data on assessing the capacity of A2A payments to generate savings in systems featuring diverse distributions of digital and cash transactions. Unfortunately, the scenario cannot be forecasted or supplemented with additional information due to this data gap. This underscores the severe lack of comprehensive and high-quality data in this domain, hindering the ability to draw conclusive insights.

Nonetheless, the alternative model's output reveals significant cost savings, especially at an EU level. The total social costs to GDP would decrease to 0.50%, a notable improvement from the current 0.66% (generated by our base model), resulting in roughly €77bn in total costs. Comparing these results to the 2012 ECB study, there is a remarkable relative decrease in absolute cost figures – approximately 40%. This underscores the considerable potential for savings in an A2A context compared to our base model, which assumes a more realistic distribution of payment methods. Notably, while the figures indicate substantial improvements on an aggregate level, there is no stark convergence in social costs observed at the country level. Wide gaps would persist, particularly evident in Poland (0.96%) and Finland (0.15%).

Group Part

Nonetheless, the average social cost would decrease to 0.59%, highlighting the overall potential for increased efficiency across EU countries compared to the current base model.

Notably, this scenario is subject to several large limitations that warrant consideration. Firstly, the assumption of a 0.17% reduction following the A2A implementation is an oversimplification and is insufficiently substantiated. As was done for Scenario 1, to assess the impact of variations in this assumption, the Excel file "Master Scenario Analysis," specifically in the sheet "Scenario Analysis B (A2A)" includes scenario outcomes with an increase and decrease of 25% from the base assumption. Secondly, the assumption of uniform and widespread adoption of A2A payments across EU countries oversimplifies the intricate dynamics of varied technological infrastructures, regulatory frameworks, and consumer preferences. Moreover, the stability of A2A systems is assumed, but real-world challenges such as technical issues and security concerns could impede their seamless implementation. Additionally, external factors like economic shifts, geopolitical events, or changes in consumer behaviour are not explicitly factored into the analysis, introducing a level of uncertainty. Recognising these limitations is imperative for a nuanced understanding of the potential implications and for informing more robust conclusions. In addition, the differences in underlying assumptions and differing time periods restricts the ability to compare the two scenario analyses.

Conclusion: The model's outputs, ranging from base findings to alternative scenarios, provide valuable insights into the complex landscape of EU social costs. Notably, the base model illustrates significant efficiency gains, with regional clusters highlighting payment dynamics. Scenario 1, envisioning EU-wide adoption of Denmark's efficiency gains, shows a promising convergence, yet assumptions demand caution. In Scenario 2, A2A adoption signals substantial

Group Part

EU-level savings, despite persisting country-level disparities. Acknowledging oversimplified assumptions and data limitations is vital for appropriate interpretation.

Overall, showcasing its applicability, the model introduces a measurable dimension to efficiency discussions, enabling decision-makers to weigh economic benefits against social costs. While the scenario analyses operate under assumptions that may not reflect realistic market conditions, the model lays the groundwork for future research, calling for more robust data to enhance its construction as high-quality information and transparency across social cost of payments becomes available.

Chapter 7. Conclusion

This thesis unfolds as a thorough analysis of the European C2B payments market, revealing a dynamic environment shaped by a multitude of factors. Chapter 2 offers an extensive overview of market dynamics towards digital payments, examining prevalent payment instruments, consumer and merchant preferences, and the degree of digitalisation across EU countries. Operational disparities and cost savings linked to digital payment systems are discerned within diverse domestic markets. Chapter 3 shifts the focus to the EU regulatory landscape, evaluating the ECB's retail payment strategy and identifying gaps in its impact. Chapter 4 explores the IFR, assessing its effectiveness in challenging the dominance of major card schemes. Despite notable advancements, challenges and potential areas for improvement are revealed, particularly regarding IFR circumvention. Chapter 5 delves into social costs, offering nuanced insights into cost-effectiveness of digitalised payments through country-specific analyses and a breakdown across stakeholders and payment instruments. The concluding chapter presents a novel model for estimating social costs, addressing data gaps through an index-based approach and linear interpolation. This innovative method offers insights into countries lacking social cost information and lays the groundwork for future research improvements.

Group Part

Based on the comprehensive analysis conducted throughout the thesis, two key recommendations emerge. Firstly, given the dynamic nature of this market and the ongoing shift towards digital payment methods, it is imperative for domestic and EU-wide regulatory bodies to institute mandatory review periods for implemented initiatives. This approach ensures a systematic follow-up and assessment of implementation, which is essential for determining whether the intended impact has been achieved or adjustments are needed. This urgency is evident in the case of the IFR, which has not undergone review since 2018 despite mounting concerns of circumvention and eroded savings. This underscores the need for regulatory bodies to periodically assess the impact of initiatives to guarantee proper implementation and avoid wasted resources. Secondly, focusing on quantitative data, a pressing need for more research is evident. This is due to the severe lack of high-quality available data, particularly in social costs and the broader impact of payment systems on economic efficiency. While our model aims to address this challenge, it involves assumptions that inherently carry limitations. Informed decision-making in the context of European C2B payments remains contingent upon the availability of high-quality and transparent data.

