

TESIS DOCTORAL

Regulatory Impacts on Card Payment Markets in Europe

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This thesis was driven by something known as ‘inat bosanski’ – Bosnian spite. In spite of nationalism, hatred, war, loss, tragedy, degradation, racism; in spite of being a refugee. I thank E², without whom this would not have been possible. I dedicate this to my parents Hajrudin & Suzana, primarily for their life-time ambition of seeing their child accomplish more than they have; an honourable aspiration which is impossible to master.

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Abstract

This thesis complements prevailing economic theory on card payment markets across Europe with industry observations and enables a critical assessment of the motives, assumptions, utilised theoretical models and consequences of policy intervention, specifically related to the interchange fee regulation. By analysing an empirical data set on acquiring, issuing and card association markets, a multivariate analysis of the subject matter is enabled, with the aim of drawing a bridge between the theoretical framework of two-sided markets and observable industry characteristics. Results show that recent policy intervention has caused several, and at times contradictory market reactions, insofar as the European Commission's motives and grounds for a regulatory involvement are concerned. A maximum price imposed on a single cost component, namely the interchange fee, disregarding total charges towards merchants, cannot a-priori be considered a mechanism to achieve ultimate cost reductions for consumers, especially in an environment where research on *pass-through* is scarce.

In contrast to forecasts made by the European Commission, results indicate that short-term issuer losses, determined to be above 4.5 billion Euro, are not offset by increases in card volume. A very low to low (and at times contradictory) correlation can be observed between the interchange fee and key payment metrics related to card adoption and usage. The major driver of payment patterns seem to be consumer habits and not fees for payment instruments. Further, contrary to widespread belief, acquirer markets show to be highly (and more) concentrated than issuer markets which are characterised by a relative degree of concentration, suggesting that issuing banks are in fact more elastic to price adjustments. Results reveal that concentration, alongside externalities, has a statistically significant influence on the setting of interchange fees in credit and debit card markets. Within credit card markets, the main drivers of interchange fees are inter-scheme concentration and acquirer concentration. Interchange fees in debit card markets are primarily influenced by issuer concentration and inter-scheme concentration. A market observation that has not been considered in literature thus far and requires further analysis is the widespread manifestation of issuer-acquirers across Europe.

Due to their nature, card scheme fees have not been dealt with in research and left out of scope in the recent regulation. Data shows that increasing card scheme fees are negatively impacting at least half of the European merchant population. Whereas the value of total card payment transactions has increased by 13% from 2015 to 2018, the share price of Visa, Inc. and Mastercard, Inc. increased by 70% and 94% respectively. Further concerns related to pass-through of savings (in particular from merchants to consumers), transparency of fees and the development of commercial cards (*steering mechanisms*) are discussed. The practical inability of merchants to surcharge (non-regulated) transactions due to the *must-take* argument remains a fundamental issue. If merchants had the possibility to benchmark total costs of card processing with national averages, it would allow for deeper insights and increase negotiation power with acquiring banks. Transparency measures and increased harmonisation with regard to scheme fees would also support the creation of a level-playing field. The legal grounds for a potential policy intervention are assessed based on previous antitrust cases in card payment markets. Three possible legal approaches are identified, namely an equalisation of issuer and acquirer scheme fees, a structural pricing change to increase acquirer involvement regarding the setting of scheme fees and policy intervention, whereby the most probable outcome of a policy intervention is a cost-based evaluation, comparable to the regulation of interchange fees. Findings suggest that there is a need to address the role and development of card scheme fees by regulators.

In light of the European Commission's pending review of the impacts associated with the interchange fee regulation, we find that an alternative approach, known as the *event study* is an appropriate tool to complement existing methodologies when addressing the topic of *pass-through*. Based on selected key event dates, the (interim) agreement between Mastercard and the European Commission to reduce cross-border interchange fees to 0.3% for credit and 0.2% for debit cards on 1 April 2009 is the single and most significant event. Results provide statistically robust evidence on the re-distribution of funds, highlighting merchant and consumer benefits as a direct causal effect. As a consequence of the regulation, total market capitalisation for the retail industry increased by 11.2 billion Euro (or 3.6%) on the event date. This results in a partial pass-through rate of 46% from acquirers to merchants. Consumer benefits directly related to the regulatory action will most probably lie in the region of up to 7.5 billion Euro; a final assessment is dependent on a richer (acquirer) data set and remains to be conducted.

Keywords: Regulation, Card Payments, Interchange fee, Competition, Two-sided markets, Event study, Pass-through, Card association

JEL Classification: D22, D43, G14, G2, K21, L1, L41, L5

Resumen

La presente tesis doctoral analiza el mercado de tarjetas de pago en Europa y el impacto sobre dicho mercado de las políticas regulatorias, principalmente aquellas relacionadas con las tarifas aplicadas sobre las transacciones pagadas mediante tarjeta. A lo largo del trabajo de investigación realizado se complementa la teoría económica predominante que explica el funcionamiento de los mercados de tarjetas de pago, y se lleva a cabo una evaluación crítica de los motivos, supuestos, modelos teóricos utilizados y las consecuencias derivadas de las políticas de intervención, especialmente de aquellas relacionadas con la regulación de las tarifas aplicadas en los intercambios. A partir de un conjunto de datos sobre adquisición, emisión y asociación de tarjetas, se lleva a cabo un análisis multivariante sobre la materia, con el objetivo de poder establecer un nexo entre el marco teórico de los denominados mercados bilaterales y las características observadas en el mercado de tarjetas de pago en Europa. Los resultados muestran que las recientes políticas de intervención han generado importantes reacciones en los mercados, en algunos casos contradictorias, en relación con los motivos y las bases que justifican la regulación por parte de la Comisión Europea. La imposición de un precio máximo sobre un solo componente de los costes asociados a las tarjetas de pago, es decir sobre la tarifa aplicada en el uso de tarjetas, sin tener en cuenta la carga total que recae sobre los comerciantes, no puede considerarse, a priori, como un mecanismo que permita reducir el coste final al que se enfrentan los consumidores, especialmente en un entorno en donde la investigación existente sobre el denominado “*traspaso de costes*” es bastante escasa.

En contraposición a las previsiones realizadas por la Comisión Europea, los resultados sugieren que las pérdidas a corto plazo que sufren los emisores, las cuales se suponen por encima de los 4,5 billones de euros, no se ven compensadas por el incremento en el volumen existente de tarjetas de pago. La correlación observada entre la tarifa aplicada a los intercambios y algunas de las principales métricas sobre el uso y la adopción de tarjetas de pago es bastante baja y en ocasiones contradictoria. Entre los determinantes de las pautas de pago, los hábitos de los consumidores parecen ser clave, algo que no ocurre con las tarifas aplicadas a los instrumentos de pago. Además, y en contraposición a la creencia generalizada, los mercados de adquisición de tarjetas de pago muestran un mayor grado de concentración que los mercados de emisión de tarjetas de pago, caracterizados por un bajo nivel de concentración, lo que sugiere que los bancos emisores presentan una mayor elasticidad ante ajustes de precios. Los resultados muestran que el grado de concentración, junto con las externalidades generadas, tienen una influencia estadísticamente significativa a la hora de fijar las tarifas sobre los intercambios en los mercados de tarjetas de crédito y débito. Dentro del mercado de tarjetas de crédito, uno de los principales determinantes de las tarifas aplicadas es el grado de concentración de los adquirentes. Por su parte, las tarifas aplicadas sobre los intercambios en los mercados de tarjetas de débito están determinadas principalmente por el grado de concentración de los emisores. Una característica del mercado, que hasta el momento no ha recibido prácticamente atención en la literatura, y que requiere un análisis más detallado, es la manifestación generalizada de los emisores-adquirentes en toda Europa.

Como consecuencia de su naturaleza, el esquema de tarifas aplicadas a las tarjetas de pago no ha sido objeto de estudio y no se ha tenido en cuenta en la regulación reciente. Los datos muestran que el esquema de tarifas aplicadas tiene un efecto negativo sobre al menos la mitad de la población de comerciantes europeos. A pesar de que el valor total de las transacciones realizadas con tarjetas de pago ha crecido en un 13% entre 2015 y 2018, el precio de las acciones de Visa Inc. y Mastercard Inc. se incrementó en un 70% y en un 94% respectivamente. Asimismo, se discuten algunas cuestiones adicionales relacionadas con el “traspaso de costes” a los ahorros (de los comerciantes a los consumidores), el grado de transparencia de las tarifas impuestas y la evolución de las tarjetas de pago comerciales. Por su parte, la incapacidad de los comerciantes de establecer un recargo sobre las transacciones realizadas sigue siendo una cuestión fundamental. Si los comerciantes tuvieran la posibilidad de comparar los costes totales relacionados con las tarjetas de pago con el promedio a nivel nacional, tendrían un conocimiento mayor y su capacidad negociadora frente a los bancos se vería incrementada. Una mayor armonización y mayor transparencia en relación con los esquemas de tarifas aplicadas favorecería la creación de un juego más equitativo entre comerciantes y oferentes de tarjetas de pago. También se evalúan las bases legales para una hipotética política de intervención a partir de antiguos casos observados de monopolio en el mercado de tarjetas de pago. Se identifican un total de tres posibles enfoques legales: igualación del esquema de tarifas de emisores y adquirentes, un cambio en el proceso de fijación de precios con el fin de aumentar la participación de los demandantes de tarjetas de pago en el establecimiento de tarifas, y la política de intervención. Los resultados sugieren que es necesario abordar el papel que juegan los reguladores en la fijación de tarifas en el uso de las tarjetas de pago.

A la espera de los resultados obtenidos por la Comisión Europea en su revisión del impacto derivado de la regulación de las tarifas aplicadas, en este trabajo se pone de manifiesto que el enfoque alternativo denominado “estudio de eventos”, es una herramienta adecuada que complementa las metodologías existentes para analizar el denominado “traspaso de costes”. A partir de algunos eventos clave seleccionados, cabe señalar el acuerdo entre Mastercard y la Comisión Europea para reducir las tarifas aplicadas a los intercambios transfronterizos al 0.3% y al 0.2% para los pagos con tarjetas de crédito y de débito respectivamente, con fecha 1 de abril de 2009. Los resultados proporcionan evidencia estadísticamente robusta de que se ha producido una redistribución de fondos, lo que supone un efecto causal directo sobre los beneficios de comerciantes y consumidores. Como consecuencia de la regulación, la capitalización total en el sector del comercio minorista se incrementó en 11,2 billones de euros (un 3.6%) en la fecha arriba señalada. Este resultado, se produce en un entorno con una tasa parcial de transmisión de costes de un 46%. El beneficio que experimentan los consumidores derivado de la regulación se situará probablemente por encima de los 7.5 billones de euros.

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I. List of abbreviations

AAR	Average Abnormal Returns
ATV	Average Transaction Value
ATM	Automated Teller Machine
CAAR	Cumulative Average Abnormal Return
CNP	Card Not Present
CP	Card Present
CR5	Concentration Ratio of top 5 firms
DR	Discount Rate
GDP	Gross Domestic Product
EC	European Commission
EEA	European Economic Area
ELV	Elektronisches Lastschriftverfahren
EMV	Europay International, Mastercard and Visa
EU	European Union
EUR	Euro
FPT	Full Pass Through
FT	Financial Times
HCSE	Heteroscedasticity-Consistent Standard Error
HHI	Herfindahl- Hirschman Index
IC+	Interchange Plus
IC++	Interchange Plus Plus
IFR	Interchange Fee Regulation
IQR	Interquartile Range
M&A	Merger and Acquisition
MIT	Merchant Indifference Test
MOTO	Mail-Order-Telephone-Order
MSC	Merchant Service Charge
NPT	No Pass Through
NPV	Net Present Value
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares

PED	Payment Entry Device
POS	Point of Sale
PPT	Partial Pass Through
PSP	Payment Service Provider
R&D	Research and Development
SEPA	Single European Payments Area
SME	Small and Medium Enterprises
TFEU	Treaty on the Functioning of the European Union
UK	United Kingdom
US	United States
USD	United States Dollar
VIF	Variance Inflation Factor
WLS	Weighted Least Squares
WSJ	The Wall Street Journal

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1. Introduction

The overarching themes of this paper are payments and payment systems. At a general level, the term payment system refers to the complete set of instruments, intermediaries, rules, procedures and processes which facilitate the circulation of money in a country or currency area. All payment transactions, irrelevant of the underlying good, asset or service sold have two settlement components. One is the delivery of a product or service and the other is the transfer of funds. A payment can therefore be defined as a transfer of funds by the payer which discharges an obligation towards the recipient of the payment, the payee, based upon its fulfilment. Payments can be classified based on the different types of actors involved in a transaction (European Central Bank, 2010).

1. Wholesale payments are payments between financial institutions and are characterised by a high transaction value and critical timing (clearing and settlement have a large commercial impact).
2. Retail payments are payments between non-financial institutions including private households, non-financial corporations or government agencies. They are characterised by lower transaction values but a comparatively higher number of transactions.

In 2015 wholesale payments via real-time gross settlement systems amounted to 470 trillion Euro (hereafter EUR) across the Eurozone via TARGET 2¹ and 835 trillion US Dollars (hereafter USD) across the United States via Fedwire funds transfer (Board of Governors of the Federal Reserve System, 2016). Both the European Central Bank and the Federal Reserve state that the primary objective of a payment system is to secure safety, efficiency and broad accessibility for market participants in order to ensure currency and financial stability. In comparison, non-cash², retail payments amounted to 277 trillion EUR (19 trillion EUR excluding credit transfers) (European Central Bank, 2016a) and 178 trillion USD (87 trillion USD excluding credit transfers) respectively (Board of Governors of the Federal Reserve System, 2016). These numbers can best be put into perspective when compared to the Gross Domestic Products (hereafter GDP) of the two regions. The European Union generated a GDP of 16 trillion USD, compared to 18 trillion USD generated by the United States (The World

¹ According to the European Central Bank's report TARGET 2 processed 91% of the total value settled by large-value payment systems in Euro (European Central Bank, 2016).

² Whilst it is of interest to reflect on the size and development of cash compared to non-cash payments, this thesis will not be dealing with cash as a payment instrument. For one this is not regarded as material to the research questions at hand, and two it is difficult to obtain accurate data on the prevalence of cash. Approaches to estimate cash usage include but are not limited to calculations based on national account data, VAT statistics, Automated teller machine (hereafter ATM) withdrawal data and surveys of payment behaviour (Krüger and Seitz, 2014). Schmiedel, Kostova and Wiebe (2012) determine social and private costs of retail payment instruments including cash. Kleine, Krautbauer and Weller (2013) try to derive the private and social costs of cash in Germany.

Bank Group, 2017) in the same year. For both regions, the volume of payments is a multiple of the national GDP, namely 17 (European Union) and 10 (United States) times the respective GDP. The significance of an efficiently functioning payments system to the overall stability and growth of both economies is obvious.

In 2014 cashless payments, for the first time, overtook the use of notes and coins in the United Kingdom (UK). According to the Payments Council UK the use of cash by consumers, businesses and financial organisations fell to 48% of total payments. The remaining 52% was made up of electronic transactions including credit transfers, cheques and cards (Peachey, 2015). According to a news release by the UK Cards Association (2014) three-quarters of all retail spending is already made using debit and credit cards – up from less than half (46.5%) in 2003 – highlighting a clear shift in consumer behaviour.

In Europe card payments have amounted to 47.5 billion transactions (up by more than 50% since 2009), generating a total value of 2.4 trillion EUR. 66% of this is attributable to debit card transactions and 34% to credit cards; a two-third debit to one-third credit share can be observed for the last 10 to 15 years and has remained relatively constant (European Central Bank, 2000-2014). Additional debates in Europe related to a maximum limit of cash transactions, the abolishment of the 500 EUR note or potentially a complete abolishment of cash (Plickert, 2016) implicate the importance of card payments today, especially when considering their increasing share in the payments mix. With a growing importance, specifically in the retail sector, card payments are under increasing scrutiny by numerous market actors.

Based on results from their *Survey on merchants' costs of processing cash and card payments*, the European Commission (2015) finds that the share of cash in face-to-face transactions amounts to approximately 60% by number of transactions and to around 30% by total volume of transactions in 10 European countries. Average transaction values (hereafter ATV) are 15 EUR for cash, 42 EUR for debit cards and 51 EUR for credit cards in the sample. The results strongly vary on a country-by-country basis and range from an 85% share of cash (by number of transactions) in Austria to only 30% in France and a 50% share of cash (by value of transactions) in Germany to below 20% in Sweden.

For Germany the share of cash transactions (in number of face-to-face transactions) is approximately 80%, while debit cards account for roughly 12% and credit cards for 3%. Based on volume of transactions, the share of cash transactions for Germany is reduced to around 50%, with debit cards achieving 26% and credit cards 9%. Overall, findings show that countries such as Belgium, France, Netherlands, Sweden and UK have a comparatively high adoption of cards and Austria, Germany, Italy, Poland and Spain a relatively low adoption (European Commission, 2015).

Schmiedel, et al. (2012) base their analysis on central bank data (including online transactions), showing similar findings. Cash has a (weighted average) share of 65% across the EU (in terms of volume), followed by debit cards (12%), credit transfers (10%), direct debit (9%) and credit cards (2%). Country specific features are also observable within the payment mix, with cash ranging from 95% in Romania to 27% in Sweden and debit cards having a share of 41% in Denmark and below 1% in Greece. Based on specific metrics linked to adoption of payment methods, ATMs, costs of processing and others, they create 5 country clusters, grouping similar countries together, thereby underlining the (still) prevalent differences between European payment markets. The 5 clusters are (1) Denmark, Finland, Sweden; (2) Austria, Germany, Netherlands, Luxembourg; (3) Belgium, Estonia, Slovenia, Portugal, United Kingdom, Spain; (4) Cyprus, Malta, Greece, Italy, Ireland, France; and (5) Bulgaria, Czech Republic, Slovakia, Poland, Romania, Hungary, Lithuania, Latvia.

The Euro area is the second largest cashless payments area worldwide, after the United States (hereafter U.S.). A major driver of this is the progress made on the project Single European Payments Area (SEPA) and the arising principles developed by the European Payments Council to ensure that:

- Cardholders are able to pay with one card across the European Union (EU)
- Merchants will be able to accept all cards via a single terminal
- Security is increased by replacing magnetic stripe technology with Chip & PIN technology and
- Card processors will be able to offer their services across all countries within the EU.