Overall, this thesis stands as an extensive assessment of the European C2B payment market. Through a thorough literature review, market reports, and the development of our model, this research serves as a foundational step towards a more nuanced understanding of the complexities inherent in the European C2B payments market. Furthermore, the implemented model underscores the urgent need for further research by highlighting the gap in limited research, data, and transparency across the EU C2B payments market.

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Appendix

A. Appendix of Section 2 – Overview of EU C2B Payments Market

Figure A 1: Share of payment instruments used at POS in terms of volume of transactions

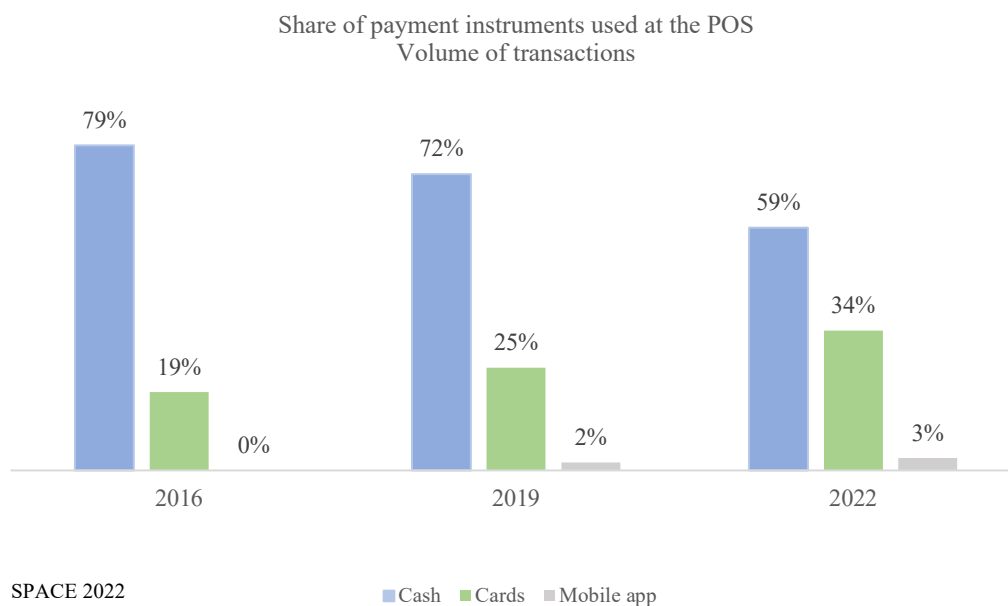


Figure A 2: Europe e-commerce share of transaction value

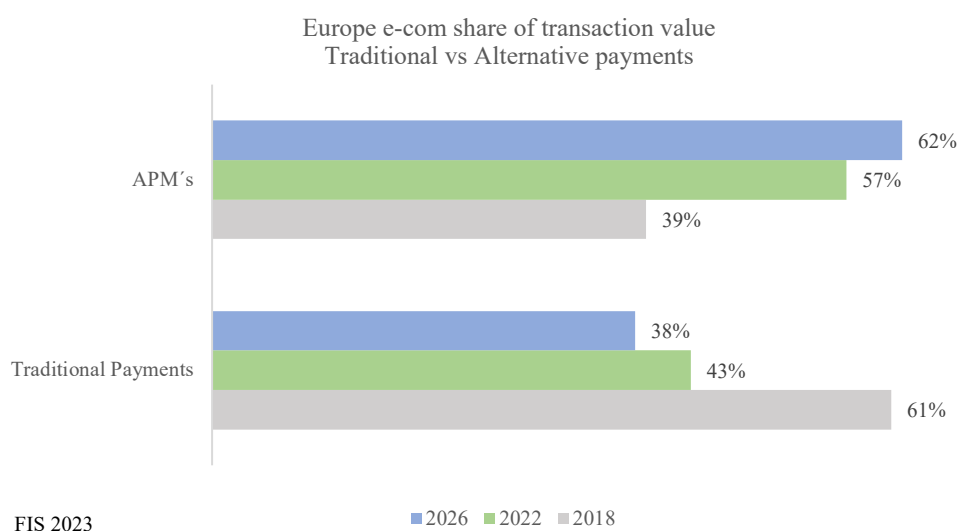


Figure A 3: Share of Alternative payments

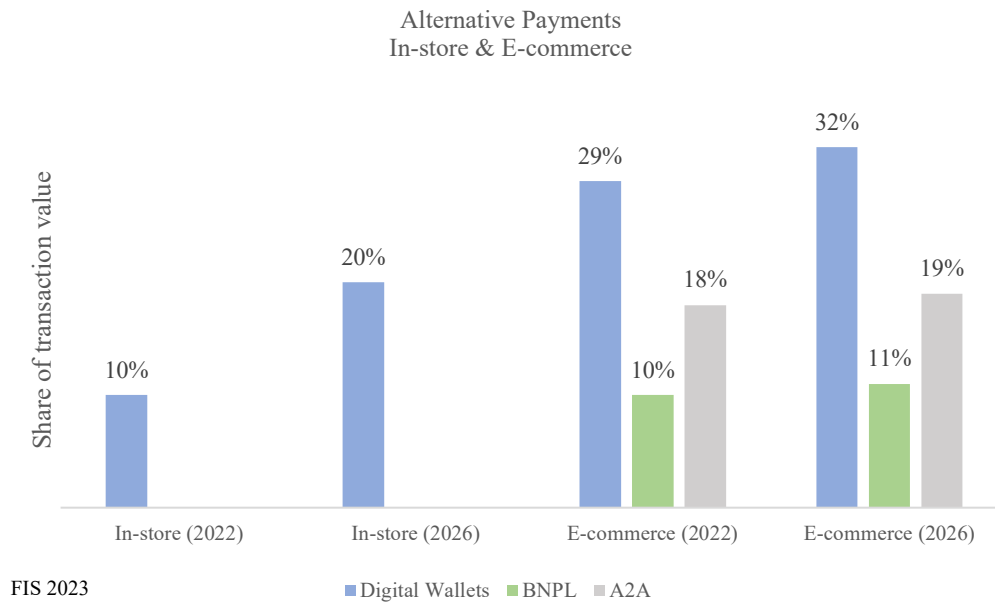


Figure A 4: Number and value of non-recurring payments

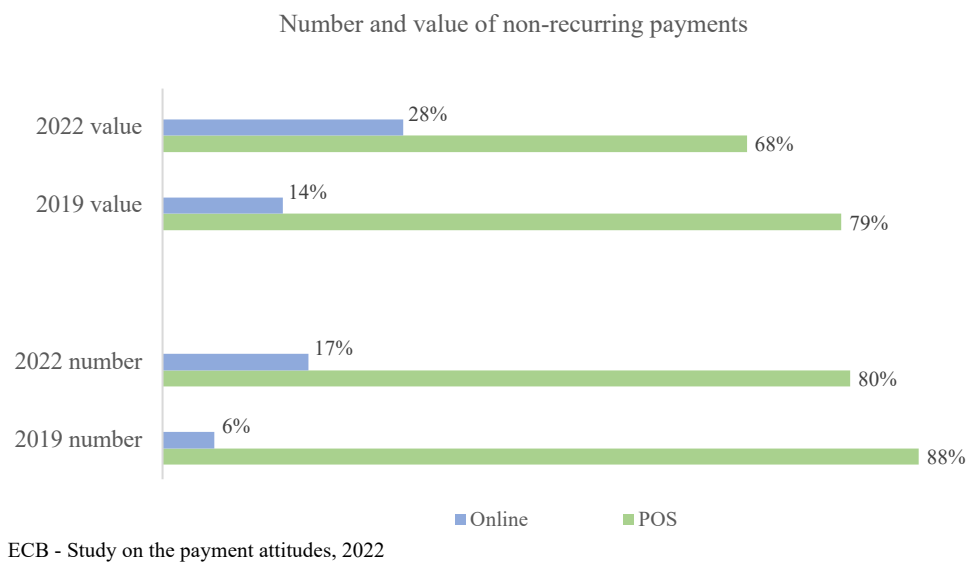
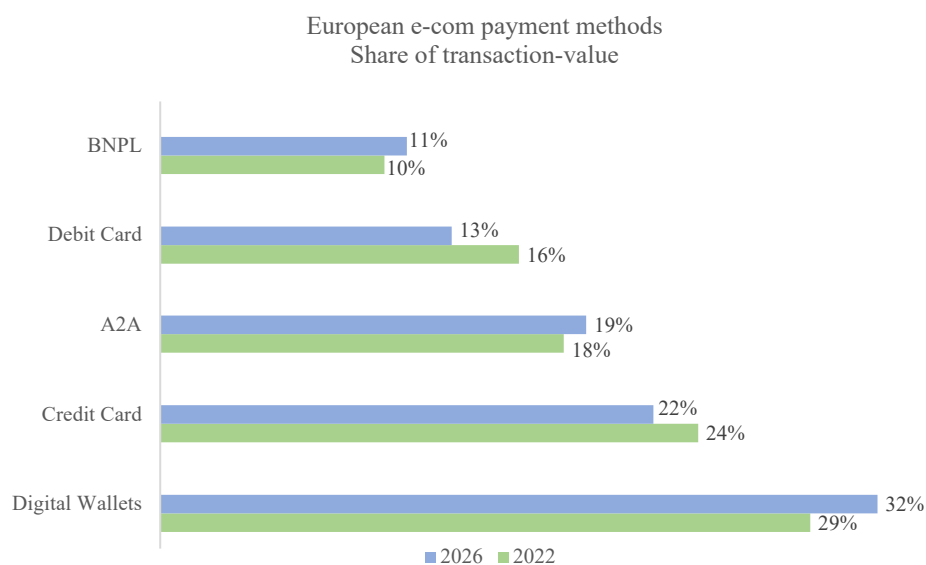
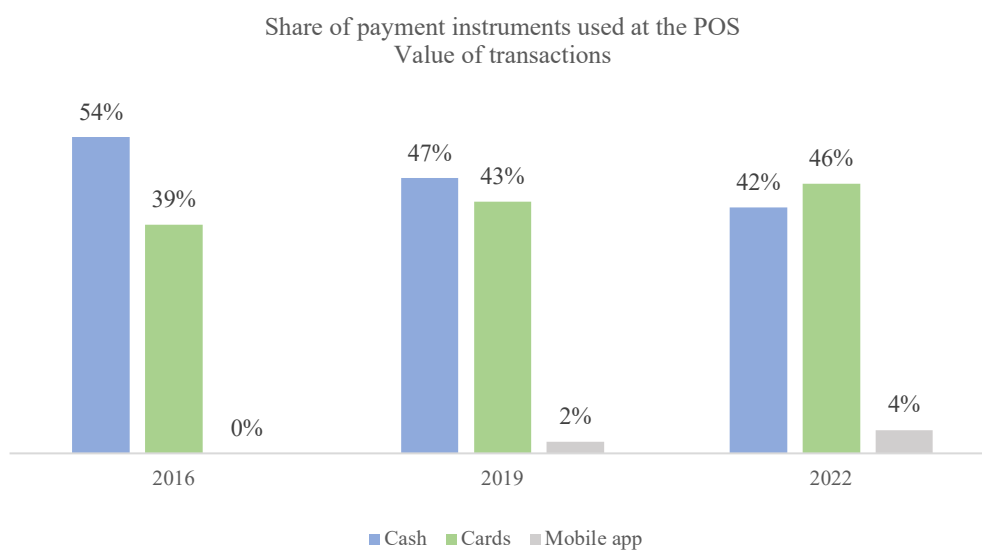