Whilst these common principles have driven a unification, consumers' payment behaviour still varies considerably across the member states (European Central Bank, 2012). This is observable when comparing the number of card payment transactions per capita in the EU (European Central Bank, 2000 - 2014). Whilst a year-on-year increase is observable for all member states, the absolute number of payments varies strongly. In 2014 it is highest (on average above 250) for Finland, Denmark and Sweden and lowest (all below 50) for Germany, Greece, Italy, Malta, Slovakia, Bulgaria, Hungary, Poland and Romania. When observing the value of card payment transactions per capita, a comparable image is depicted. For the analysed 28 countries in 2014, the minimum value is 318 EUR for Bulgaria and 13,138 EUR for Luxembourg. The median lies at approximately 3,000 EUR per capita.

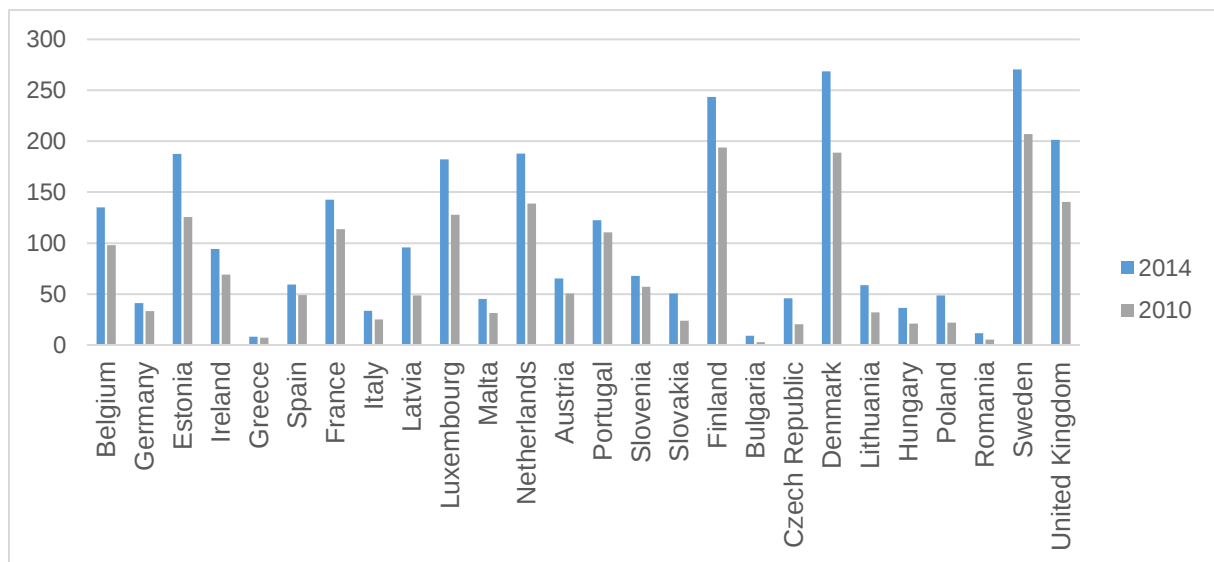


Figure 1 Number of card payment transactions per capita in the EU (based on European Central Bank, 2000-2014)

This discrepancy between countries can also be highlighted by the differing interchange rates. In the graph below, interchange fees in 2014, prior to the European Commission's (hereafter EC) regulatory intervention and cap, are depicted. As in some cases the interchange fee consists of a fixed monetary amount instead or alongside an ad valorem component, monetary amounts have been transformed into percentages by use of the average (mean) transaction value for the corresponding year and country. By 2014 some of these countries have already pursued regulatory intervention with regard to interchange fees and these have been either lowered over several years (see Spain) or capped at a certain amount (in the case of Switzerland Maestro payments are capped at an interchange fee of 0). Also notable is the fact that in some countries fees are capped per card association (Visa in Slovenia), per card type – credit/ debit (in Austria) or per payment instrument – payment cards (in Poland). Comparing the interchange fee with the card transaction figures per capita, no evident correlation is observable at first glance. Although, countries with a low (high) card adoption seem to have a high (low) interchange fee (see Germany for one and Finland for the other), numerous cases exist where this does not apply (see Portugal, Hungary or Austria and others).

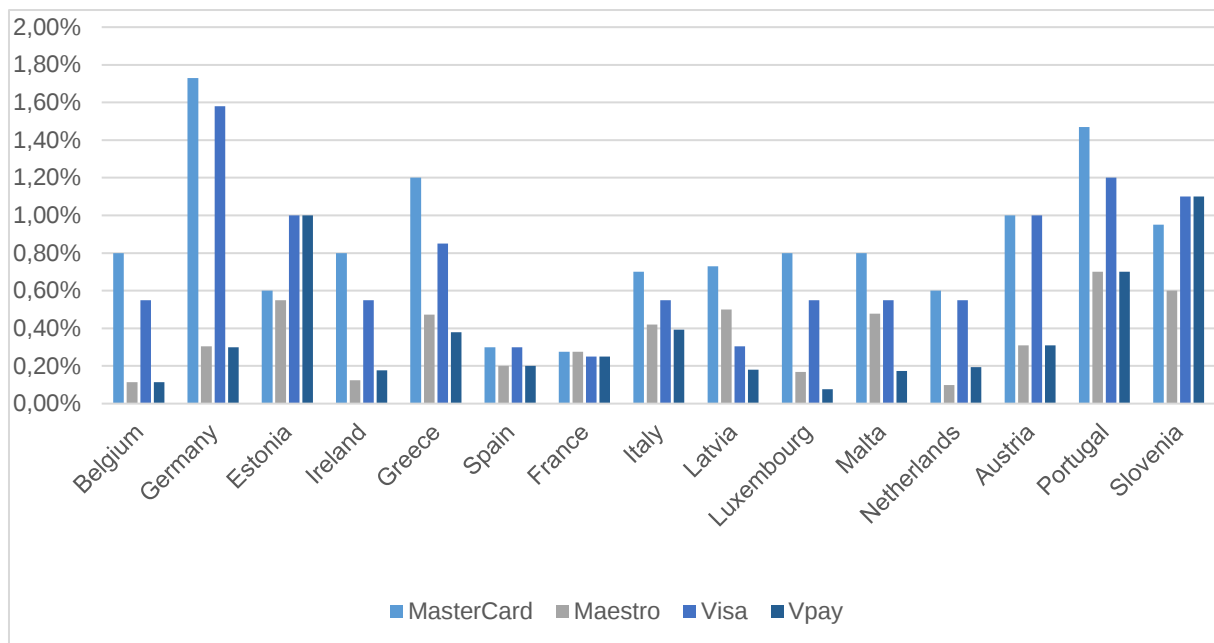


Figure 2 Interchange fees in 2014 for European countries (based on data from Visa Europe Services Inc., 2014 and Mastercard International Inc., 2014)

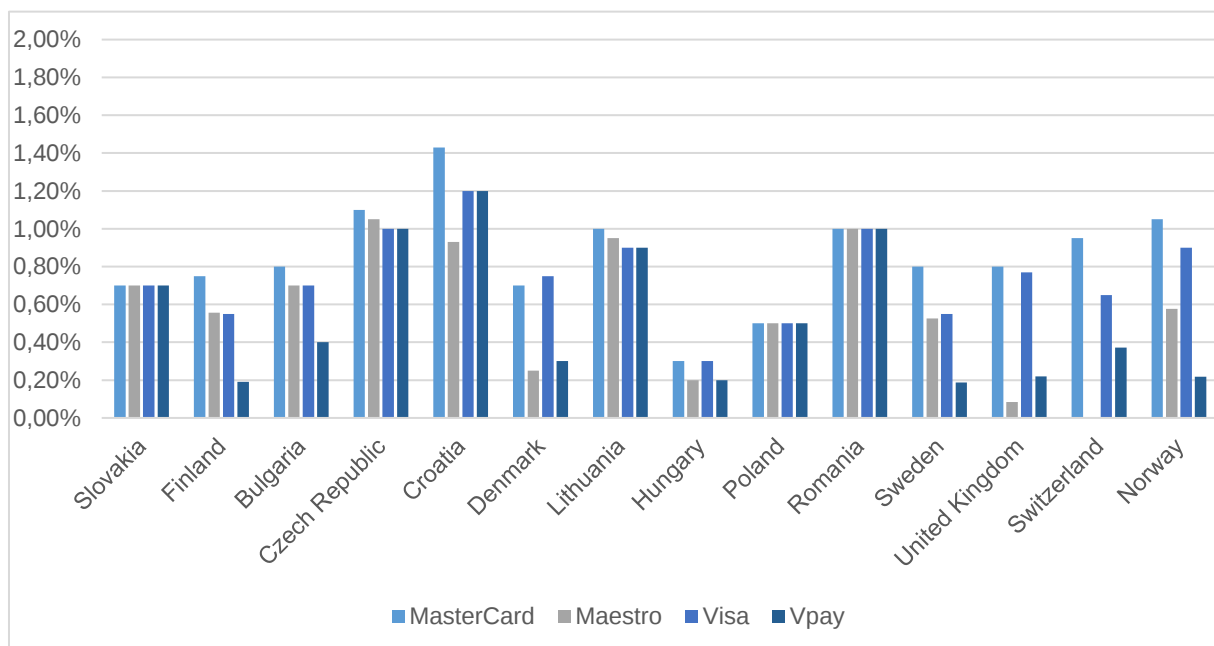


Figure 2 (continued): Interchange fees in 2014 for European countries

2. Area of research

Two-sided or network markets such as payment or videogame platforms, newspapers and marketplaces all exhibit usage and membership externalities (Rochet and Tirole, 2004). The value of membership to one user is affected by the addition of a further or the loss of an existing user. In non-mature network markets buyers must, when deciding to join a network, form expectations about availability, price, and quality of network components that they will be purchasing in the future. The demand for a network good is therefore a function of both its price, and the expected size of the network, whereby a purchase decision will only be made if the user's private benefit exceeds the costs of the good. When further users join the network, adoption externalities will be exerted (Katz and Shapiro, 1994).

The equilibrium in network markets can diverge from the social optimum due to (1) imperfect competition caused by economies of scale and product differentiation; (2) the importance of R&D and innovation, together with the high chance of tipping, resulting in a monopoly and (3) un-internalized network externalities in any market transaction. Although such characteristics may draw attention from policy makers to attempt and regulate these markets, the likelihood is that they will lack the necessary information to achieve the goal of maximising social surplus, as systematic empirical research and data is lacking in this field (Ibid).

Drawing upon above characteristics of network systems, the functioning of four-party card payment markets will depend on membership and participation by both cardholders and merchants. Membership within the payment network will be valued higher by cardholders when additional merchants sign-up and conversely, merchants' membership will be valued higher when additional cardholders join the system. At the point of simultaneous participation, in form of processed transactions, network externalities will be exerted upon the market participants. Cooperative card payment markets are represented by five major parties, namely cardholders and merchants, their respective issuing (cardholder) and acquiring (merchant) banks as well as the card association.

Card associations such as Visa or Mastercard offer authorisation, payment processing, settlement, and associated services linked to simplicity, security and ease of payment by effectively connecting acquiring and issuing banks to the same network from a legal and technological perspective. Additionally, card schemes define new card products and most importantly are in charge of setting the interchange fee; in line with regulations set by national legislation and governments (Mastercard, 2018) and (Visa, 2018).

The services provided by issuing banks often differ and are adapted to customers' needs (mass market versus high net worth individuals). Issuing banks also define the card portfolio (brand) to be issued and the positioning with regard to co-badging³ and other strategic aspects. Shared processes (between issuer and acquirer) include authorisation of payments, routing and switching as well as fraud management (Huch, 2013). The largest issuers in the U.S., measured by outstanding volumes on credit cards are JP Morgan Chase with 126 billion and Bank of America with 101 billion USD. In the EU the largest issuers are located in the United Kingdom (Barclays with 28 billion USD), followed by Spain (BBVA with 2 billion USD) (HSN Consultants Inc., 2014).

The acquiring bank enables the commercial acceptance of card payments by linking the merchant to the payment network. If, in addition to the commercial services, the technical ability to process payments is provided then acquirers tend to be also referred to as network service providers. If card transactions are acquired and processed, both the acquirer and network service provider need to be in possession of a licence issued by the card associations. Some network service providers choose to exclusively act as technical payment service providers and are not part of the commercial agreement of acquiring card data but rather in routing this information from the point of sale to the acquirer. As these processes require a high degree of specificity and are generally not standardised, each project requires sufficient transaction volumes to result in profitability (Huch, 2013).

Merchants are charged a Merchant Service Charge (MSC) or Discount Rate (DR) per transaction. In addition, if complementary services are provided by the acquirer such as gateway functionality or hardware, i.e. a Point of Sale (POS) terminal, further per item or monthly fees may be levied. The avoidance of missed sales due to a credit line, efficient reconciliation, enhanced reporting and customer tracking, greater security and the reduction of delays at counter are some of the benefits of cash substitution. Cardholders benefit from rewards or cash-back programmes and the benefit of credit lines and payment traceability (Tirole, 2011). In return, an annual cardholder fee is generally levied by the issuing bank.

The interchange fee is a transfer payment that balances demand from the different network participants and allocates costs in a proper fashion. The network impact of alterations in the size and structure of the interchange fee will largely depend on the pass-through of costs by each member and is thus closely related to the competitive characteristics within each

³ *Co-badging* or *co-branding* implies that issued cards carry two distinct brands. This is enabled via a cooperation agreement between the national card system (for example Girocard in Germany) and the international card system (Maestro). When the card is used within national boundaries it is processed via the local brand (Girocard). When it is used abroad the transaction is processed via the international brand (Maestro), providing customers more flexibility and a broader product scope (European Central Bank, 2006).

industry segment. Card associations, issuing and acquiring banks, merchants and consumers cooperate within the system but also compete at different levels.

Below figure shows the interactions between the market participants in a cooperative card network. In a proprietary (three-party) environment (or in an *on-us*⁴ transaction) the interchange fee is set by the same party that acquires it. Card association, issuer and acquirer are essentially one organisation. This applies to payment networks such as American Express and Diners. Every time a card payment is made, the issuer (on behalf of the cardholder) is instructed to pay the acquirer (on behalf of the merchant) for the value of the goods or services. The interchange fee typically flows in the opposite direction: it is paid by the acquirer to the issuer. Besides interchange fees, there are up to four additional fees that can be found in a four-party card transaction, namely the MSC, the cardholder fee and two scheme fees paid by the respective issuer and acquirer to the card associations.

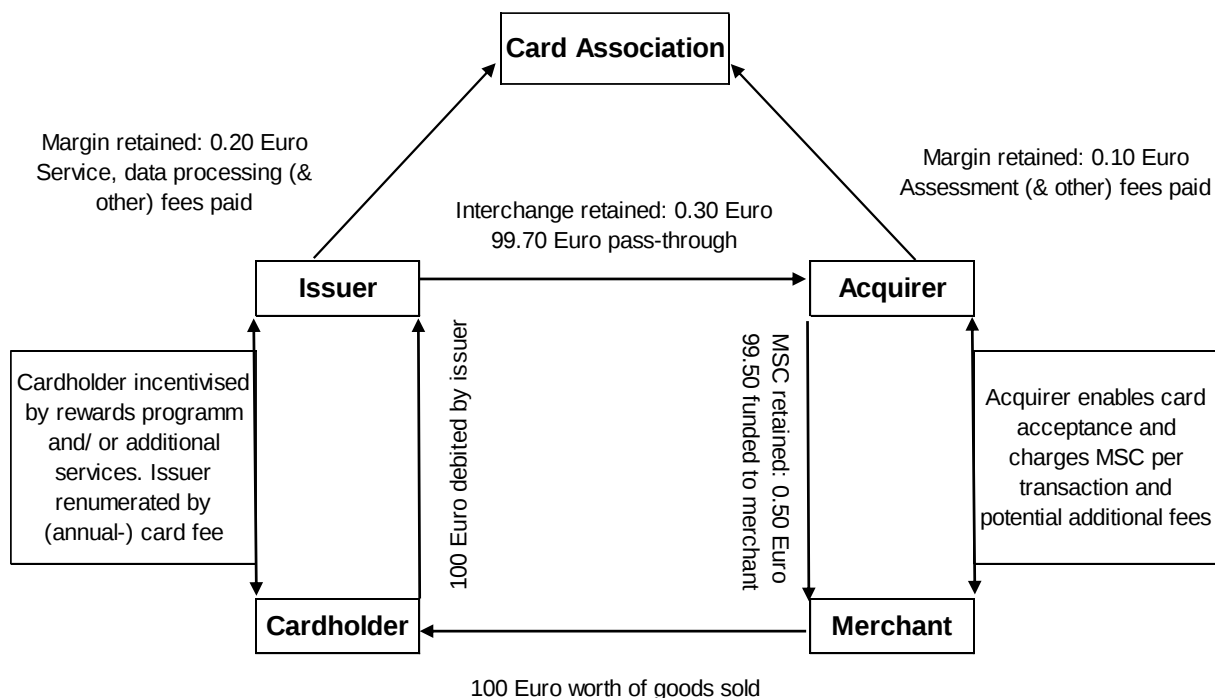


Figure 3 Flow of payments in a card transaction within a four-party system (based on Rochet and Tirole, 2003a)

Often the cardholder fee will be depicted as a negative figure when modelling payment markets as the derived benefits (including reward programs or cash-back) can be larger than the annual card fee, which itself must not be charged by every issuer. The scheme fees are

⁴ An on-us transaction implies that the acquiring of the transaction on behalf of the merchant and the issuing of the card towards the cardholder are covered by the same banking organisation. The settlement of payment can be performed in-house within one financial institution if the accounts to be debited and credited are held within that institution. Due to the increased processing efficiencies interchange fees are lower for such transactions and generally agreed bilaterally between the bank and the merchant (European Central Bank, 2010).

charged for the membership in the card network, whereby the size of the fees is generally negatively correlated to the number of cards issued and/ or the number of transactions acquired⁵. These are the sources of profit for the respective card association and a direct cost to both issuers and acquirers (Börestam and Schmiedel, 2011). Whilst the MSC is significantly driven by the level of interchange fees, other cost elements include the acquirer scheme fee as well as an acquirer profit margin, generally referred to as a processing fee (European Commission, 2007).

$$MSC = \text{Interchange Fee} + \text{Acquirer Scheme Fee} + \text{Processing Fee}$$

Formula 1 Components of Merchant Service Charge

Based on individual evaluations of costs and derived benefits for the enablement of card payments, an agreement is made between the acquirer and merchant regarding the size of the MSC, which is to be debited from every transaction. Whilst the merchant can surcharge⁶ a consumer for transactions settled via card instead of cash or a different means of payment, generally these costs will have been included in the product's initial price. Surcharging has not been frequently exercised by merchants due to competition for consumers and restricting card scheme regulations in numerous countries⁷. The acquirer will retain the processing fee for provisioning of services, whilst an acquirer scheme fee will be paid to the card association. The remainder of the MSC, namely the interchange fee, flows to the consumer's issuing bank. The issuing bank will in turn deduct a portion of the interchange fee (issuer scheme fee) to be transferred to the card association, whilst retaining the residual. This *net-interchange fee* is a transfer payment to equalise marginal benefits and costs for the issuing side, as the sum of accrued fees from card products is generally lower than the marginal costs incurred.