Figure A 5: European E-commerce payment methods



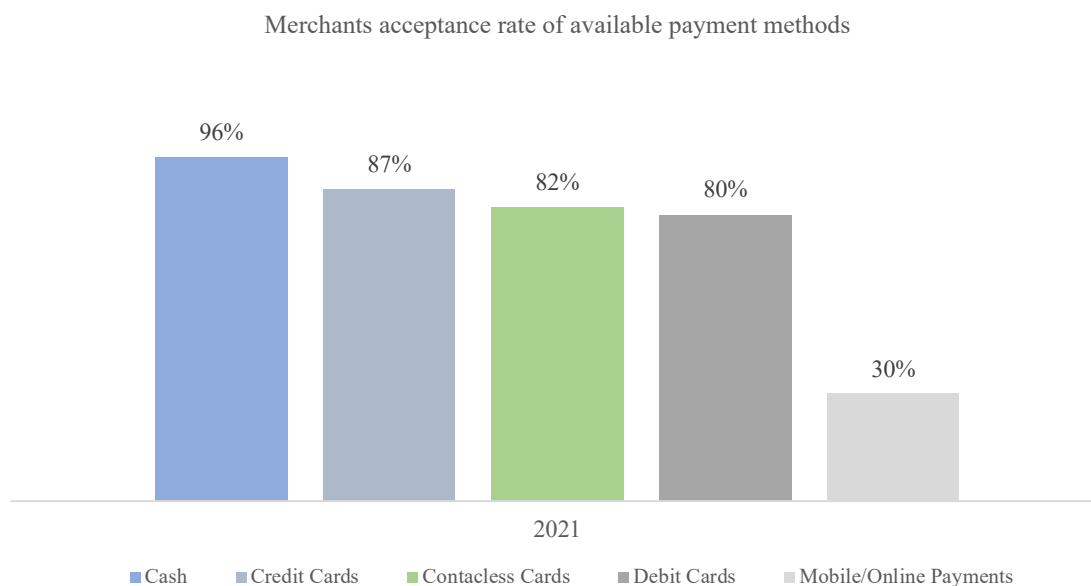
FIS 2023

Figure A 6: Share of payment instruments used at the POS in terms of value of transactions



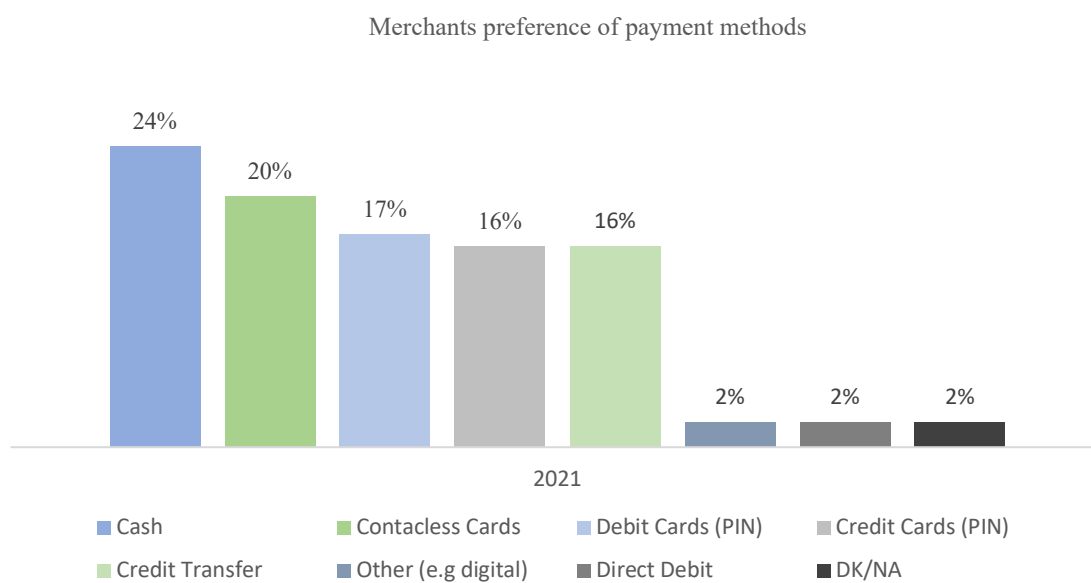
ECB - Study on the payment attitudes, 2022

Figure A 7: Share of payment instruments used at the POS in terms of value of transactions