Assuming an MSC of 0.5% and a transaction value of 100 EUR (paid by the cardholder), the merchant is charged 0.50 EUR by the acquirer. As per above formula, these 0.50 EUR will contain the interchange fee, scheme or assessment fees as well as an acquirer processing fee. The interchange fee, passed on from acquirer to issuer, is set at 0.3% which is the current interchange level for credit card transactions within the European Union. The acquirer and issuer scheme fees are set at 0.1% respectively and are paid to the card

⁵ Economies of scale play a significant role for both issuers and acquirers.

⁶ Surcharging can be classified as an additional charge by the merchant towards the consumer for using a certain type of payment instrument at the point of sale. Generally, this is done to steer consumers towards a more preferential (and potentially cost effective) payment instrument for the merchant (Rysman and Wright, 2014). In a wider sense surcharging is also linked to payment discounts provided by the merchant for the use of a specific payment instrument (for example cash) as this effectively implies a higher price for the same goods or services if settled via a different instrument (such as cards). Article 11 of the regulation on interchange fees for card-based payment transactions deals with surcharging and steering rules (Council of the European Union and European Parliament, 2015).

⁷ For further discussions on surcharging see Wright (2012), Rochet and Tirole (2002), Zenger (2011) and Gans and King (2003).

association. From the initial MSC of 0.50 EUR, the acquirer (issuer) will retain 0.10 EUR (0.20 EUR). The depicted figures closely resemble actual figures and exemplify costs for a domestic⁸ transaction within the European Union.

Assuming a competitive and functioning card market, all prices discussed above (cardholder fee, processing fee and even scheme fees to a large extent) can be assumed to be in equilibrium, based on demand and supply elasticities of the relevant market participants. However, one fee component, namely the interchange fee, differentiates four-party card networks from other commercial set-ups and poses a complex task when trying to determine its optimal size. The interplay of different actors regarding the interchange fee⁹, the efficient setting of a privately versus socially optimal interchange fee and the economics of card payments in general have been addressed widely in recent literature. The most relevant findings are summarised below.

Alongside an historical overview on the evolution of these payment systems, Baxter (1983) asserts that the demand for a private good, in this case card payments, will be dependent on each group's evaluation of the good's marginal utility. Four-party card transactions will take place as long as the marginal utility of consumers and merchants is higher than the marginal costs incurred by issuers and acquirers. Due to the fact that transactional services require the acceptance and provision of a certain payment mechanism by both the merchant and consumer, the valuation of marginal utility of the specific service is contingent on the acceptability of this form of service by the other party.

Whilst total supply is defined as the sum of individual charges made to the merchant and consumer and total demand is an aggregate of merchant and consumer demand, the valuation of marginal utility of each transaction and hence the associated costs to each party, can (and in most cases, will) differ. Activities performed by one bank or another do not directly imply that the associated costs will also be borne by the bank performing them. Assuming a perfectly competitive market in which the sum of the two revenue streams, stemming from issuing (consumer) bank and acquiring (merchant) bank equal the sum of the two marginal cost streams, it follows that a transfer payment, known as the interchange fee, between issuer and merchant bank must take place so as to bring equality with regard to incurred marginal costs and marginal utility (revenue) to all parties at any given number of transactions (Ibid).

⁸ A differentiation between domestic (card issuer and merchant are located in same country), intra-regional or intra-European Economic Area (card issuer and merchant are located within same region) and international (card issuer and merchant are located in different regions) needs to be made as different prices (in terms of interchange and assessment fees) apply and certain regulations are only applicable to specific transaction types.

⁹ The interchange fee has historically been set by card associations. In recent history, there has been growing involvement by national governments and legislative authorities to influence the setting and level of interchange fees for payment transactions.

Key to his finding that the interchange fee is an efficient balancing mechanism for cooperative payment markets versus a complete set of bilaterally negotiated agreements is the assumption that both issuing and acquiring banks are behaving competitively and charging prices towards consumers and merchants corresponding to their marginal costs. Whilst Baxter (1983) critically reviews this notion at a later point, he (and most others until today) fails to provide any empirical evidence to support his findings.

In addition to the previously discussed technological benefits and costs associated with payments, Rochet and Tirole (2002) recognise that both consumers and merchants are strategic players and will have further motifs for card utilisation. Whilst a merchant can use card acceptance as a tool to attract customers, a consumer will, in addition to the technological benefit of relying on card payments, consider other potential charges that may be levied by the merchant for the payment¹⁰. Competition between different payment systems is also discussed.

Within a two-sided payment market, that is characterised by network externalities, Rochet and Tirole (2002) model several scenarios to enable a comparison between a privately (bank profit-maximising) and socially (welfare-maximising) interchange fee. The model assumes market power on the issuing side and competitiveness on the acquirer side. Issuing banks will be setting an optimal interchange fee and acquirers will be indifferent to this fee as it will be fully passed on to the merchant. Under the no-surcharge rule merchants will only accept cards if the interchange fee is equal or lower than the net cost to the merchant (equal to the average cardholder benefit). As competition within the issuing market increases, cards are made available to a wider clientele thereby lowering the average cardholder benefit. Merchants' resistance will increase as they are less inclined to take card payments and drive the maximum interchange fee down. If card issuers are the dominant party within card organisations, an interchange fee will be set that is higher than socially optimal and ultimately lead to card utilisation above the socially optimal level.

Following Rochet and Tirole (2002), system competition increases merchant resistance and may reduce social welfare by lowering the interchange fee. However, merchant resistance has been overstated in previous literature as non-technological benefits of card payments were disregarded. Abolishing the no-surcharge rule and allowing merchants to levy additional fees for card payments would result in a neutral interchange fee and card utilisation below the socially optimal level. By comparing for-profit¹¹ and cooperative payment systems they

¹⁰ Rochet and Tirole (2002) investigate market behaviour under the inclusion and exclusion of surcharging.

¹¹ At the time both Visa and Mastercard were non-profit member organisations, whereas three-party payment systems such as American Express or Diners were privately held corporations. Main findings

highlight the fact that whilst a for-profit card association can utilise two separate instruments, i.e. merchant discount and cardholder fee to optimise the market structure, a cooperative card scheme will have only one mechanism (interchange fee). Setting higher interchange fees may initially seem to be driving issuing banks' profits within a cooperative card association, however in case of perfect competition these benefits will be competed away and ultimately passed on to cardholders. In such cases it would be more advisable to set a lower interchange fee to ensure wider acceptance.

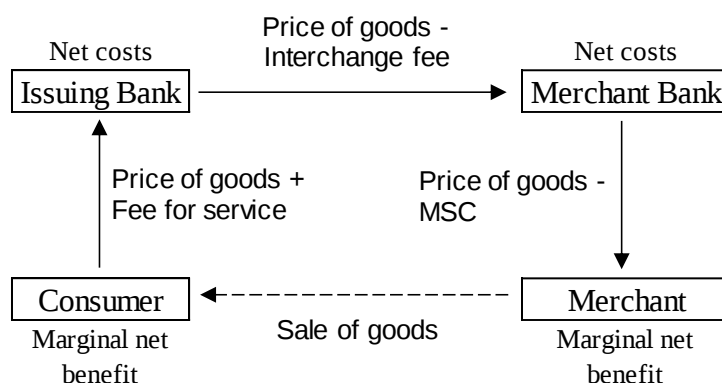


Figure 4 Payment flow within a four-party card transaction according to Rochet and Tirole (2002)

Figure 4 depicts the two-sided payment market as described by Rochet and Tirole (2002). A change in the level of interchange fees will only impact issuing banks' profits as merchant banks are passing the fee on at full extent. Issuing and acquiring banks incur net costs for the provision of services while consumers and merchants attain marginal net benefits. A socially optimal interchange fee results at the point where net marginal costs of issuing and acquiring less marginal net benefits of consumers and merchants equal the fee for service (cardholder fee). If, at equilibrium, total net costs less total net benefits are higher than the fee for service, the resulting interchange fee will be above the socially optimal level. Assuming issuer power within the card association, an interchange fee will be set that is equal to the (strategic) merchants' net benefit, taking into consideration the non-technical benefits of card acceptance. The privately optimal interchange fee may result in a fee equal to or higher than the socially optimal interchange fee and above the level determined by Baxter (1983).

By laying out the basic economic principles for the determination of interchange fees, Rochet and Tirole (2003a) examine the case for public regulation. Card payment markets are fundamentally classified as two-sided markets, whereby balancing pricing structures, i.e. transfer fees such as the interchange fee are essential for the exploitation of network

prevail today as the structure of four-party payment networks has not been altered by the privatisation of card associations.

externalities. Before public intervention is taken to regulate these markets, the identification of a serious market failure including the validation of its empirical relevance must be given. Further, the least discretionary way of addressing the market failure is to be pursued so as to avoid (further) market disruptions. Misunderstanding the economics of the problem and imposing cost-based regulations could cause substantial distortions to the industry, as there is no reason to assume that privately optimal interchange fees are, a-priori, higher or lower than socially optimal ones.

Whilst the setting of different prices towards different users within the network, based on demand elasticities is a characteristic present in other platform markets, the actual level of fees will be dependent on the costs incurred by issuers and acquirers for their provision of services, intensity of competition between different payment schemes and alternative means of payment as well as demand elasticities of cardholders and merchants. Interchange fees are set by the network in order to maximise total profit for its members; cardholder fee and merchant discount on the other hand result from competition within issuing and acquiring markets. It cannot be assumed that interchange fees are systematically inflated (or deflated) by card associations. The three main reasons why it is not in the interest of card associations to set interchange fees that deviate markedly from social optima stems from *network externalities*, as extensive demand reductions from one side of the market will spill-over to the other; *intra-system competition*, as much of the increases in interchange fees will be competed away and passed through from issuing banks to cardholders; and *inter-system competition*, which can alter the price structure and allocation of fees between the two sides of the market in the presence of market power (Ibid). As a result of this, any regulatory involvement in the setting of interchange fees will require an empirical analysis of these factors.

Schmalensee (2002) analyses the functioning of payment card systems as a moral hazard problem within a two-stage game between acquirers and issuers. He concludes that there is no economic basis for antitrust policy to favour proprietary (three-party) payment systems over cooperative payment systems. Whilst the interchange fee cannot solve the double marginalisation problem, it can mitigate problems caused by differences between issuing and acquiring sides. Like Baxter (1983), he advises that any market involvement should be viewed critically as it is highly unlikely that regulators will have sufficient information to implement a socially optimal interchange fee. As within a perfectly competitive market with no friction, any interchange fee would be consistent with a zero-profit market equilibrium, Schmalensee assumes a payment system composed of profit-seeking, imperfectly competitive acquiring and issuing banks, albeit asserting that acquiring markets have shown to be highly competitive. In this scenario the privately optimal fee depends mainly on differences in market power between issuing and acquiring banks rather than on their collective market power.

Findings suggest that in a non-extreme case the profit-maximising interchange fee also maximises total output as well as producers' and consumers' surplus.

Due to externalities, the size and sign¹² of the value-maximising interchange fee will be dependent on the system's objectives, differences in costs, intensity of competition and demand elasticities of issuers and acquirers, as well as on differences in spill-over effects between them. Schmalensee (2002) concludes that the more intense the competition on either side of the system, the less sensitive the unit mark up on that side of the system to changes in the interchange fee will be. In cases where issuers' profit is weighted more heavily than acquirers', the interchange fee is increased, in order to transfer profits to the issuing side, which will in turn, *ceteris paribus*, reduce welfare and system output. He points out that member banks' voting power in cooperative card associations is more sensitive to issuing volume than to acquiring volume.

Market externalities, network effects and further interdependencies between market participants affecting the level and structure of interchange fees are discussed by Rochet and Tirole (2006). A market can be defined as two-sided if a platform can utilise the transfer fee to affect the volume of transactions by charging more to one side and reducing the price (by an equal amount) paid by the other side. The price structure, in addition to the price level affects the economic outcome (volume, profits and/ or welfare) of the platform and needs to be designed so as to bring both sides on board. Rochet and Tirole build a model integrating *ex-ante membership* and *ex-post usage* charges and externalities in order to derive the optimal pricing formulas. Usage externalities arise from adoption decisions, whilst membership externalities are derived from network participation. If an end-user can derive a positive net surplus from interacting with additional end-users, network participation will generate membership externalities. If an end-user benefits from the adoption of a certain good, enabled by the counterparty, then a positive usage externality is exerted on the same.

Demand elasticities and competition play a crucial role within the model. The price charged by one side of the platform towards the other depends on what the other side is willing/ able to bear, whereby the price is inversely related to the other side's elasticity of demand. Demand elasticities are also affected by platform competition and the extent of multi-homing, whereby a differentiation needs to be made between membership and usage multi-homing¹³.

¹² Direction in which the interchange fee will flow, i.e. from acquirer to issuer (most prevalent case in card acquiring at the point-of-sale) or vice versa (issuing banks pay interchange fees to ATM operators for each transaction).

¹³ In economic literature frequently referred to as multi-homing (versus single-homing), it refers to consumers holding (membership multi-homing) and using (usage multi-homing) payment cards from multiple networks. To give an example, a cardholder may hold a (back-up) card from Mastercard but rely on an American Express card. Reasons are diverse and can include the fact that certain merchants may be reluctant to accept American Express (generally associated with a higher MSC) whilst the

By taking into account the strategic effects arising from competition between heterogeneous merchants, Wright (2004) analyses the determinants of optimal interchange fees within cooperative card networks and addresses the origin of potential deviations between the privately and socially optimal levels. Drawing upon the findings of Rochet and Tirole (2002) and Schmalensee (2002), the consequences of altering interchange fees and the underlying dependencies are outlined. Increases in the interchange fee will raise the merchants' costs (MSC) of accepting cards and lower card fees/ increase consumer rewards. Hence a trade-off between promoting card usage and merchant acceptance will normally exist. A card association seeking to expand volume of transactions will set an interchange fee to maximise the product of consumer and merchant demand for cards, thereby balancing increases in card utilisation due to a higher interchange fee with decreases in card utilisation due to a lower merchant acceptance. The privately optimal (profit-maximising) and output-maximising interchange fees coincide only where no asymmetry in pass-through of costs exists between issuers and acquirers. A greater pass-through of costs (towards merchants) on the acquiring side than on the issuing side (rebate of issuer revenues to consumers), will result in restricted output and inflated members' profits. Thus, if acquirer markets are more competitive than issuer markets the privately optimal interchange fee may be artificially high and above the output-maximising level.

One of the factors that has not been considered in previous models is the potential use of (higher) interchange fees to spur investments by issuers or acquirers in cases where pass-through is less than perfect. If additional profits are fed back into the system to foster innovation, interchange fees that may have shown to be too high and socially undesired by other models, could actually result in being socially optimal (Weiner and Wright, 2005).

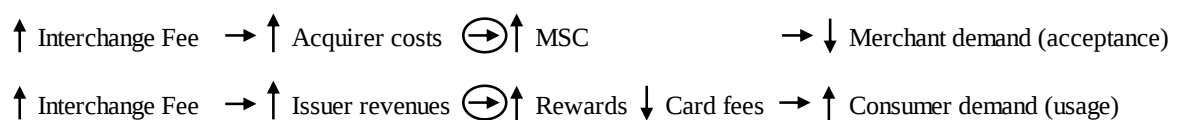


Figure 5 Impacts of interchange fee increases based on relative degrees of pass-through (based on Weiner and Wright, 2005)

An increase in the interchange fee will lead to increases in acquirer costs and ultimately MSCs, regardless if the market is characterised by a single acquirer or strong competition between numerous acquirers. Correspondingly, an increase in interchange fees will lead to increases in issuer revenues and ultimately cardholder benefits. Whilst the presence of a causal relationship between these components is evident, the degree to which costs and revenues will ultimately be passed through depends on the level of competition within each

consumer may prefer to use this card, due to higher associated benefits. See Guthrie and Wright (2007) for a model of competing payment schemes.

side of the market. If market forces are equal in size and offset each other, only the structure of interchange fees and not the overall fee level will be altered. If fee changes on one side are not offset by the other, the overall level of issuer and acquirer fees will be impacted. A card association can therefore use interchange fees to relatively expand cardholding and usage (merchant acceptance) by increasing (decreasing) the interchange fee. The level of competition within issuer and acquirer markets does not only influence the overall level of fees¹⁴ but also the relative success of expanding one side versus the other (Ibid). Findings are shown in above figure, whereby the influence of competition within issuing/ acquiring markets on cardholders and merchants is highlighted.

Guthrie and Wright (2007)¹⁵ present a model of competing payment schemes and analyse how competition between card associations and between strategic merchants affects the choice of interchange fees, and thus the structure of fees charged to (multi-homing) cardholders and merchants. Due to the over-representation of cardholder interests and the internalisation of customers' benefits by merchants, a single card scheme will set a fee structure at which point homogeneous merchants are just willing to accept cards. In this case, platform competition cannot raise the interchange fee and the charges towards the merchant. Rather, and depending on the importance of merchants' interests in determining the choice of payment scheme, platform competition may reduce the interchange fee; albeit never below the socially optimal level. If merchants are heterogeneous and derive different benefits from card acceptance, platform competition can result in merchants' being charged more (and cardholders less); mainly driven by the strategic behaviour of merchants to attract consumers and generate additional business, resulting in an over-utilisation of cards. Competition and the attempt to motivate consumers to switch to holding their card exclusively can ultimately drive card schemes to set interchange fees which are too high even for their own good. This inherent dysfunctional competition between card associations can therefore increase, rather than decrease interchange fees.

Their model provides no basis for the claim by policy makers that cost-based interchange fees are efficient or more desirable than privately set interchange fees. In order to justify any involvement in the setting of interchange fees within payment markets, policy makers need to estimate merchants' benefits from accepting card payments first. It is

¹⁴ If acquirers pass-through all of the additional costs of higher interchange fees and issuers retain a proportion of any increases, a higher overall level of fees will be the result of an increasing interchange fee (Weiner and Wright, 2005).

¹⁵ Guthrie and Wright (2007) assume a transaction and revenue maximising card association, inability of merchants to price discriminate, an inelastic consumer demand for goods, fully elastic merchant demand, and perfect competition within acquiring and issuing markets. They highlight, in line with the findings of Rochet and Tirole (2002), that in case of positive issuer (and acquirer) margins a higher interchange fee may be justified and can equal the socially optimal interchange fee, given that positive issuer margins lead to higher consumer fees and lower card usage.

insufficient to base any regulation on the notion that privately set interchange fees are too high, without having a clear understanding by how much these will need to be reduced. Allowing for positive margins within issuer and acquirer markets opens up the possibility that interchange fees are in fact too low. Further, any regulation of interchange fees can be undermined by a differentiated treatment of proprietary (three-party) card schemes as these do not have to set an interchange fee to achieve their desired fee structure, ultimately giving them a competitive advantage against cooperative (four-party) card schemes (Ibid).

By departing from existing two-sided market theories and focusing on the impact of issuer concentration (instead of network externalities) on card industry performance, Rochet and Wang (2010) show that consolidation among major card issuers is a driving force of rising interchange fees and consumer card rewards, resulting in increasing issuer profits, and decreasing merchant profits and consumer welfare. Findings are derived from a three-stage game in a four-party credit card system. Empirical evidence for the U.S. credit card market (1996–2006) supports above findings and suggests that 58% of the increase in interchange fees can be explained by rising issuer concentration. Rochet and Wang show that (in theory) a regulation of card payment markets can lead to reductions in retail prices, and increases in merchant output levels and profits, ultimately leading to higher consumer utility and social welfare. All findings are based on several market assumptions including treatment of issuers' costs as exogenous and disregarding the possibility of cost advantages due to endogenous investment efforts.

The reviewed literature highlights the importance and the lack of empirical data when introducing models of four-party card payment systems, determining optimal interchange fees and assessing the necessity of regulatory involvement. The levels of pass-through ought to be empirically assessed prior to any regulatory intervention within cooperative card payment networks if unintended consequences of interchange fee reductions are to be avoided¹⁶. Above

¹⁶ Bolt, et al. (2013) highlight the risks of unintended consequences associated with the application of the *tourist test* benchmark in markets where card usage is rapidly increasing while the use of cash is declining. Based on Dutch payment data for 2002 and 2009 they find that an application of the *tourist test* methodology could result in an increase of interchange fees for debit card payments from 0.2% to 0.5%.

The Reserve Bank of Australia implemented a series of regulations (including a reduction of credit card interchange fees by approximately 50%) during the period of 2003 to 2008, with the goal of increasing efficiency within the payment card industry. Observable outcomes were a reduction in average MSC from 1.4% to 0.8%, an increase in average cardholder fees of 23% and an unjustified application of surcharges compared to merchant costs. A reduction in retail prices or increase in quality of service by merchants could not be observed (Stillman, et al., 2008).

Zywicki, et al. (2014) analyse the unintended consequences of Regulation II of the Durbin Amendment to the Dodd-Frank Act in the United States. Alongside a reduction (by 50%) of free-current accounts offered by banks and an increase in average monthly charges on non-free current accounts, an increase in acquirer margins from 0.58% to 0.89% is observable, with no evidence of price reductions or pass-through from merchants to consumers.

overview merely provides an excerpt (and is by no means to be regarded as complete) of findings, whereby the selection is primarily based on the relevance and interconnectedness to the questions investigated within this thesis.

Iranzo, et al. (2012) find that a regulation of Spanish interchange fees over the period of 2006-2010 has led to a re-allocation of profits within the payment system. Reductions in interchange fees (by 57%) are offset by increases in cardholder fees (by 50%), with merchants mainly profiting from the regulation as average MSCs decline by 57%. Again, no confirmatory evidence is found for a pass-through of cost reductions by merchants to consumers.

3. Grounds for a European regulation of card payment markets

In their *Proposal for a Regulation of the European Parliament and of the Council on interchange fees for card-based payment transactions* (European Commission, 2013), the EC puts forward several market observations that underline the necessity of a regulated influence which at the point in time is already being adopted on a national level in some European markets (such as Poland, Hungary, Italy and UK) but is lacking directive across the EU. Also, national competition authorities in several markets (Germany, Italy, and UK) show on-going legal proceedings related to the matter. The EC bases its argumentation (similar to previous cases against Visa (European Commission, 2002) and Mastercard (European Commission, 2007)) on agreements and/ or decisions which directly or indirectly fix purchase or selling prices or any other trading conditions with the effect of prevention, restriction or distortion of competition within the internal market. Interchange fees are classified as horizontally agreed (indirectly fixed) minimum/ floor prices between issuers and acquirers which distort competition.

An exemption to Article 101(1) Treaty on the Functioning of the European Union (hereafter TFEU) can be granted if Article 101(3) TFEU is applicable in cases of efficiency or welfare gains which, without the above described agreements would cease to exist. This was the outcome of the case against Visa in 2002, where the EC acknowledged that interchange fees led to efficiency gains compared to bilateral agreements and, due to the existence of network externalities, interchange fees (as a balancing mechanism) could be regarded as advantageous to the card payment system. In the Mastercard case antitrust authorities did not find that interchange fees are a way to internalise network externalities and optimise card usage. According to the EC (European Commission, 2013), MasterCard was unable to prove the existence of such efficiencies brought by interchange fees and thus an exemption in terms of Article 101(3) was not granted.

Malaguti and Guerrieri (2014) provide a historical overview of major regulatory involvements and competition cases during the last decade from which a certain metamorphosis of arguments and stances provided by the EC can be observed. Scenarios from analysing both (acquiring and issuing) markets and granting exemptions regarding interchange fees, to solely focusing on issuer markets and evaluating a potential de-facto ban of interchange fees, to a return to bilateral agreements or transaction clearing at par, and finally to capping interchange fees European wide at a level proposed by the card associations rather than based on the EC's own findings, can all be observed.

Alongside the overall aim of developing an EU-wide market for payments and card transactions; this being one of the three pillars of the SEPA framework (European Payments Council, 2009), arguments for a regulation of the European card payments market encompassing interchange fees include, but are not limited to the:

1. Proposition of transparency measures to allow retailers and consumers to make better informed choices of payment instruments.
2. Facilitation of EU wide pricing strategies of retailers for products and services.
3. Reduction of MSCs for retailers and a subsequent reduction in final prices for goods and services for consumers.
4. Enablement of consumers and retailers to attain accurate information on fees paid in relation to payment transactions thereby avoiding inefficient prices.
5. Promotion of integrated EU wide services, efficiency and innovation in the field of card payment services by reducing entry barriers (high interchange fees).

This thesis empirically addresses exactly these goals by (1) determining a statistical and causal relationship between interchange fees and consumer payment behaviours as well as merchant payment offering; (2) reviewing interchange fee developments across European countries in a pre- and post-regulatory environment; (3) assessing the financial impact on merchants and ultimate consumer prices and; (4) discussing transparency of pricing and reporting enhancements by acquirers.

Given that until December 9, 2015 every country (excluding countries such as Spain and Hungary that have adopted the legislation earlier) in Europe has numerous different interchange rates¹⁷; a move towards more unified rates for debit and credit card transactions has the benefit of an overall transparency increase. Unified interchange rates have also existed for more than 15 years (last data source from 2000) for all Intra-EEA transactions¹⁸ as different interchange rates for every possible combination of card issuer and merchant country would have been too complex. In 2009, two years after The General Court confirmed the Commission's findings that Mastercard's multilateral interchange fees restrict competition and inflate costs of card acceptance for merchants without leading to benefits for consumers, Mastercard agreed to implement Intra-EEA fall back interchange rates of 0.2% for debit and 0.3% for consumer credit card transactions (European Commission, 2007).

¹⁷ These range within the European Economic Area (hereafter EEA) from 0.034€ for debit transactions in the Netherlands to 1.73% in Germany for credit transactions (Mastercard International Inc., 2014). In addition country peculiarities need to be considered such as Switzerland introducing a 0% interchange rate on debit transactions over 10 years ago (Mastercard International Inc., 2006).

¹⁸ Intra-EEA transactions are transactions initiated with a card issued in country A within the EEA and utilised in country B. Card issuer and merchant are located in different countries but both within the EEA.

Hence, a reduction from approximately 90 to 2 interchange rates within the 28 EU countries reduces pricing complexity and increases transparency. However, numerous countries such as Belgium, Ireland, Finland, Netherlands and UK have implemented varying interchange rates which are equivalent or lower than the 0.2% and 0.3% provisions and hence in line with the regulation but different from the majority, thereby increasing diversity and complexity again (Visa Europe Services Inc., 2014 and Mastercard International Inc., 2014). Further, it is questionable how this increase in transparency will allow retailers and consumers to make better informed choices of payment instruments.

Not only will other fee components such as assessment/ scheme fees and acquirer processing fees remain unregulated, but further fee structures such as integrity fees or chargeback fees introduced by the card associations. Also, consumers will have the additional burden of ensuring that a retailer is accepting a certain card type, given the abolishment of the *Honour all cards* rule within Article 10 of the regulation (Council of the European Union and the European Parliament, 2015). Further, cardholders will be unable to obtain sufficient information on the costs of cash or alternative payment instruments in order to make an educated comparison and efficient choice of payment. If, in addition to above, retailers offer rebates for cash payments or surcharge transactions with unregulated card types (linked to Article 11 of the regulation and the *Surcharging/ Steering* rule) (Ibid), then the question arises if the overall level of complexity may have even increased for consumers and retailers rather than decreased.

The spread between the lowest and highest interchange rate on consumer cards in 2014 in Europe is 1.64%-points. It is discussable if this amount actually qualifies as one of the barriers to a region-wide pricing strategy for retailers across Europe and if unified rates will help facilitate this. Europe remains a heterogeneous geographic area in terms of countries' economic sizes, cultures, wealth and spending habits. According to Kilroy, et al. (2015), retailers are executing a new, more dynamic pricing strategy, thereby pricing their products and services according to consumer demand, competition, category dynamics and economics. Hence, no or only a minimal negative impact can be associated with the pricing strategies of products and services across European countries by differing interchange rates. If retailers' pricing strategies were solely aimed at utilising the identical price in each market, then the price for a McDonald's Big Mac would be computable for each market across the globe via the current exchange rate. However, the Big Mac Index (The Economist, 2020) shows a disparity based on the theory of purchasing-power-parity. Therefore it seems that even a standardised, complimentary product such as the Big Mac is not priced equally in European or global markets.

According to Iranzo, et al. (2012), Evans & Mateus (2011), Jaeger, et al. (2011), Evans, et al. (2013) and Stillman, et al. (2008) reductions in interchange fees in the U.S., Spain, Australia and other regions are passed on to a significant degree to retailers in form of reduced MSCs (in Spain 65%, in Switzerland and Australia 95 – 100%) due to high competition within the acquiring market. An analysis of the pass through rates to consumers yields different results. All studies show that consumer prices are either only slightly impacted (U.S.), not at all (Australia and Spain) or that no empirical relationship can be established between decreasing interchange rates and lower consumer prices (Switzerland). This is mainly driven by the fact that prices are set based on other factors than payment card metrics and that the price reductions are minimal (several basis points) and as such cannot be transformed into absolute, monetary values and simply deducted of each product's price.

Price rigidities, low (and especially lower in comparison to the acquiring market) competition between retailers as well as other macro-economic factors can disprove the assumption that interchange fee levels are a barrier to merchants' pricing strategies. Furthermore we can observe a total cost increase for consumers due to increased annual cardholder fees or reduced benefits from reward programmes in all above mentioned cases. Sharing this opinion, Payment Service Providers (hereafter PSP) are also opposed to the regulatory initiative as it would lead to higher cardholder fees and an overall loss in consumer welfare as retailers would not pass on benefits to consumers (European Commission, 2013).

When focusing on fees incurred for payment transactions with different instruments it is essential to define the scope of analysis and differentiate between aspects such as private versus social costs, card present (hereafter CP)¹⁹ or card not present (hereafter CNP)²⁰ transactions, inclusion of benefits of payment instruments, merchant category or merchant size, marginal or total cost analysis and others. Even if retailers (majority not aware of total fees incurred for different payment instruments) and consumers could attain information on fees and thereby adapt their payment behaviour, it remains unresolved how this would lead to more efficient prices and how these efficient prices would be set as well as what their effects on other metrics may be. If this was to be regarded as the major argument for the regulation, then it may have been achieved equally by lifting the *no-surcharge* rule, thereby allowing retailers to surcharge transactions with specific payment instruments based on their discretion and associated costs. This would have also yielded more accurate results for each retailer as the prices could be set individually to match the respective costs of cards.

¹⁹ Classic brick and mortar, POS transactions where card is either swiped or put into Payment Entry Device (hereafter PED) for chip reading. Card is present/ visible during transaction.

²⁰ E-Commerce or Mail-Order-Telephone-Order (hereafter MOTO) transactions.

Zenger (2011) finds that the *tourist test interchange* (Rochet and Tirole, 2011) and *perfect surcharging* (Rochet and Tirole, 2002) by merchants are equivalent, hence lifting the *no-surcharge* rule has an equal allocative efficiency to setting the interchange fee at the *tourist test* level which itself is the interchange that makes merchants indifferent between card and other payment instruments. Wright (2012) also finds that to the extent that retailers can steer consumers to their preferred means of payment through surcharges and discounts, the bias against retailers (due to payment card fees) is likely to be less prominent, although the rationale for regulating lower interchange fees may remain. Given that costs associated to specific payment instruments vary for each merchant, a specific and individually set surcharge seems more guiding to consumers' choices of payment instruments than a multilaterally regulated, single interchange fee which ought to be incorporated into prices for goods and services sold by retailers.

The term *efficiency* is mentioned on numerous occasions throughout the EC's proposal (European Commission, 2013). It relates to the issue of indirect steering or stimulation of consumers (for instance promotion of credit card use via rewards programmes or cash-back programmes) to use certain payment instruments (to a higher or lower extent than would be privately or socially optimal), although these payment instruments (for that specific transaction) may cause higher transactional fees than other instruments. Due to this, benefits are reduced and at the same time disproportionate merchant fees levied which in total result in welfare reduction rather than welfare maximisation. This is not only closely linked to the argument of transparency and consumers being informed about costs associated with certain payment instruments before making a transactional payment decision but also to the question of which party bears the costs or consequences of the payment instrument decision.

In Australia, the RBA intervened in the payment card industry for this reason (amongst others) because it believed that interchange fees were reducing the efficiency of the payment system. In the absence of surcharges for credit card transactions, a consumer has the incentive to use a credit card (motives can include interest-free, delayed repayment) instead of cash or a debit card as they encounter equal transactional fees (in this case 0), thereby transferring the negative externalities (higher interchange rate on credit than debit cards for instance) to the retailer. According to the RBA, the retailer, due to high competition and potential loss of customers does not have an option to decline credit cards (*must-take cards* argument). As the party profiting from the benefits (consumer) is not bearing the costs and as credit cards consume significantly more resources (in order to process a transaction) than debit cards, a market inefficiency is present which justifies a regulatory intervention (Stillman et al., 2008).

An important distinction within the discussion for “[...] *more efficient means of payment* [...]” and “[...] *efficient market outcomes, wider choice of payment service providers, including pan-European ones and innovative players, and in lower costs to retailers and consumers.*” (European Commission, 2013, pp. 14-15) is to be made between socially and privately optimal interchange rates. The applicability of the *tourist test* methodology depends on the strength of competition in issuer, acquirer and retailer markets and yields different results for socially and privately optimal interchange rates based on competition metrics (Rochet and Triole, 2011). It becomes important to point out which interchange rate is targeted; whereby the EC’s approach seems strongly focused on privately optimal interchange rates, having retailers and private consumers as their main focus. Furthermore, the EC pursues a cost-based approach only. In principle, value is determined by comparing benefits with costs and evaluating the results. Aspects such as convenience, safety, or prevention of illegal activities like money laundering or trafficking, albeit hard to quantify (Schmiedel et al., 2012) all play an important role in determining efficient interchange fees, a value maximizing and optimal card instrument usage and the above mentioned targets.

The EC bases its recommendations with regard to innovation and reduction of entry barriers (due to high interchange fees) on one main argument. As competition between card associations is largely aimed at winning as many issuing banks in each market in order to expand the number of cards in circulation, an increasing, rather than a decreasing interchange fee develops. An increasing interchange fee further incentivises issuing banks to further continue issuing more cards. This higher interchange fee now serves as an entry barrier for new online and mobile payment solutions and therefore hinders innovation (European Commission, 2013).

According to the EC this has led to a disappearing of national debit schemes in a number of member states and also hinders new entrants as the current interchange fees function as a minimum threshold to convince issuing banks to issue payment cards of a certain type. A common rationale is that interchange rates are set by the schemes (in this case Visa and Mastercard) to optimise total output and are hence influenced by total number/ value of transactions, number of cardholders, number of merchants with POS terminals accepting card payments and other metrics. The fact that national debit schemes have been negatively impacted by higher interchange fees is sparsely documented. In 2010, according to the European Payment Cards Yearbook (2012), national debit schemes in selected markets such as France (Cartes Bancaire had a share of total transaction volume of 91%), Germany (Girocard had a share of total transaction volume of 52%, whereby another national debit scheme ELV²¹ had a share of 32%) and Denmark (Dankort accounted for 77% of total card

²¹ The national direct debit scheme in Germany, also known as Elektronisches Lastschriftverfahren.

volume) showed comparatively high market shares. These are only some markets in which international card schemes have not been able to displace local debit and continue to have a minimal market share with regard to overall card transactions.