ECB - Use of Cash by companies in the euro area 2022

Figure A 8: Merchants preference of the different payment methods



ECB - Use of Cash by companies in the euro area 2022

Figure A 9: Cash and Card trend in 2021 and 2022

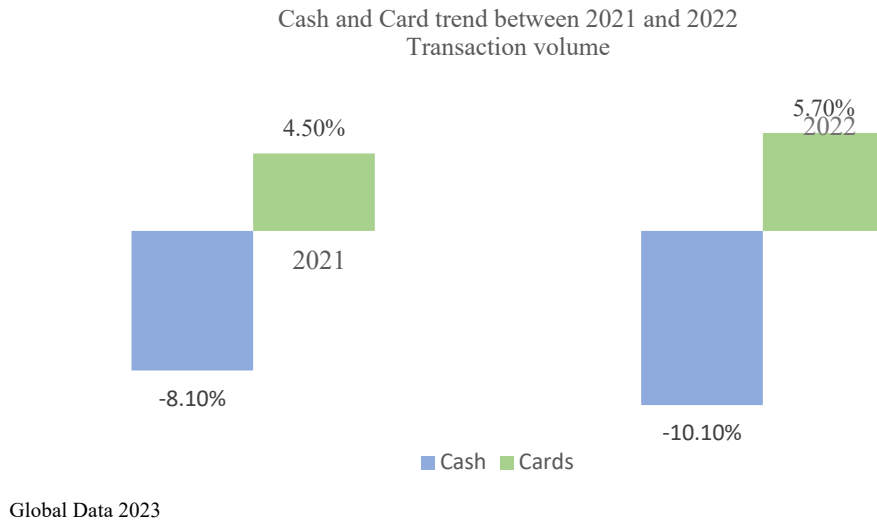


Figure A 10: Use of cash among aged groups

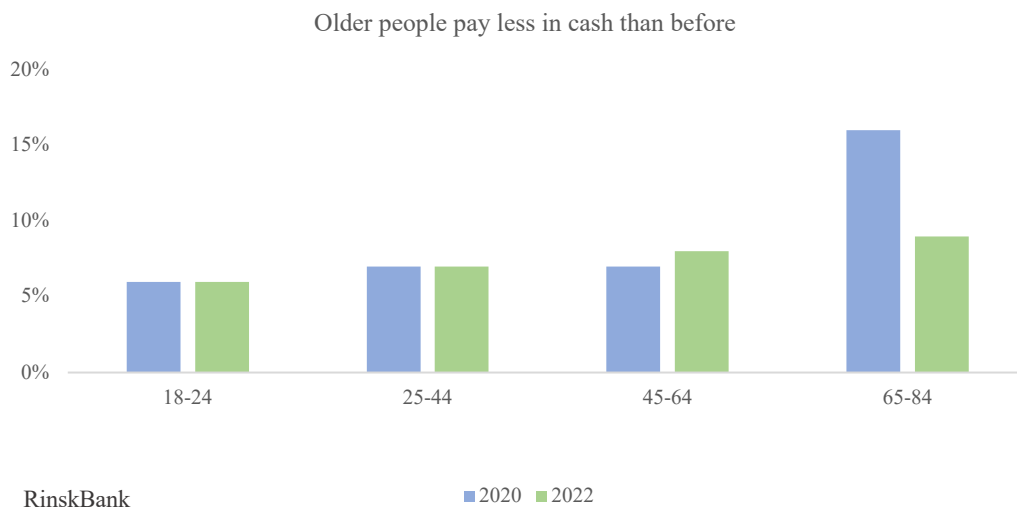


Figure A 11: Share of payment methods in Denmark

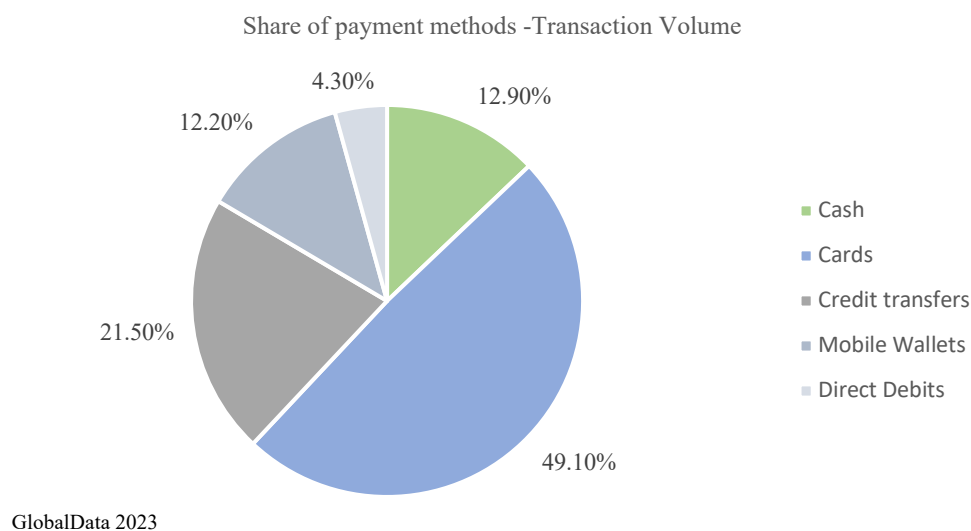


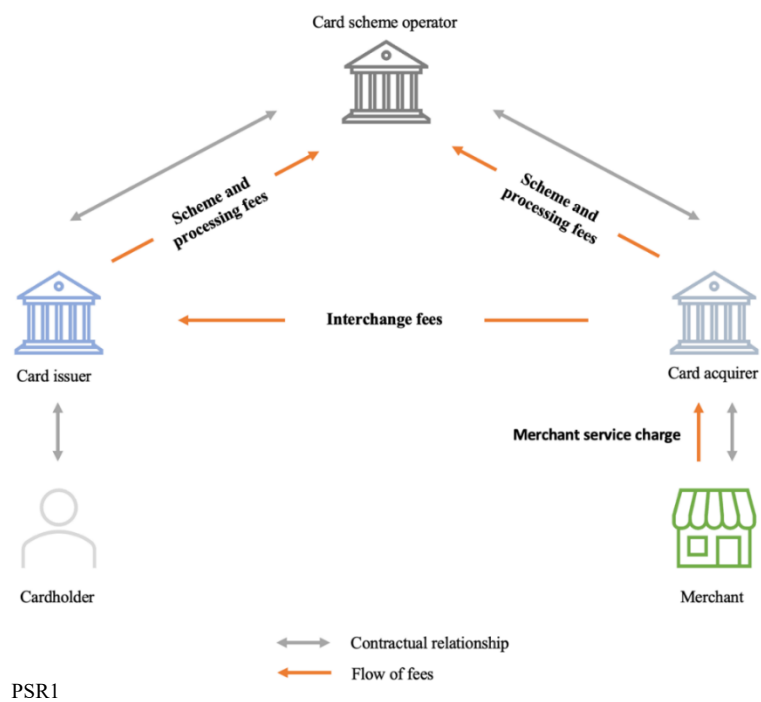
Table A 1: Economic and technological indicators

Country	Unbanked people (2022)	Digital Skills	Internet penetration (2023)	Number of POS terminals per 1,000 inhabitants
Highly Digitalised Payment Countries			97.30%	-
Denmark (DK)	16%	68.70%	98.10%	26
Sweden (SE)	17.10%	66.50%	97.20%	21
Moderately Digitalised Payment Countries			93.70%	-
Germany (DE)	16.30%	48.90%	93.10%	18
Poland (PL)	27.20%	42.90%	88.40%	30
Highly Cash-Based Payment Countries			88.70%	-
Portugal (PT)	23.40%	55.30%	85.10%	37
Italy (IT)	20.90%	45.60%	86.10%	66