Contrary to the EC's view, above average interchange and assessment rates seem to have a positive influence on metrics such as implementation, market adoption, transaction penetration and acceptance with regard to new product launches. According to ERPB CTLP Working Group (2015), although card payment usage is classified as low (scale: low, medium, high), contactless payment usage is highest (descending order) and above 50% in countries such as Czech Republic; between 10% and 50% in Hungary, Poland, Slovakia and between 3% and 9% in Austria, Croatia, Spain. Whilst the Czech Republic is the only country where contactless payments are classified as developed, the rest are classified as in development. UK, Netherlands, France and Ireland are seen as *movers* whereas other European countries are classified as *slow movers* or *last movers*. Czech Republic, Poland and Slovakia are the only countries with a high issuance penetration (>50%) and a high acceptance penetration (>50%).

The median of the weighted average interchange fees²² of the last 9 years for these countries, compared to the rest, shows that Poland has the highest rate with 1.55%, followed by Czech Republic with 1.02% and Romania with 1%. Slovakia (0.7%) and Hungary (0.85%) both lie well above the European median of 0.51%. Based on this, it is reasonable to assume that the higher earnings of issuing banks via inflated interchange fees (and higher card associations' earnings via increased assessment rates) are re-invested in research and development for these markets to become European forerunners in implementing contactless and proximity payments.

On December 9, 2015 the historically highest reduction of interchange fees in terms of size and regional scope is recorded for the European card payments market. All four-party, consumer card payments, including local debit schemes are multilaterally set within the EEA, to a weighted average maximum of 0.3% for credit cards and 0.2% for debit cards (Council of the European Union and the European Parliament, 2015). This regulation follows other mandated decreases of interchange fees in countries such as the U.S. (Evans et al., 2013) or Australia (Stillman et al., 2008). Following a prohibition of cross-border multilateral interchange fees due to restriction of competition in the sense of Article 101(1) TFEU, Mastercard and later Visa Europe determine *compliant* interchange rates on the basis of a methodology named the *tourist test* or *merchant indifference test* (hereafter MIT) and propose these for the member states of the EU and any (intra-) trade between them. In order to determine a benchmark for

²² Assessment rates (or scheme fees) are out of scope as no publicly available information is obtainable on these. Also, they tend to differ between acquirers depending on transaction numbers and volumes.

assessing efficiency justifications brought forward by payment card associations, the EC launches a study to measure merchants' costs of processing cash and card payments and utilises results to compute MIT interchange fees for several different scenarios. Although these results differ (in some instances to a large extent) from the, by card associations proposed interchange fees, the EC accepts the 0.2% and 0.3% rates and implements these on December 9, 2015.

4. Problem Statement

Whilst the last three decades have seen a growing interest in card payment markets in Europe and the U.S. by academics and regulators, most research has relied on theoretical foundations; empirical findings in this field continue to be scarce and limited to a number of publications. These include Weiner and Wright (2005) and Rochet and Wang (2010) who address a potential relationship between issuer concentration and interchange fees; Ardizzi (2013) who analyses the impact of interchange fees on consumers' choice of payments and European Commission (2015) and Górka (2014) who aim to determine optimal interchange fees based on the MIT.

Concurrently, the importance of empirical data is referenced multiple times, notably with regard to a relationship between interchange fees and consumer payment behaviour, competition and pass-through within the payment network as well as the ultimate impacts of the regulatory involvement. Numerous unintended consequences of similar antitrust proceedings have been highlighted in recent history, amongst others in the Netherlands (Bolt et al., 2013), Australia (Stillman et al., 2008), the U.S. (Zywicki et al., 2014) and Spain (Iranzo et al., 2012). The aim of this thesis is to draw a bridge between the theoretical framework of two-sided markets and observable industry characteristics in order to enable an assessment of prevailing theory and complement findings with empirical data. Results shall allow for an assessment of the recent regulatory measures taken in Europe with regard to card payment markets; all of which have had a remarkable impact on society.

Whilst socially efficient pricing in multi-sided platforms may result in setting the fees for participants on a particular market side (for instance card issuing) below measures of average marginal costs, by disregarding the multi-sided nature of the card market, antitrust analysis might erroneously conclude that below-cost and discriminatory pricing is predatory (Evans, 2003). This imbalance in cost allocations is caused by the lower price elasticity on the merchants' side, meaning that merchants' demand for card acceptance is affected relatively little by changes in price, i.e. there is an element of *must-take* at play, whereby merchants lack the power or ability to refuse card payments (Vickers, 2005).

In order to ensure a holistic assessment of these and further intricacies as well as the avoidance of detrimental consumer impacts and macroeconomic disruptions, an empirical validation of theoretical findings is essential. However, the likelihood that regulators would possess all the necessary information to achieve the goal of maximising social surplus is questionable, as systematic empirical research and data lack in this field (Katz et al., 1994). This thesis aims to fill that void to a considerable degree.

Reductions in interchange fees will lead to lower MSCs; which would to a certain degree be passed on by merchants to consumers. These cost reductions would however be offset by

a reduction in card issuing, which issuers would seek to offset by increasing annual card fees (or reducing benefits and reward programmes) towards consumers. The interplay of these factors can in fact result in negative, rather than positive effects on consumers and the network as a whole.

Any regulatory involvement in free markets shall follow the ultimate goal of improving consumer welfare. Regulations are expected to comply with the OECD framework of regulatory impact analysis (OECD, 2019). As such, the EC has also committed to a regulatory assessment within Article 17 of the interchange fee regulation (Council of the European Union and the European Parliament, 2015)²³ by mid-2020 (originally planned by 9 June 2019) with a dedicated focus on below areas:

- a) the development of fees for payers;
- b) the level of competition among payment card providers and payment card schemes;
- c) the effects on costs for the payer and the payee;
- d) the levels of merchant pass-through of the reduction in interchange fee levels and;
- e) the effect on the market of the exclusion of commercial cards.

Fees and costs for cardholders and retailers and the interrelation between those fees and consumer spending behaviour is addressed in article 1 (mainly focusing on issuers), article 3 (with a view on pricing transparency and further cost implications for merchants) and article 4. It is noteworthy to re-iterate at this point that the ultimate success factor of the regulatory involvement by the EC in card payment markets across Europe is the reduction of MSCs for retailers and final prices for goods and services for consumers. Sector evolution, especially the development of intra-and inter-system concentration, price elasticities on merchants' versus issuers' sides and the relationship to interchange fees is addressed in article 2. Revenues for card associations and card issuers is addressed in articles 1 and 3, whereby article 3 mainly deals with the historic evolution of card associations from member-owned organisations to publicly traded entities and critically evaluates the legal grounds of interchange and especially assessment or scheme fees which are the core revenue drivers of card associations. Acquirer and merchant pass-through of fee reductions resulting from the interchange fee regulation (IFR) is empirically assessed in article 4. Article 3 also deals with

²³ Further information can be obtained from the tender specification documents issued by the EC as part of the process to determine the right partner in conducting the final support study on the application of the IFR (European Commission, 2018).

the allegedly increased issuance and the steering of consumers towards non-regulated (exempted) commercial cards.

Article 1 aims to validate some of the assumptions made by the EC in their regulatory proposal (European Commission, 2013) and assess a potential statistical and causal relationship between interchange rates and selected card payment metrics. Aspects which are analysed include the (partial) offsetting of issuing bank losses by disproportionate increases in card volumes and increases in merchant card acceptance due to reduced merchant pricing; all of which rely on a statistically significant correlation between interchange fees and consumer payment behaviour. Findings shall support the evaluation if a single, comprehensive regulatory approach is the most effective tool in creating an efficient environment for card payments across Europe.

Article 2 deals with competition within European and U.S. issuer, acquirer and scheme markets over the course of the last 10 years. The aim is an empirical assessment of the influence of intra- (issuing and acquiring markets) and inter- (Visa versus Mastercard; international card schemes versus national card scheme) system concentration, rather than market externalities, in the setting of interchange fees. Results shall support an evaluation of (1) the prevailing assumption that issuers are (supposedly) more powerful members of card networks²⁴ and (2) preliminary consequences of the enacted regulations.

Article 3 is the first of its kind to examine the recent development of card scheme fees within four party card payment networks in terms of their role, development and complexity. Due to their nature²⁵, these fees have not been dealt with in research or covered by the IFR (Council of the European Union and the European Parliament, 2015). Findings shall enable an evaluation if inflated scheme fees or the introduction of new fee structures have been reducing merchant (and subsequently) consumer benefits from the interchange fee reduction. Further, alternative arrangements for the setting of scheme fees and legal grounds for a potential regulation are discussed.

Article 4 discusses the usability of the event study analysis to determine the impacts of the IFR on acquirers, merchants and consumers. Any alterations in size and structure of interchange fees will have different impacts on the network participants depending on the pass-through of costs or savings by the respective members. In order to conduct a regulatory impact analysis, an empirical assessment of the re-distribution of funds and the evaluation if cost

²⁴ If card issuers are the dominant party within card networks, an interchange fee will be set that is higher than socially optimal and ultimately lead to card utilisation above the socially optimal level (Rochet and Tirole, 2002), thus constituting a ground for a potential regulatory intervention.

²⁵ Fee components based on private (not publicly accessible) agreements between the respective card association and issuing or acquiring bank.

savings have been passed on to merchants and subsequently consumers (through lower prices) is crucial.

5. Methodology

In line with the central objectives of this thesis, the core methodologies utilised are all of an empirical nature. A purpose decision is made to base findings on a quantitative, rather than qualitative sample and research methods. For one, an abundance of data is available, with the majority of required data being or having been publicly available at a certain point in time. For the other, the European card payment market generates vast amounts of transaction data on a daily basis but is relatively concentrated, i.e. dominated by a few large organisations. Any qualitative analysis would bear the risk of overrepresenting large issuers, acquirers and/ or merchants and as such limit the applicability of findings to a certain group of market participants. Thus, the intent of this research is to extract findings and validate prevailing theories and hypotheses based on relatively large data samples; determine relationships and potential causality, thereby controlling for bias or any subjectivity.

In order to control for and minimise the risk of misinterpretation (especially with regard to causality) and potential (unintended) exclusion of significant elements, the research methodology is validated by sporadic and unsystematic interviews with industry experts. This is especially true for the methodologies deployed in articles 3 and 4. Within article 3, the survey is conducted by EuroCommerce with findings and derived interpretations being validated with card associations, acquirers, consultancies and retailers. For paper 4, several interviews with industry experts and representatives from regulatory bodies have taken place to ensure that no key event is missed, potential leakage of information is accounted for and the conclusions resonate with general market characteristics. Further actions that are taken to ensure robustness of the research include a verification of assumptions and findings with industry publications such as the *The Nilson Report* (HSN Consultants Inc., 2007-2015). In order to verify determined interchange rates for Europe and the U.S. (article 1) and key regulatory occurrences (article 4) over 180 publications during the time span of 2007 to 2015 are systematically reviewed.

As part of the methodological selection process, several potential alternative statistical and econometrical methods (such as Factor Analysis or Monte-Carlo-Simulation) are excluded. The primary determinant of the suitability of any method is the specific research question at hand, as well as the interpretability of findings based on the data sample. Therefore, in line with each article dealing with one or two questions as part of the overarching research problem, a separate and most suitable research methodology has been selected for each article. Whilst at first sight, this may seem to result in a conglomerate of utilised methods with no directly apparent linkage, upon further analysis, a clearer, coherent picture should start to emerge.

Article 1 deals with the fundamental role of interchange fees and their relationship with consumer payment behaviour as well as the regulatory (financial) impact on card issuers. Both themes are derived from statements made by the EC with regard to potential benefits of the policy intervention. The selected key metrics, i.e. *number and value of total card payments*; *number of total cards in circulation*; *number of total POS in circulation* and *number/ value of total card payments per capita* are deemed as suitable proxies for consumer payment behaviour. The card associations Visa and Mastercard have previously stated that their (pre-regulatory) interchange rates are calculated based on specific (confidential) market metrics and optimally set. Hence, findings obtained within article 1 also complement existing research in demystifying these and similar complexities.

For every country within the sample (28 European countries in total), data is collected between the period of 2007-2014, amounting to 2,912 data points, spanning over a period of eight years. Interchange data is collected over several years for the major consumer credit and debit cards and historical data verified with industry publications and market participants (card associations, issuers and acquirers). As interchange rates can be set as fixed per item fees (in differing currencies), ad valorem fees (%) or a mixture of both, interchange data is transformed, resulting in weighted average interchange fees per country for debit and credit cards. Depending on the degree of complexity, for certain markets these modifications can entail up to seven steps, starting from currency conversions and per item cost transformations to ad valorem fees based on the average transaction values for the card type and year to ultimately determining single weighted average costs based on card usage (debit versus credit as well as Mastercard versus Visa). Also, modifications are run twice in order to obtain average interchange fees per card type (debit/ credit) and per country as well as a single, weighted average interchange fee which is utilised for the subsequent statistical analysis. One of the by-products of this research is an exhaustive and comprehensible overview of historical (pre-regulated) interchange rates across European countries, which thus far had been lacking in research. The importance of empirical data in this field has been voiced on multiple occasions, amongst others by Katz and Shapiro (1994), Wright (2004) and Weiner and Wright (2005).

To determine the strength of a potential relationship between the interchange fee and each selected payment metric, partial rank correlations or Spearman's partial correlations (Spearman, 1904) are applied. All correlation analyses are performed using IBM's SPSS software. For the sake of robustness, Bravais-Pearson and Spearman correlations are determined initially, yielding comparable results for the original (no modifications with regard to missing values and outliers in order to avoid loss of information and variance) data set. Whilst to the untrained eye, these results may seem convincing, an inherent problem of zero order (raw) correlation analyses is prevalent, namely the fact that a correlation between

variables A and B can actually be driven by the influence of (a hidden) variable C. This phenomenon is known as covariance and can be controlled for by residualisation, i.e. the attempt to control for one (first-order), two (second-order) or multiple (n-order) variables when determining the relationship between A and B.

Due to the relatively high covariance within the data set, the (fifth-order) partial rank correlation is selected as the most-suitable methodology as it determines the relationship between two metrics after adjusting for the effect of one or more additional variables on the results (Cowden, 1952). A further advantage of a correlation analysis based on ranks is that it is resistant to outliers. The interpretation of results is based on Fahrmeir et al. (2017) whereby a correlation coefficient below 0.5 (0-0.2) signals a (very) low correlation; results between 0.5 and 0.8 a medium correlation and coefficients above 0.8 a strong correlation. Whilst minor deviations with regard to the interpretation of results may exist, this classification is in line with prevailing theory.

Building upon findings of article 1, specifically the low to non-existent relationship between the level of interchange fees and consumer payment behaviour, the subsequent analysis focuses on determining the influence of concentration, rather than market externalities on the setting of interchange fees. As above, findings shall complement insights regarding the setting of interchange fees and the roles played by member organisations, in specific the power distribution between issuers and acquirers who exhibit diverging interests with regard to the setting of interchange fees. Whilst issuers profit from higher interchange fees, to acquirers these represent the major cost component of the overall fees charged towards merchants, thereby potentially impeding card acceptance and usage; both of which have positive revenue effects on acquirers. Furthermore, article 2 presents a complementary literature review, especially with regard to the most prevalent findings on the economics of card payment networks. The previously applied methodology is also developed by utilising more enhanced statistical tools.

Findings of article 2 are thus based on the obtained weighted average interchange fee data from article 1 and country-specific concentration metrics for the acquiring, issuing and card association (including local debit scheme) markets. These have been built using empirical data from (1) the European Central Bank's Statistical Data Warehouse (<http://sdw.ecb.europa.eu/>), (2) two selected market intelligence firms, providing financial and economic research services based on proprietary data, namely Timetric (<http://www.timetric.com/>) and The Nilson Report (<https://www.nilsonreport.com/>) and (3) a selected data set from Elavon Financial Services, DAC (<https://www.elavon.com/index.html>), a global acquiring bank. The resulting sample provides an overview of market shares

(determined by *number of issued cards* for issuers; *number of processed transactions* for acquirers and *number of cards in circulation* for card associations) by card type (credit versus debit) for each European country.

Concentration is determined separately for each industry via the Herfindahl-Hirschman Index (hereafter HHI) and Concentration Ratio of the five largest firms by market share (hereafter CR5). Both measures are recognised tools, presently applied by both the European Central Bank (2016) to annually assess the level of market concentration within the banking sector and the U.S. Department of Justice and Federal Trade Commission (2010)²⁶ to analyse post-merger effects and changes in concentration. The OECD (2010) also confirms the reliance on HHI and CR internationally when assessing concentration. The HHI is a statistical measure of concentration based on the structure-conduct-performance paradigm, whereby a heavier weight is attributed to firms with larger market shares. It corresponds to the theoretical notion in economics that the greater the concentration of output in a small number of firms, the greater the likelihood that, *ceteris paribus*, competition in a market will be weak (Rhoades, 1993).

The resulting HHI measures, differentiated by card type and industry are presented in two forms. First, on a per country basis to highlight discrepancies within the European payments market. Second, on an annual basis ranging from 2008 to 2017. The concentration ratio of the top 5 firms is deemed as a more suitable predictor variable to be included in the regression analysis due to its interval scale (0-100%). Subsequently, the relationship between the interchange fee (response variable) and issuer, acquirer, and scheme competition (predictor variables) is determined via multiple regression analysis and assessed separately for debit and credit card markets. Below figure shows the initial regression formulas that have been run. Due to the nature of the analysis and the importance of a complete data set, outliers are not removed²⁷.

²⁶ According to the U.S. Department of Justice and Federal Trade Commission (2010) unconcentrated markets will show a HHI below 1500, moderately concentrated markets between 1500 and 2500 and highly concentrated markets above 2500.

²⁷ Given that regression analysis is neither distributionally robust, nor outlier resistant this may have had an undesired (albeit non-material) impact on final results.

Interchange Visa Credit_t

$$= a * \text{Issuer Concentration Credit } C5_t + b * \text{Acquirer Concentration Credit } C5_t \\ + c * \text{Inter Scheme Concentration Credit } C2_t \\ + d * \text{Intra Scheme Concentration Credit Visa}_t + \text{Constant}$$

Interchange MasterCard Credit_t

$$= a * \text{Issuer Concentration Credit } C5_t + b * \text{Acquirer Concentration Credit } C5_t \\ + c * \text{Inter Scheme Concentration Credit } C2_t \\ + d * \text{Intra Scheme Concentration Credit MC}_t + \text{Constant}$$

Interchange Visa Debit_t

$$= a * \text{Issuer Concentration Debit } C5_t + b * \text{Acquirer Concentration Debit } C5_t \\ + c * \text{Inter Scheme Concentration Debit } C2_t \\ + d * \text{Intra Scheme Concentration Debit Visa}_t + \text{Constant}$$

Interchange MasterCard Debit_t

$$= a * \text{Issuer Concentration Debit } C5_t + b * \text{Acquirer Concentration Debit } C5_t \\ + c * \text{Inter Scheme Concentration Debit } C2_t \\ + d * \text{Intra Scheme Concentration Debit MC}_t + \text{Constant}$$

Formula 2 Regression formulas

The goodness of fit of each model is assessed by the coefficient of determination (R^2). R^2 represents the variance explained by the regression line divided by the total variance of the dependent variable and corresponds to the squared correlation coefficient by Bravais-Pearson. As a rule of thumb, an R^2 value below 1/3 is indicative for a low goodness of fit and almost no linear relationship between the predictor and response variable(s); an R^2 value between 1/3 and 2/3 for a medium goodness of fit and a weak-to-medium linear relationship and an R^2 value above 2/3 for a high goodness of fit and a strong linear relationship. The F-Test (ANOVA) is also a common indicator for the overall goodness of fit of a regression model. For the null-hypothesis to be rejected within this empirical analysis, a minimum statistical significance of 95% is required.

Similar to the challenges faced within article 1 regarding covariance, in multiple regression models multicollinearity is a statistical term for the existence of a high degree of linear correlation amongst two or more explanatory variables (drivers). In the presence of multicollinearity, a difficulty arises to assess the effect of the independent variables on the dependent variable, often leading to regression coefficients that contradict expectations and lack causality. There are several approaches to detect and deal with multicollinearity, two of which have been applied in article 2. For one, the influence of multicollinearity is not observable as the Variance Inflation Factor (hereafter VIF) lies below 1.6 at all times. VIF values of 3.5 or higher indicate possible collinearity between this predictor and others in the model. For the other, initial results are confirmed with findings from a stepwise regression; thus, suggesting robustness.

The research conducted within article 3 differs in numerous ways from the previous two articles. First, a conscious choice is made to depart from a pure evaluation of interchange fees and focus on further provisions of the IFR, predominantly the role and development of card association fees. A growing concern over the introduction of new acquirer assessment or scheme fee components and structures as well as noteworthy increases in existing fees has been voiced publicly; see amongst others Jones (2017), Pinnhammer (2017) and Godwin (2018). Second, a stronger emphasis is laid on present and future developments, rather than historical drivers and impacts. Whilst the legal argumentation by policy makers can only be critically evaluated subsequent to an empirical assessment of actual market occurrences and relationships, the fact remains that the IFR came into force in 2015. In view of the EC's pending regulatory review, a legal discourse on scheme fees based on previous antitrust cases against Visa and Mastercard is outlined. Additionally, topics that may not have been addressed previously are highlighted for a potential inclusion as part of the regulatory review. As part of this, a methodological excursus to inductive reasoning is dared, whereby a hypothesis on the legal interpretation of scheme fees is established, rather than tested.

Article 3 discusses results stemming from survey data on (1) the development of card scheme fees within four party card payment networks, (2) transparency of fees towards merchants, (3) pass-through of savings to retailers and subsequently consumers and (4) the development of commercial cards, collected by EuroCommerce from 104 merchants operating under different legal entities across the EU via an online survey during the period between January and April 2018. EuroCommerce (2018) is the retail, wholesale and international trade representation to the European Union. The relevant survey comprises six sections (*Your company profile*, *Visa & MasterCard Interchange fees in consumer card operations*, *Commercial cards*, *Merchant Service Charges*, *Choice of Card Products & Application Selection* and *Transparency*) and 38 questions in total (depicted in table 1). All questions are of a quantitative nature, containing pre-defined response options of a nominal or ordinal scale.

1	Your contact details
2	Your economic sector
3	The location covered by this specific response (please complete a separate response for each country, if you have operations in multiple member states)
4	The data you are quoting from for the rest of this survey is taken from the 12 month period: [2016; 2016/ 2017; 2017]
5	Your total annual turnover
6	What is your card sales breakdown between domestic and EU/ EEA cards for the Member State to which this response relates?
7	What is your card sales breakdown between EU/ EEA cardholders and non-EU/ EEA cardholders for the Member State to which this response relates?
8	Your total number of sales outlets
9	Your total number of payment terminals
10	Are you aware of the existence of a competent authority responsible for the implementation of the IFR within the member state in this response?
11	Have you contacted this authority about any aspect of the IFR?
12	For consumer debit cards, has your competent authority applied: [a max. cap (0.2% or less); a max. cap and a max. transaction cost; applied a weighted average; I don't know]
13	Has your card acquirer passed on these full reductions from the caps?
14	What is the split of card transactions by value between debit and credit (please exclude commercial cards when making your selection)
15	Are you able to apportion a split between Visa and Mastercard cards? (please exclude commercial cards when making your selection)
16	Do you technically differentiate between commercial cards and consumer cards at PoS?
17	At PoS, are commercial cards handled differently to consumer cards in any way?
18	Does the member state authority, to which this response relates, permit the surcharging of commercial cards?
19	Which statement below best reflects your policy on accepting commercial cards?
20	As a percentage of your total card sales, what percent of transaction volume relates to 'commercial' or 'corporate' cards?
21	As a percentage of your total card sales, what percent by value relates to 'commercial' or 'corporate' cards?
22	In percentage terms, can you quantify any increase in your overall volume of commercial cards since January 2016?
23	If there was an increase in the volume of commercial cards, approximately how much extra has this cost you annually?
24	Have you seen any increases in your commercial card fees?
25	Have any new contract provisions or additional fees (such as scheme fees, processing fees, authorisation fees or CAPs on refunds) been introduced that have reduced your benefits from the IFR?
26	Since this regulation entered into force, has your overall Merchant Service Charge (the total fees you pay for card acceptance)? [Reduced; Increased; Stayed the same; I don't know]
27	Taking your total Merchant Service Charge costs into account, would you say that following card types... [Increased; Decreased; No Change]

28	Could you elaborate on the overall movement in your fees in percentage terms?
29	Please elaborate on the overall movement in basis points?
30	How have you passed on any savings from the IFR to your customers?
31	Have you publicised your preferred payment products in your store?
32	Where have you publicised your preferred choices of payment application? (You may select more than one option)
33	Are you ready to implement software or hardware changes to allow choice of application selection at point of sale?
34	What was the biggest single problem you encountered in implementing the choice of payment application selection at Point of Sale?
35	What is the total cost of implementing the IFR choice of payment application?
36	Does your card acquiring bank now provide you with clear information to enable you to distinguish the different fee elements within your Merchant Service Charge (interchange fee, scheme fee, card acquirer processing fee)?
37	Does your card acquiring bank now provide you with clear information to enable you to distinguish the different card types within your Merchant Service Charge (consumer credit, consumer debit, prepaid, commercial/ corporate)?
38	Does your card acquiring bank now provide you with clear information to enable you to distinguish different card origins within your Merchant Service Charge, such as 'domestic', 'intra-regional' and 'inter-regional'?

Table 1 Survey conducted by EuroCommerce in 2018

A systematic review of antitrust cases and court decisions brought forward by the EC against Visa and Mastercard is performed using the EC's Antitrust/ Cartel Cases Search tool (European Commission, 2018a). The legal grounds, reasoning and ultimate court decisions are compared in order to identify similarities. Given the fundamental role of Article 101 TFEU, an excursus on its application and interpretation is made. Alternative arrangements and legal grounds for a potential regulatory involvement in the setting of scheme fees are discussed based on Article 5 of the IFR (Council of the European Union and the European Parliament, 2015) Article 101 TFEU and Article 102 TFEU (European Union, 2012). In case of regulatory action, the question of a potential applicability of Article 101 TFEU is evaluated, given the fact that scheme fees, unlike interchange fees, are based on confidential, bilateral agreements, rather than collusive behaviour. Article 102 TFEU deals with abusive exclusionary conduct by dominant undertakings (i.e. Visa and Mastercard) resulting in distorted or unfair trading conditions (i.e. inflated scheme or association fees), whereas Article 5 IFR prohibits a circumvention of the imposed caps, amongst others by potentially decreasing issuer scheme fees to alleviate the financial impact of the IFR and compensating for the revenue by increasing acquirer scheme fees, ultimately being passed-through to merchants and consumers.

The link between articles 3 and 4 is the key prerequisite for a successful regulatory involvement in terms of social welfare, namely the question of pass-through. Whilst it is a fact that issuers have suffered substantial losses due to the IFR and that these losses have equally

benefited acquirers in terms of cost reductions, the ultimate question remains if and to what extent savings have been passed through by acquirers to merchants, and subsequently from merchants to consumers. Findings of article 3 highlight some primary concerns, however as neither the data sample is representative for European merchants, nor can subjectivity and bias be excluded on the matter, the rate of pass-through is deemed an empirical question that requires a fact-based examination.

Article 4 assesses the usability of the event study methodology to determine the re-distribution of profits and costs amongst the network participants and the ultimate regulatory impacts of the IFR in Europe. The main rationale behind this choice lies in the fact that thus far, the research community and policy makers have primarily relied on two methodologies to address merchant pass-through within card payment markets, namely questionnaires or in-depth interviews, which are both prone to error as their results are highly subjective and in general do not provide a measure of materiality. Also, given the inherent complexity and interrelatedness of merchant product pricing with a multitude of other internal and external factors, an assessment of pass-through towards consumers becomes highly speculative and is at times too complex to conduct. The second methodology that has been applied previously is based on the usage of proxies, thereby estimating the elasticity of pass-through, i.e. how much retail prices change in response to merchants' cost savings (Shapiro, 2013) and applying these across the industry. However, research is limited on this subject and results can strongly vary across time, sector or region, making its usability questionable. In the case of card payment markets, any selected proxy would have to, amongst other criteria, be based on a two-sided market framework in a business-to-consumer environment and be applicable to some, if not all, countries at hand.

Using financial market data, event studies measure the financial effect of a given economic event or announcement within the marketplace on the value of a firm. Compared to alternative methods of calculating financial impacts, the measurement of security prices has the advantage of being based on numbers that are determined by the collective decisions of all investors in the market and are thus both objective and present a consensus. In a free economy, market value, calculated as the discounted present value of future cash flows, will always be the primary metric of a company's worth (Tabak and Dunbar, 1999). A further advantage over alternative procedures is the fact that it can determine causality with a statistical probability. The methodology deployed today follows a universal approach²⁸ and is essentially the same as the one utilised in the most prominent piece of research in this field by

²⁸ Following steps are taken as part of the approach: definition of data sample and selection of event date(s), securities to be analysed and news sources; followed by removal of confounding events to control for systemic bias. Then, collation of final list with asset price data and definition of methodology for calculating (average and abnormal) returns. Subsequently, testing statistical significance.

Fama et al. (1969)²⁹. Whereas the application of event studies with regard to mergers and acquisitions, earnings or macro-economic announcements is deemed relatively straightforward and is implicitly accepted by the U.S. Supreme Court, it has its limitations, especially related to regulatory changes as these are often debated in the political arena over longer time periods, whereby accompanying monetary effects will be gradually (rather than immediately as with the above examples) incorporated into security prices. Thus, an acknowledged risk associated with event studies is the lack of distinct event dates and a potential influence of confounding factors (Konchitchki and O'Leary, 2011).

To control for above pitfalls, the IFR is decomposed into (24) separate procedural stages that have taken place in the political arena over the course of 15 years, ranging from 16 October 2000 and the initial accusation of anti-competitive behaviour against Visa to 9 December 2015 when the regulation formally entered into force. The initial composition of events is derived from the publicly accessible outline of the regulatory procedure by the EC. A systematic literature review is applied to data bases of prominent media sources (including The Wall Street Journal, Financial Times, Finextra, The Nilson Report, Reuters and CNBC) to enrich above data set. To assess robustness of the preliminary sample, control for potential information leakage and identify any further (hidden) events, expert interviews are conducted with random representatives from regulatory bodies, retail trade representations and global retailers. Also, preliminary statistical analyses are conducted to assess the volatility of key metrics (including stock returns) during the selected period. This ensures the identification of any potentially missed distinct event dates, as these would be characterised within the results by abnormal variable trends.

Based on the extent of media coverage, the inclusiveness of any figures in the specific news (this is essential for investors to assess potential future revenue impacts of the events and incorporate these in security prices) and causality, especially preceding and succeeding occurrences, seven key event dates selected and analysed separately via event studies in order to detect even minor monetary effects that may have had a gradual and/ or phased impact on security prices. The selected event dates are searched for confounding events (*noise* within the data set) that may have had an influence on results; none are identified. Examples of confounding events can include global/ regional stock market crashes that substantially impact security prices. If these are not systematically removed or accounted for, results may hint towards an occurrence in relation to the defined hypothesis whereas these actually have no causal relationship to it. Several steps are taken to ensure data quality including matching the respective weekdays to the specific event dates so that in cases where

²⁹ The methodology as such dates back further; see Dolley (1933).

information is released outside of general banking working hours, the subsequent working day is considered.

Event studies are based on the notion of (semi-strong) market efficiency (Fama, 1970) with respect to publicly available information. Taking three key market assumptions as a given, namely the absence of transaction costs in trading securities, full availability of information to all market participants free of charge and the fact that current security prices represent the discounted value of future cash flows, Fama (1970) holds that no market participant is able to generate excess rates of return (i.e. *beat the market*) by using historical stock information or applying a technique known as *fundamental analysis* to extract current information from financial statements or announcements. According to Fama (1970) any information release related to a security will be immediately incorporated in the security's price. The concept of (semi-strong) market efficiency is the fundamental principle behind the event study methodology, which itself depends on several statistical notions such as individual abnormal returns being independent of each other and identically distributed; most of which can however be relatively easily solved for (Binder, 1998).

The data set is composed of 21 retailers (with a market capitalisation of 568 billion EUR), 43 issuers (811 billion EUR) and 16 extracted pure issuing banks (315 billion EUR) across Europe. Issuers are classified as firms engaged in issuing and acquiring services simultaneously; pure issuers as firms without an operational or financially controlling engagement in acquiring services. The largest European issuers (acquirers) are identified via The Nilson Report based on the number of issued cards (processed card volume). The sample is enhanced with proprietary data from Timetric (Global Data Plc), a market intelligence firm providing financial and economic research services. Large firms are over-represented within the sample across all three industries. Whilst the sample cannot be considered representative for smaller and medium-sized firms, the sample size can be considered material given the market capitalisation of each group.

The majority of included companies (a total of 230 issuers and 375 acquirers are initially identified) is excluded from the analysis due to private ownership, change of legal entity or engagement in M&A activity during the researched time frame. In both cases, data is either not obtainable at all (no securities listed for private firms) or only partially (before or after the M&A) whereby the resulting data will also be prone to excessive variance. The largest European retailers are identified by retail revenue. Information is extracted from Deloitte's (2020) report *Global Powers of Retailing*. Similar to the above, from a total of 250 retailers across the globe, only 21 publicly listed retailers, domiciled in Europe are included in the data set. The majority of companies are excluded due to private ownerships, merchants engaging

primarily in business-to-business activities (and thus not seeing extraordinary impacts from the regulation; see Nestlé as an example) or lacking data due to changes of entity or legal form over the considered time span. Whilst a separate analysis of acquirers would have been key for a full mathematical assessment of pass-through, a unique characteristic of the European card payment market has hindered this, namely the widespread presence of issuer-acquirers. As these firms engage in multiple markets and have diverging interests with regard to their network participation, they constitute a separate sub-category and cannot be regarded as comparable to pure acquirers. In fact, only five pure acquirers are identified across Europe, whereby this number is deemed too low to justify an inclusion within the sample.

Daily stock returns (closing prices) are collected from 2 January 2008 to 31 December 2015 from Yahoo! Finance (Verizon Media, 2020). The EURO STOXX 50 index is selected as the market proxy, covering the 50 largest stocks from 11 Eurozone countries (Stoxx Ltd., 2020). Prior to the regression analysis being run, the data quality is assessed, whereby any missing values and outliers³⁰ are replaced by their mean. The selected event window ranges from one day prior to the actual event date to one day afterwards. Whilst there is no prescribed window selection, selecting a short-horizon event window has the advantage of focusing on the informative content of the event, thereby avoiding a dilution of results by including days that are not statistically significant and avoiding the impact of confounding events that may have occurred several days prior or after the actual event date. On the flipside, a model that only considers a single event date will not allow for information leakage prior to the event, i.e. if media sources published the news in the morning of the event day, there is a chance that a selected number of investors may have heard and reacted upon it the previous day. Also, the model will not allow for a slightly belated response after the event. Given that most stock markets close in the early afternoon and that media coverage continues, any publications or information releases shortly before or after market closure, would be incorporated in the following day's prices. Thus, excluding the previous and following day surrounding the event bears a large risk of missing significant information, that may negatively impact final interpretation of results.

The task of selecting the most suitable event and estimation window is controversially discussed within the research community.³¹ Whilst the findings presented in this thesis relate to results obtained via the preferred (and deemed most suitable) econometric model, several

³⁰ The Interquartile Range (hereafter IQR) method is applied to detect outliers.

³¹ See amongst others Ahern (2009), Fama (1997), Konchitchi and O'Leary (2011) and Duso (2010).

other models³² are tested and the analysis amended³³. We find that results are consistent with regard to different models deployed; an extension of the event window has not resulted in the identification of any other significant event dates. In line with prevailing theory, the estimation window has a range of one year (ca. 250 trading days) prior to the event window, starting one year before the event window or in our case two days before the event date. The actual length of the estimation windows may vary by a few days depending on the availability of data within the sample. For each event, a separate data set of 250 records is deemed sufficiently large for the regression model to make robust estimations (Binder, 1998). Increasing the estimation window for multiple years could lead to misleading results, amongst others by increasing the likelihood of confounding factors leading to increased volatility of the stocks, especially during an economic environment as prevalent in the period of 2008-2009 (global financial crisis).

To determine the effect of the announcements on security prices, the relationship between the return on individual stocks and the expected return on the market portfolio is captured using the Ordinary Least Squares (hereafter OLS) market model, in line with the mathematical approach of Brown and Warner (1985). In simple terms, a comparison is made between the asset price that occurred as the result of the announcement of the event (average abnormal return (hereafter AAR) on the event day or cumulative average abnormal return (hereafter CAAR) during the event window) with a hypothetical asset price that would have occurred if no event had been announced (expected return). The null hypothesis to be tested is that the mean abnormal return for the event day is statistically equal to zero. Whilst significant results (in particular at a confidence level of 99%) suggest, with a very large certainty, that findings are not caused by chance, the rejection of the null hypothesis does not allow for an ultimate conclusion that the findings may not be driven by other (unknown) factors, as this risk is prevalent in any form of event study. To avoid a potentially disproportionate influence of the event returns on the normal return measure, thereby detrimentally impacting the significance and explanatory power of the model (MacKinlay, 1997), estimation window and event window purposely do not overlap.