GlobalData, Statista, EuroStat

B. Appendix of Chapter 4: Assessment of IFR in the Card Payment Market

Figure B 1: Fees flowing within the Four-Party Scheme



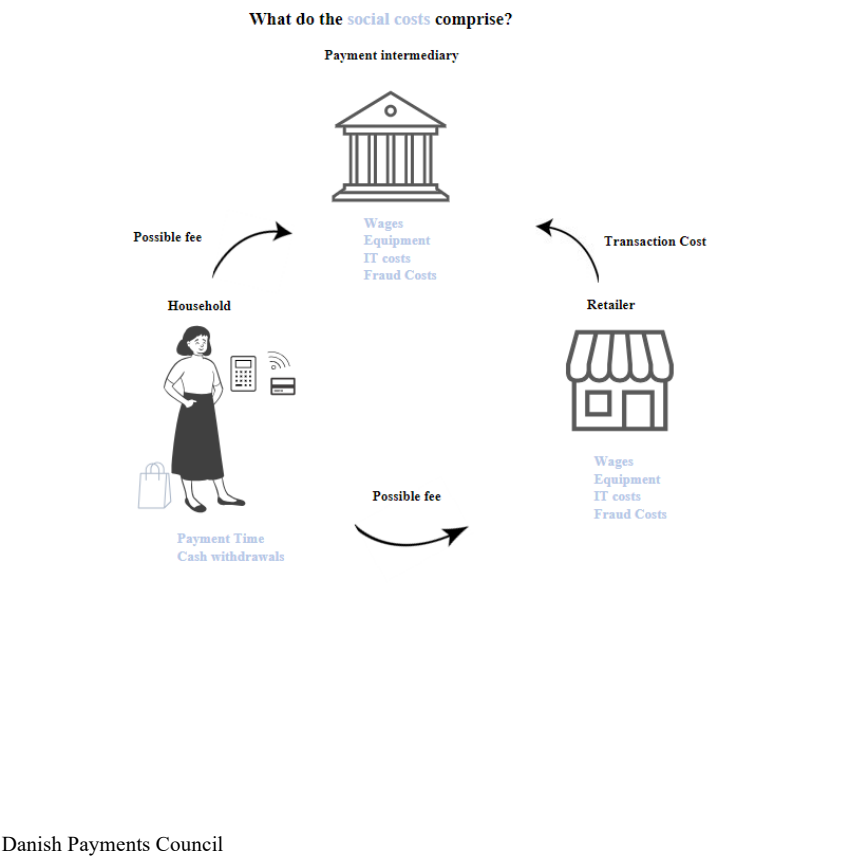
C. Appendix of Section 6: Economic Costs of the European C2B Market

Table C 1: Methodology Overview of national studies

Country	Denmark	Hungary	Italy	Poland	Portugal
Title	Series: Cost of payments in	Time is Money: A Survey of	Il costo sociale degli strumenti	Costs of payment instruments on	Custos sociais dos
Year of data collection	2016-2018	2018-2020	2016	2015; 2018	2017
Publication	2018	2022	2020	2019; 2020	2019
Payment instruments					
Cash	✓	✓	✓	✓	✓
Cheque	-	-	✓	-	✓
Debit Card	✓	✓	✓	✓	✓
Credit Card	✓	✓	✓	✓	✓
Direct Debit	(Betalingsservice and Leverandorservice)	✓	✓	✓	✓
Credit Transfer	✓	✓	✓	✓	✓
Mobile Payment (1)	✓	-	-	✓	-
Other	(calculated for P2P) Inpayment giro forms	Postal money orders	-	(BLIK and PeoPay) Prepaid cards and charge cards	Prepaid cards
Stakeholders					
Consumers/ Households	✓	✓	-	✓	✓
Banks and other payment intermediaries	✓	✓	✓	✓	✓
Retailers and other companies	✓	✓	✓	✓	✓
Cash-in-transit companies?	✓	✓	-	✓	-
Central banks?	✓	✓	✓	✓	-
Payment relationships					
C2B	✓	✓	✓	✓	✓
P2P	✓	✓	✓	✓	✓
B2B	✓	✓	✓	✓	-
Costs Concepts					
Social Costs	✓	✓	✓	✓	✓
Private Costs	-	-	✓	✓	✓
Representativeness of data					
Banks and other payment intermediaries					
Sample size	5 banks 2 card companies	16	15	10 banks 10 infrastructure providers 52%-66% (banks)	7 banks
Market share	70%	close to 100%	70%	50%-99% (infrastructure provider)	82%
Retailers and other non-financial companies					
Sample size	2148	300 retailers (including 3 large) 300 other companies	403	1302	245
Consumers					
Sample size	1202	1500	n/a	-	825