In order to assess whether the abnormal returns and buy-and-hold (average) returns are statistically significant from zero, a test statistic is used. An advantage of using test statistic to make inferences on the statistical significance of the abnormal return is that in short-window event methods it is not highly sensitive to the benchmark model of abnormal returns or other assumptions regarding the cross-sectional or time-series dependence of normal returns (Konchitchki and O'Leary, 2011). Correcting the analysis for cross-correlation and auto-

³² These include market model versus constant mean return model and Ordinary Least Squares (hereafter OLS) versus Weighted Least Squares (WLS) regression.

³³ Multiple analyses are performed and the event window adapted from a single day (see above) to two days and 15 days prior and after the event.

correlation show no significant impacts when using daily returns data; rather higher explanatory power can be achieved when ignoring cross-sectional dependence than when running test-statistics which account for potential dependence (Brown and Warner, 1985). The critical t-test value for a two-tailed statistical significance with a confidence level of 95% is 1.96. A heteroskedasticity-consistent standard error (hereafter HCSE) estimator of OLS parameter estimates is implemented to control for the effects of heteroskedasticity on inference. As an alternative method of estimating standard errors is employed, namely one that does not assume homoscedasticity, this approach allows for the regression model to be estimated using OLS (Hayes and Cai, 2007).

Assuming regulatory compliance, every acquiring bank will reap the full benefits of the IFR. In a two-staged game every acquirer will then decide if and to what extent to pass these savings on to merchants (stage 1), which will subsequently each decide on pass-through towards consumers (stage 2). Given that total capitalisation of each individual firm and thus the portfolio of companies representing each specific industry is known, the CAAR can be translated into a total, financial impact on the industry. The total, daily market capitalisation is determined as a product of stock price and the number of outstanding shares for each firm within the three groups. The absolute increase in market capitalisation, representing the net present value of future expectations, is calculated as the difference between the total capitalisation on the event day and the previous day. In a market economy value (discounted present value of future cash flows) is represented within the stock price. In the case of retailers, the analysed portfolio accounts for 44.5% of the total market capitalisation of the top 100 European retailers. Figures can thus be expressed as industry-wide metrics.

By incorporating previous empirical findings on the financial impacts of the IFR on issuing banks and determining the Net Present Value (hereafter NPV) of these, the financial impact on the retail industry, stemming from the IFR, can be resolved. Whilst a separate statistical analysis of the acquiring industry is essential to assess causality of financial impacts on the retailer industry, in the sense of determining where these are derived from (i.e. from a reduced pass-through by acquirers to merchants or from an increased pass-through by merchants to consumers), this problem can be resolved for, yielding, albeit preliminary, interpretable results. These are then evaluated based on findings from the previous three publications as well as the inherent characteristics of the regulatory environment and comparable research including the EC's study on the application of the interchange fee regulation from 2020.

6. Results

A critical review of the European Commission's Multilateral Interchange Fee Regulation

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ABSTRACT

Following the implementation of the European Commission's Multilateral Interchange Fee Regulation in 2015, interchange fees in the European card payments market recorded their highest ever reduction in size and regional scope. This paper reviews the motives and grounds of the regulation in relation to issuing banks' revenue losses. Using data collected from Visa, MasterCard and the European Central Bank over a period of eight years, the paper assesses the relationship between interchange fees and selected payment metrics. In contrast to forecasts made by the European Commission, the results indicate that short-to-mid-term issuer losses are not offset by increases in card volume. Furthermore, no quantifiable improvement in social welfare due to the regulation can be identified. Policy intervention should not rely solely on complex theoretical models. Empirical data based on industry observations must be considered. The findings call for a more conservative regulatory involvement in card payment markets.

Keywords: *regulation, Europe, two-sided markets, card payments, multi-lateral interchange fee, issuing bank, partial rank correlation*

INTRODUCTION

In 2014, cashless payments in the UK surpassed the use of notes and coins.¹ According to the UK Cards Association,² three-quarters of all retail spending is now made using debit and credit cards — up from less than half in 2003, highlighting a shift in consumer behaviour. In Europe, meanwhile, card payments play an essential role in the market, accounting for 47.5 billion transactions in 2014 (up by more than 50 per cent since 2009), with a total value of €2.4tn.³ At the same time, novel methods to reduce the volume of cash transactions, such as a ceiling value for cash transactions and the abolition of the €500 note (or for that matter, cash itself), are an increasingly common subject of debate.⁴

Due to their growing importance, card payments have come under increasing regulatory scrutiny. The European Competition Network provides an extensive overview of competition cases brought against Visa, MasterCard and other national payment schemes.⁵ After several legal proceedings, on 9th December, 2015, the European card payments market recorded its highest ever reduction in interchange fees, in terms of both size and regional scope. All four-party,

consumer card payments, including national payment schemes are multilaterally set within the European Economic Area, to a weighted average maximum of 0.3 per cent for credit cards and 0.2 per cent for debit cards.⁶ This regulation follows other mandated decreases in interchange fees in countries such as the USA,⁷ Australia,⁸ Spain⁹ and Switzerland.¹⁰

Following the prohibition of cross-border multilateral interchange fees due to the restriction of competition under Article 101(1) of the Treaty on the Functioning of the European Union (TFEU),¹¹ MasterCard and Visa Europe determined compliant interchange fees on the basis of a methodology known as the tourist test or merchant indifference test;¹² these fees have been proposed for trade within and between EU member states. To determine a benchmark for assessing efficiency justifications brought forward by payment card associations, the European Commission has launched a study¹³ to measure merchants' costs of processing cash and card payments and published a proposal for a regulation based on the results.¹⁴

Within both documents, the European Commission acknowledges that issuing banks will suffer substantial revenue reductions and claims that these will be (at least partially) compensated by increases in card volumes driven by higher card acceptance and a changing payment behaviour. In the words of the German banking industry committee: 'The European Commission's principal reason for regarding the capping of interchange fees as proportionate is founded on its assumption that any losses incurred by the banks would be offset by an increased volume of card transactions'.¹⁵ This paper aims to quantify the decrease in revenues incurred by issuing banks across Europe and to empirically assess the grounds of this claim.

The paper is organised as follows: the introduction provides a brief description of the growing importance of payment cards and the increasing involvement of regulators

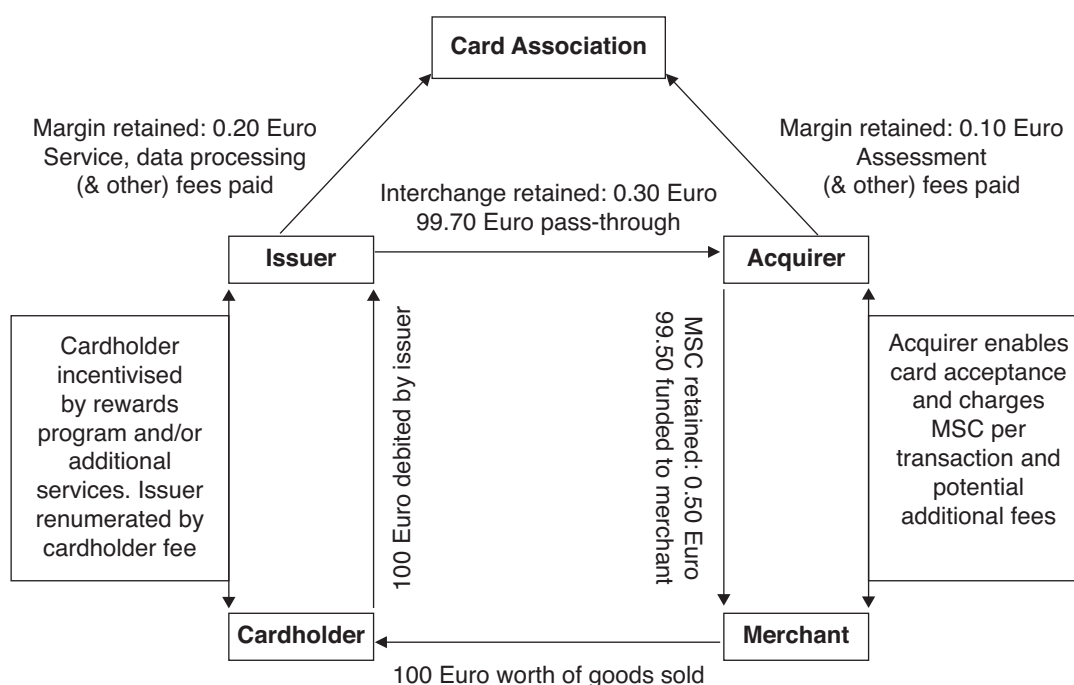
within this sector. This is followed by an overview of the relevant literature, to include a theoretical background on the functioning of two-sided payment markets and the 'must-take cards' argument. Apart from Figure 1, which exemplifies the payment flow within a (four-party) card environment, this section is primarily of a technical nature and may be disregarded by readers not interested in the theoretical economics behind card payment markets. Subsequent to the literature review, the paper lays out the methodology, in particular the statistical approach to assess the relationship between the interchange fee and selected payment metrics. Results are then presented and discussed, closing with a technical interpretation of the statistical analysis. The final section concludes.

LITERATURE REVIEW

Card payment markets can be classified as two-sided markets¹⁶ as they bring together two groups of end users (merchants and cardholders) to a network in which, by setting a balancing price, the platform can effectively cross-subsidise between these parties and influence overall performance. The profit of each party therefore depends not only on the volume and margin of the transactions processed but also on the decomposition of earnings. The balancing price is not only a mechanism to favour one side over the other but also an essential tool to bring the two sides together, as the network can only function if, at the same time, merchants accept cards and cardholders use them.¹⁷

Two-sided markets are characterised by the network externalities arising out of this structure. The most prominent externalities in payment networks are adoption and usage externalities. Interdependent services are provided by card associations to cardholders and merchants, which consume them simultaneously. For the network to function effectively, it therefore becomes necessary

Figure 1: Flow of payments in a (four-party) card transaction



Source: Author's illustration based on Rochet, J.-C. and Tirole, J. (2003) 'An economic analysis of the determination of interchange fees in payment card systems', *Review of Network Economics*, Vol. 2, No. 2, pp. 69–79

to get both sides onboard. The membership externality is complemented by the usage externality as cardholders only add value to the network if they actually use their card for payments rather than simply holding it.¹⁸

All payment card systems must balance demand between cardholders and merchants. This balancing act is performed by the interchange fee. Baxter was first to recognise the importance of the interchange fee as a balancing mechanism within card payment markets and to argue against the view that they represent a form of horizontal price fixing.¹⁹ The price determination depends on the demand elasticities of the parties involved. It will be set to maximise the overall profit of the network participants and cannot *a priori* be regarded as a market distortion. It may well represent a socially efficient way to recover common costs while providing a service to a larger number of participants than would be the case

otherwise. For this reason, the interchange fee is utilised by the network to balance demand, maximise participants' profit and allocate costs in a proper fashion.²⁰ Several studies have modelled the determination of optimal interchange fees in cooperative card systems under restrictive assumptions. The main conclusions are that privately and socially optimal interchange fees must account for multiple factors, including the split of total costs between issuers and acquirers, demand elasticities for merchants and cardholders, and the intensity of competition in issuer and acquirer markets.²¹

Figure 1 outlines the flow of payments in a card transaction within a cooperative (four-party) system such as Visa or MasterCard based on an exemplary purchase of goods for €100 and a payment via credit card. In a proprietary (three-party) environment, the interchange fee is set by the same party that acquires the transaction. Card association,

issuer and acquirer are essentially the same party (see American Express). As there is no minimum interchange fee and the balance between cardholder fees and merchant fees is decided internally to maximise profit, these schemes are outside the scope of the European regulation. Additionally, their market share in the EU is below the 5 per cent threshold.²²

The interchange fee is not a price for a single service; rather, it is a balancing instrument. From the perspective of acquirers, an increase in interchange fees will lead to an increase in their costs and ultimately in the total merchant service charge (MSC). This will apply in a scenario with a single or multiple acquirers, although the pass-through rate will depend upon competition within the segment. If pass-through is less than perfect, the increased interchange fee will reduce acquirer profits. Similarly, from the perspective of issuers, an increase in interchange fees will increase issuers' profits and ultimately lead to an increase in benefits, services or reward programmes for cardholders (assuming full pass-through), thereby promoting higher card usage. Again, this will apply in a scenario with a single issuer or with multiple issuers, whereby the pass-through rate will depend on the degree of competition. If it is less than perfect, the additional revenue from increased interchange fees will be partially retained as incremental profit.²³

Wright,²⁴ Rochet and Tirole²⁵ and Hayashi and Weiner²⁶ all recognise the interchange fee as a balancing instrument and present evidence on the determination of optimal interchange fees as well as private and public interests in the setting of interchange fees. The card network's objective is to maximise overall profits, primarily by increasing the number of transactions being processed. The critical issue that may arise is that such a fee can follow the objective of rewarding issuers and consumers for using the network rather than merchants, ultimately leading to an inefficient equilibrium.²⁷

The price structure in card payments is generally set so that merchants pay a larger share of the aggregate price than cardholders. In certain cases, cardholders may enjoy a subsidy for holding and using their card (eg travel insurance or a cashback programme). This imbalance in cost allocations is caused by the lower price elasticity on the merchants' side, meaning that merchants' demand for card acceptance is affected relatively little by changes in price. This gives the card associations some flexibility in pricing and allows a disproportionate allocation of costs. For merchants, low price elasticity is mainly attributable to the fact that accepting card payments has become a necessity in many business sectors.²⁸

Apart from surcharging, which refers to the practice of price differentiation based on the selection of payment instruments, retailers generally cannot charge different prices for goods and services. This is mainly due to the transaction costs involved and the risk of losing profitable business to rival retailers. Additionally, when cardholders collect rewards on certain cards, their willingness to pay with a different means is even lower. This signals that retailers must take cards in certain instances.²⁹ Rochet and Tirole analyse this argument further and conclude that retailers are not only willing to accept cards due to the prisoner's dilemma arising from the competition among themselves, but also in cases where the marginal costs exceed the marginal benefits for card payments.³⁰

In line with prevailing economic theory, Wright³¹ and Rochet and Tirole³² assert that setting interchange fees based on costs faced by issuers has no concise theoretical basis. Instead, the focus should lie on the two parties executing the transaction, namely retailers and cardholders. Additional costs, which are imposed on retailers due to selection of payment instrument by cardholders, should essentially be internalised by cardholders themselves.

METHODOLOGY

The following variables (payment metrics) have been selected to test the hypothesis of whether a statistically significant relationship is observable between the weighted average interchange fee and:

- number (and yearly development) of total card payments;
- value (and yearly development) of total card payments;
- number (and yearly development) of total cards in circulation;
- number (and yearly development) of total points of sale in circulation;
- number of total card payments per capita; and
- value of total card payments per capita.

Data on all variables has been collected for a total of 28 European countries (26 EU member states³³ plus Switzerland³⁴ and Norway³⁵ over an eight-year period (2014–2007). Interchange data are publicly available and have been collected from Visa³⁶ and MasterCard's³⁷ official websites over a period of several years. In total, there are 224 cases and 13 variables, resulting in 2,912 observations. To enable comparability, all monetary values are denominated in euros. The same approach is also taken with regard to any per item interchange fee components denominated in local currency. Norway and Switzerland have been included to enable a complete, European-wide analysis.

Data on interchange fees are based on consumer card brands and a common category/fee tier, namely electronic Europay, MasterCard and Visa (EMV) chip and PIN transactions. These are secured transactions within a card-present environment. Given the EMV adoption rates across Europe (96 per cent in 2013, 97 per cent in 2014), the vast majority of all brick-and-mortar transactions are today processed with these interchange rates.³⁸ Weighted average interchange fees per country are computed under

consideration of the average transaction value for card transactions, the respective market shares of Visa and MasterCard in Europe³⁹ and any per item components of the interchange fee.

To analyse the data set and assess the relationship between the weighted average interchange fee and each variable from the two sets, the statistical approach of partial rank correlations or Spearman's⁴⁰ partial correlations is applied. As described by Cowden, there are three coefficients of correlation involving similar interpretations in common use. The simple correlation, which is a linear correlation between the dependent variable and one independent variable; the multiple correlation, which is a simple correlation between the dependent variable and an estimate of that variable obtained from a linear equation involving two or more independent variables; and the partial correlation, which is a simple correlation between the dependent variable and one independent variable after adjusting each for the effect of one or more additional variables.⁴¹

To apply the rank correlation coefficient, all metric variables are ranked. Ties are resolved by assigning the mean of the two ranks to each case. The correlation is calculated for the ranks (ordinal) as well as the original (metric) variables. The results stemming from the Bravais-Pearson correlation are for comparison only, as no modification to underlying data with regard to outliers and extreme values has been made (to avoid loss of information and variance). The major problem in interpreting the results of the Spearman correlation with regard to a potential association between the average interchange fee and any other variable is summarised by Kendall:

'In interpreting an observed dependence between two qualities we are constantly faced with the question whether an association (correlation) of A with B is really due to the associations (correlations) of

each with a third quality C. This has led naturally to the theories of partial association and correlation, which attempt to decide the matter by the consideration of subpopulations in which the variation of C is eliminated.⁷⁴²

The partial rank correlation is applied instead of the simple Spearman correlation in order to eliminate any potential influences of other variables when assessing the relationship between the weighted average interchange fee and one selected dependent variable. In every calculation scenario, one dependent variable will be selected, while all other variables will be controlled for. However, a potential (hidden) influence of an external variable can never be completely excluded.

RESULTS AND DISCUSSION

First, results for the issuer impact analysis will be presented, based on the mandated interchange reductions in selected European card payment markets. These markets account for 99.3 per cent of total debit card and 99.6 per cent of total credit card transactions within the EU in 2014. Table 1 shows that total issuer losses amounted to €4.2bn, with Germany and the UK suffering the greatest impact. As Hungary, Poland and Spain adopted the regulation earlier, the impact in these markets is not included in the final result. Average interchange rates (unintentionally) increased for credit cards in France and debit cards in the UK.