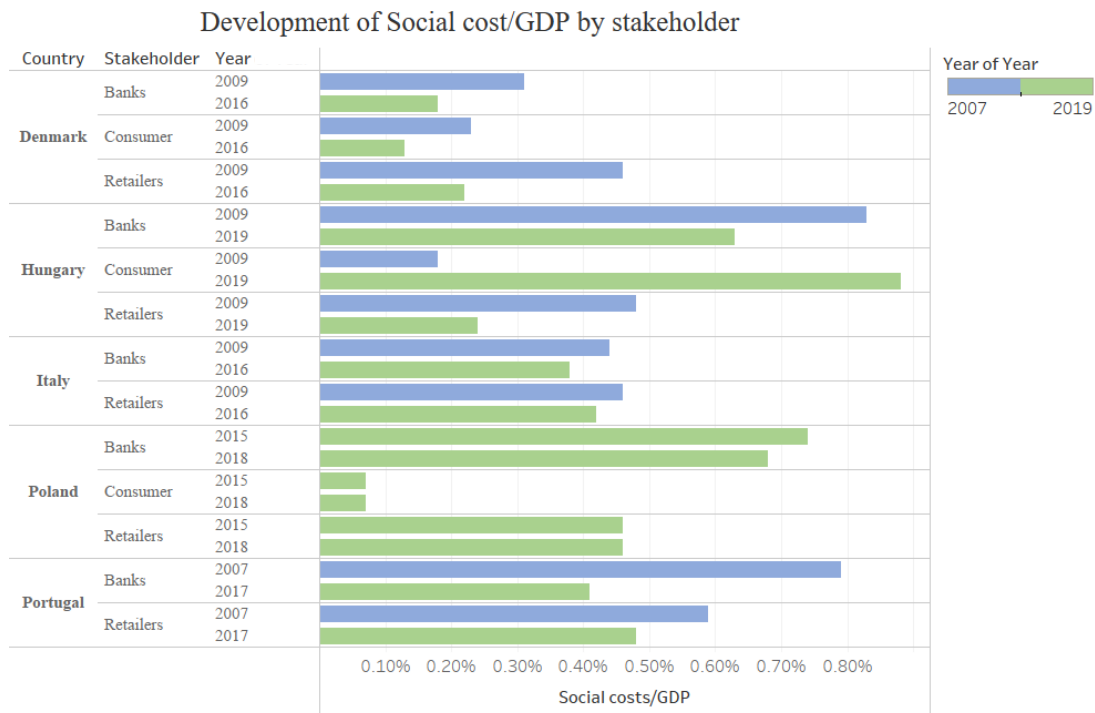
Junius et al. 2022

Figure C 1: Social Cost in Three-Party-Model



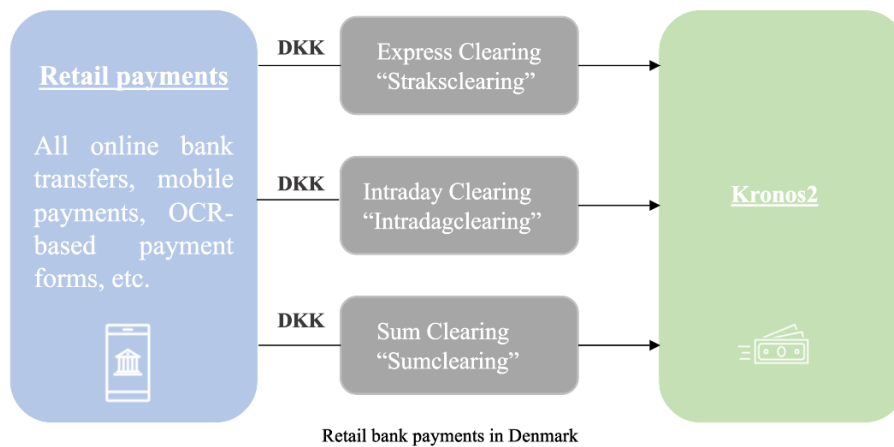
Danish Payments Council

Figure C 2: Social Cost by Stakeholder



Junius et al. 2022

Figure C 3: Payment Infrastructure in Denmark



Danmarks Nationalbank 2021

D. Appendix of Section 6: Social Cost Model

Equation D 1: Formula Min-Max Normalization

$$X' = \frac{x - xmin}{xmax - xmin}$$

Equation D 2: Formula CAGR

$$CARG = \left(\frac{Final\ Value}{Starting\ Value} \right)^{\frac{1}{N}} - 1$$

Equation D 3: Formula Interpolation

$$y = ymin + \frac{(x - xmin) \cdot (ymax - ymin)}{(xmax - xmin)}$$

Table D 1: Overview Social Cost in Europe

Countries	Available Social Cost/GDP <i>national report</i>	Index	Total Social Cost/GDP (2022) <i>extrapolated</i>
Denmark	0.53%	0.50	0.00%
Hungary	1.75%	0.12	0.00%
Italy	0.80%	0.16	0.00%
Poland	1.21%	0.19	0.00%
Portugal	0.99%	0.20	0.00%

Countries <i>extrapolated</i>	Index	Total Social Cost/GDP (2022) <i>interpolated</i>
Austria	0.28	0.67%
Belgium	0.38	0.51%
Czech Republic	0.25	0.72%
Estonia	0.32	0.60%
Finland	0.54	0.24%
Germany	0.26	0.71%
Ireland	0.45	0.39%
Greece	0.18	1.03%
Netherlands	0.64	0.15%
Spain	0.27	0.69%
France	0.33	0.59%
Croatia	0.18	1.03%
Latvia	0.22	0.77%
Lithuania	0.14	1.22%
Luxembourg	0.71	0.15%
Slovenia	0.21	0.79%
Slovakia	0.21	0.79%
Sweden	0.46	0.38%

Extrapolated Social Cost to GDP for all countries in the scope and calculations described in Chapter 7