To compensate for these losses, card issuers across the EU would need to process 80 per cent more debit and credit card volume. Given that card payment markets have historically grown at an average of 9 per cent following previous interchange reductions (see Table 2), it seems highly unlikely that such a growth in card acceptance is achievable in the short to mid-term. Total card payments increased by 12.5 per cent in value from 2015 to 2016.

The German Banking Industry Committee argues against the European Commission's claim vis-à-vis compensation of issuer losses and asserts that the major driver for payment patterns is consumer payment habits and not fees or the pricing of payment instruments. No causal link between the costs of card payments to merchants and their popularity with consumers is observable.⁴³ Malaguti and Guerrieri conclude that public intervention should depend on the level of development within the respective market, as all considerations made until one point, may have different effects if a country's payment industry is less developed and relies exclusively on paper-based payment instruments, as opposed to a country in which the payments market is highly mature and the final consumer can exercise an effective choice among alternative instruments.⁴⁴

Tables 2 and 3 confirm that the European payments market remains highly segregated and over the last few decades has undergone only the first steps towards unification, such as the implementation of a single currency, or initiatives such as the Single European Payments Area and the Payment Services Directive.⁴⁵ Each country remains unique in terms of payment behaviour, resulting in high heterogeneity within the data sample, especially with regard to wages and labour costs. These directly influence the costs of payment processing,⁴⁶ size of the economy and card payments market as well as competition in providing payment acceptance. Differences in card adoption and the relative importance of payment services such as national debit schemes can add further differences.⁴⁷ Interchange levels and processing fees such as the merchant service charge also vary.⁴⁸ This not only increases complexity when trying to determine and implement a single, optimal interchange fee but also raises the question whether an optimal interchange fee for Europe is the most efficient solution.

Table 1: Financial impact of interchange fee regulation on European card issuers

Country	Value of payments, 2014 (€000)		Interchange, 2015		Interchange, 2016		Issuer impact (€000)
	Credit card	Debit card	Credit card (%)	Debit card (%)	Credit card (%)	Debit card (%)	
Austria	11,703,590	21,430,500	1.00	0.31	0.30	0.20	105,499
Belgium	14,131,882	59,597,674	0.68	0.11	0.30	0.11	53,701
Czech Republic	2,049,869	11,697,102	1.05	1.03	0.30	0.20	112,460
Denmark	4,611,538	54,154,721	0.63	0.25	0.30	0.20	42,295
Estonia	681,871	3,622,036	0.80	0.78	0.30	0.20	24,417
Finland	8,153,072	34,358,820	0.65	0.38	0.30	0.20	90,382
France	227,547,012	215,762,533	0.27	0.27	0.30	0.20	82,770
Germany	94,885,361	162,202,438	1.49	0.30	0.30	0.20	1,291,338
Greece	4,740,445	1,323,378	1.03	0.43	0.30	0.20	37,649
Hungary	1,500,267	7,112,834	0.30	0.20	0.30	0.20	—
Ireland	6,939,258	17,671,200	0.68	0.15	0.30	0.10	35,205
Italy	53,914,591	88,365,316	0.63	0.53	0.30	0.20	469,524
Netherlands	12,104,135	97,398,437	0.48	0.12	0.30	0.06	80,227
Norway	15,269,049	70,409,641	0.98	0.38	0.30	0.20	230,567
Poland	7,667,261	28,063,645	0.30	0.20	0.30	0.20	—
Portugal	3,866,588	57,768,860	1.24	0.70	0.30	0.20	325,190
Slovenia	1,660,199	3,170,912	1.03	0.85	0.30	0.20	32,730
Spain	65,713,434	56,181,665	0.30	0.20	0.30	0.20	—
Sweden	39,206,358	64,262,547	0.68	0.35	0.30	0.20	245,378
UK	216,932,509	568,304,894	0.79	0.18	0.30	0.20	949,308
Total	793,278,290	1,622,859,152	0.75	0.39	0.30	0.18	4,208,640

Table 3 shows the five number statistics for the first set of absolute variables. A large discrepancy in weighted average interchange fees is observable with 0.2 per cent being the lowest value and 1.57 per cent the highest value in the data set; the median value is 0.6 per cent. Figure 2 highlights the slightly asymmetric distribution of cases (positively skewed; reference line marks mean).

Contrary to the European Commission's view, average interchange and assessment rates seem to have a positive influence on metrics such as implementation, market adoption, transaction penetration and acceptance with regard to new product launches. According to ERPB CTLP Working Group, although card payment usage is classified as low (on a scale of low, medium, high), contactless payment usage is highest (descending order) and above 50 per cent in the Czech

Republic, between 10 per cent and 50 per cent in Hungary, Poland and Slovakia, and between 3 per cent and 9 per cent in Austria, Croatia and Spain. While the Czech Republic is the only country where contactless payments are classified as developed, the rest are classified as in development. The UK, Netherlands, France and Ireland are seen as movers whereas other European countries are classified as slow movers or last movers. Czech Republic, Poland and Slovakia are the only countries with a high issuance penetration (>50 per cent) and a high acceptance penetration (>50 per cent).⁴⁹

For this set of countries, the median weighted average interchange rates for the last nine years lie well above the European median. Poland has the highest rate, with 1.55 per cent, followed by the Czech Republic with 1.02 per cent and Romania

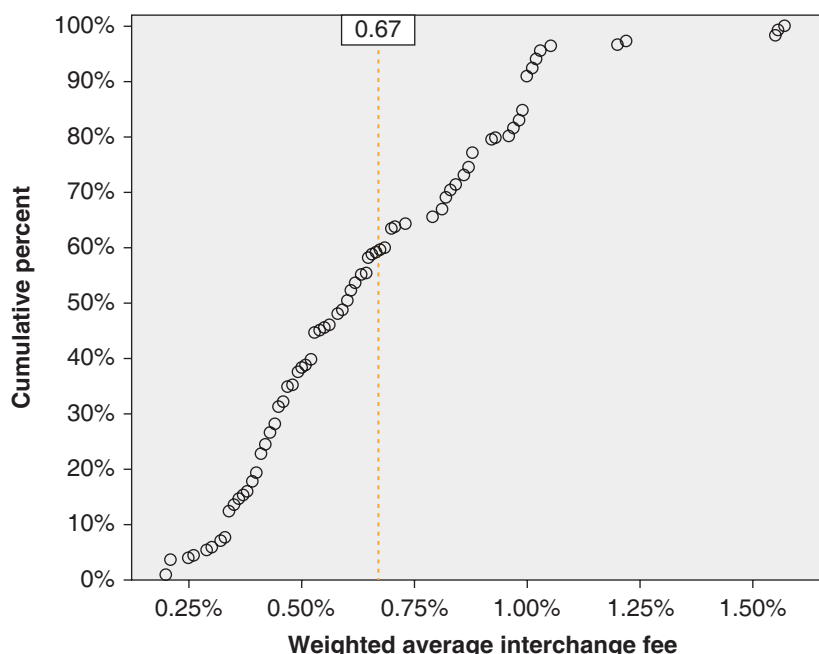
Table 2: Interchange fees for selected European countries from 2007 to 2014

	<i>Weighted average interchange fee (%)</i>							
	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>
Austria	0.92	0.66	0.60	0.53	0.53	0.53	0.53	0.54
Belgium	0.42	0.41	0.41	0.42	0.20	0.21	0.21	0.20
Bulgaria	0.58	0.60	0.62	0.63	0.59	0.61	0.55	0.58
Czech Republic	1.03	1.03	1.03	1.02	1.05	1.02	1.02	1.02
Denmark	0.49	0.35	0.33	0.34	0.34	0.34	0.34	0.30
Estonia	1.00	1.00	1.00	1.00	0.99	0.87	0.87	0.87
Finland	0.67	0.68	0.71	0.34	0.34	0.34	0.38	0.36
France	0.45	0.45	0.45	0.45	0.45	0.45	0.29	0.26
Germany	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.79
Greece	0.88	0.88	0.88	0.86	0.86	0.84	0.82	0.83
Hungary	0.88	0.88	0.88	0.86	0.86	0.84	0.82	0.83
Ireland	0.41	0.39	0.38	0.37	0.35	0.34	0.32	0.29
Italy	0.44	0.46	0.46	0.47	0.48	0.47	0.47	0.47
Latvia	0.61	0.63	0.62	0.63	0.64	0.40	0.39	0.32
Lithuania	0.82	0.81	0.82	0.82	0.83	0.92	0.92	0.92
Luxembourg	0.49	0.50	0.49	0.47	0.52	0.40	0.40	0.41
Malta	0.53	0.53	0.53	0.53	0.43	0.43	0.43	0.41
Netherlands	0.44	0.44	0.47	0.49	0.21	0.21	0.21	0.21
Norway	0.73	0.51	0.52	0.53	0.53	0.41	0.42	0.43
Poland	1.55	1.55	1.55	1.56	1.56	1.57	1.22	0.50
Portugal	1.01	1.01	1.01	1.00	1.00	0.98	0.93	0.92
Romania	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Slovakia	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Slovenia	0.98	0.97	0.97	0.97	0.98	0.99	0.99	0.99
Spain	1.20	1.05	0.96	0.81	0.81	0.79	0.79	0.25
Sweden	0.58	0.58	0.61	0.60	0.60	0.42	0.41	0.41
Switzerland	0.62	0.61	0.58	0.45	0.43	0.49	0.53	0.56
UK	0.39	0.39	0.36	0.36	0.34	0.34	0.34	0.32

Table 3: Five-number-summary for absolute variables

	<i>Weighted average interchange fee (%)</i>	<i>No. card payments (000)</i>	<i>Value of card payments (€000)</i>	<i>No. cards in circulation</i>	<i>No. POS in circulation</i>	<i>No. card payments per capita</i>	<i>Value of card payments per capita (€)</i>
Valid	224	224	224	224	224	224	224
Missing	0	0	0	0	0	0	0
Minimum	0.20	8,154	507,209	553,860	8,849	1	89
Percentile 25	0.43	128,323	4,396,773	5,231,363	46,463	28	969
Median	0.60	480,558	23,160,000	11,346,892	125,183	59	2,441
Percentile 75	0.88	1,514,037	78,713,844	25,397,120	278,974	128	6,125
Maximum	1.57	13,010,000	785,237,402	159,013,000	1,847,461	367	16,682

Figure 2:
Scatter diagram:
Weighted average
interchange fee



with 1 per cent. Slovakia (0.7 per cent) and Hungary (0.85 per cent) also show relatively high interchange rates. The findings show that the higher earnings of issuing banks via increased interchange fees are re-invested in the development of innovative payment solutions including contactless and proximity payments. In the USA, investments by network participants in the security and expansion of card processing systems amounted to US\$20bn in 2009 (prior to the Durbin Amendment). These investments have been funded by interchange fees.⁵⁰

The results of the zero order (raw) and partial correlation analysis are depicted in Table 4. Significant (two-tailed) correlation at the 0.01 (0.05) level is highlighted (italics and underlined). The partial rank correlation has been calculated for two variables separately while controlling for the rest (5th order partial correlation). The interpretation of results will be based on Fahrmeir *et al.*:⁵¹ for a correlation coefficient below 0.5 a low correlation between the two variables is assumed (0–0.2 very low correlation; 0.2–0.5

low correlation); for results between 0.5 and 0.8 a medium correlation and for correlation coefficients above 0.8 a strong correlation.

A significant rank correlation (Spearman) between the weighted average interchange fee and seven out of ten variables can be observed. For the first set of absolute variables, the correlation is constantly negative, implying a positive development of metrics such as card adoption and usage, card issuance and merchant acceptance with a decreasing interchange fee. The strongest (medium strength) correlation is observable for the per capita variables. The results of the second set of relative variables are different in terms of strength and direction. The two variables characterised by a significant correlation at the 0.01 level are the development variables for number and value of total card payments. However, in contrast to the initial findings, a positive correlation is evident, implying an increase in the yearly growth rates for card adoption and usage with an increasing interchange fee.

Table 4: Results of correlation analyses

<i>Variables</i>	<i>Bravais-Pearson</i>		<i>Spearman</i>		<i>Partial Rank</i>	
	<i>Corr.</i>	<i>Sig.</i>	<i>Corr.</i>	<i>Sig.</i>	<i>Corr.</i>	<i>Sig.</i>
Number of total card payments '000	-0.338	0.000	-0.354	0.000	0.074	0.276
Value of total card payments € '000	-0.354	0.000	-0.458	0.000	-0.243	0.000
Number of total cards in circulation	<u>-0.166</u>	0.013	-0.102	0.129	<u>0.135</u>	0.046
Number of total POS in circulation	-0.182	0.006	-0.181	0.006	-0.011	0.875
Number of total card payments per capita	-0.460	0.000	-0.539	0.000	0.063	0.354
Value of total card payments per capita	-0.565	0.000	-0.656	0.000	-0.243	0.000
Dev. in number of total card payments	0.203	0.002	0.188	0.005	-0.019	0.782
Dev. in value of total card payments	0.216	0.001	0.241	0.000	0.176	0.009
Dev. in number of total cards in circulation	-0.050	0.460	-0.077	0.250	<u>-0.172</u>	0.011
Dev. in number of total POS in circulation	-0.044	-0.508	0.102	0.130	0.060	0.372

Findings for the partial rank correlations highlight that the majority of assumed, initial correlations (Spearman zero order correlations) between the weighted average interchange fee (predictor) and outcome variables are based on influences of one or more other variables. By residualisation, an attempt is made to determine the true degree of association between these variables. The number of significant correlations has decreased to three variable pairs, namely value of total card payments, value of total card payments per capita and development in value of total card payments.

A very low to low statistically significant relationship between the interchange fee and the metrics card adoption and usage can be assumed, while the association with the other variables is negligible. Results related to the correlation between the weighted average interchange fee and development in number of total cards in circulation is significant at the 0.05 level and is in fact higher (123 per cent increase) than for the simple correlation. However, observations are contradictory, as with an increasing interchange fee, an increase, rather than decrease in card issuance would be expected. Furthermore, the absolute variables number of total card payments, number of total cards in circulation and number of total card payments

per capita all result in a positive fifth order partial correlation.

CONCLUSION

The need to evaluate empirically whether mandated interchange fee reductions are the right measure to achieve the European Commission's goals stems primarily from the fact that the arguments advanced by policy makers and the research from economic theorists are largely informed by models and generally accepted hypothetical assumptions. The present paper uses empirical data to examine the statistical relationship between interchange fees and payment metrics such as card acceptance, issuance and card spending. This paper complements economic theory with industry observations and enables a critical review of the motives and basis of policy intervention.

As a consequence of the European Commission's Multilateral Interchange Fee Regulation, card-issuing banks across Europe have incurred revenue losses of approximately €4.2bn, with those in Germany and the UK suffering the greatest impact. Given that an increase of 80 per cent in processed card volumes would be necessary to compensate for the losses, it is highly unlikely that this will be the case in

a short to mid-term scenario. The European card payment market has historically grown at an average of 9 per cent following previous mandated interchange reductions. Total card payments increased in value by 12.5 per cent from 2015 to 2016. The results of the partial rank correlations empirically confirm the above inference and show that for three variables, a very low statistical relationship can be observed between the interchange fee and card issuance, usage and acceptance, while no statistical relationship can be observed for the other variables.

Any regulatory interventions in the functioning of card payment markets should be applied conservatively and only after conducting a full market analysis based on theoretical literature and industry observations. Policy intervention should also consider consequences of previous regulations, which in the case for the USA,⁵² Australia,⁵³ Spain⁵⁴ and Switzerland⁵⁵ all fail to show a noteworthy pass-through of savings from retailers to consumers and an ultimate increase in social welfare. This raises the concern whether interchange reductions are actually the right measure to achieve the desired outcomes or if alternative measures may be more beneficial.

Zenger⁵⁶ finds that the tourist test interchange⁵⁷ and perfect surcharging⁵⁸ by merchants are equivalent. Hence, lifting the no-surcharge rule is expected to have an equal allocative efficiency to setting the interchange fee at the tourist test level. Wright⁵⁹ also finds that to the extent that retailers can steer consumers to their preferred means of payment through surcharges and discounts, the bias against retailers (due to increased card fees) is likely to be less prominent, although the rationale for regulating lower interchange fees may remain. As costs for payment instruments differ across the merchant landscape, an individually set surcharge seems more likely to guide consumers' choices of payment instruments than a multilaterally regulated interchange

fee, which ought to be incorporated into prices for goods and services sold by retailers.

The ultimate consumer impact of such regulations can in fact be detrimental and cause macroeconomic disruptions. Reductions in interchange fees will lead to lower merchant service charges towards merchants, which would not (or only to a low degree) be passed on to consumers. These positive network effects would however be offset by a reduced card base due to lower interchange fees which issuers would seek to offset by increasing annual card fees (or reducing benefits and reward programmes) towards consumers. This can in fact cause a negative effect on consumers and the network as a whole.

AUTHOR'S NOTE

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The influence of intra- and inter-system concentration on the pre-regulated setting of interchange fees within cooperative card payment networks

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Abstract

This paper deals with motives and consequences of regulatory involvement in cooperative card payment networks across the European Union and USA. The aim is to draw a bridge between the theoretical framework of two-sided markets and observable industry characteristics. By consolidating a data set on intra- and inter-industry concentration in acquiring, issuing and card scheme markets, a multivariate analysis of the determinants of interchange fees is enabled. Unlike previous studies, it departs from a pure theoretical view and empirically assesses the influence of concentration, rather than market externalities, in the setting of interchange fees. Findings allow for a preliminary assessment of the applicability of established theoretical models and policy intervention in card payment markets. Contrary to widespread belief, acquirer markets show to be highly (and more) concentrated than issuer markets which are characterised by a relative degree of concentration. Results show that concentration has a statistically significant influence on the setting of interchange fees in credit and debit card markets. Findings within this paper call for a more conservative regulatory involvement, as well as a review of utilised economic models incorporating empirical evidence.

Keywords Interchange fee · Competition · Regulation · Two-sided markets

JEL Classification D4 · G2 · L1 · L5

Introduction

The term *payment system* refers to the complete set of instruments, intermediaries, rules, procedures and processes which facilitate the circulation of money in a country or currency area [1]. Non-cash, retail payments amounted to 277 trillion Euro (EUR) across the European Union [2] and 178 trillion US Dollars (USD) in the USA [3]. For both regions, the volume of payments is a multiple

of the national gross domestic product, namely 17 times for the European Union and 10 times for USA [4]. The significance of an efficiently functioning payments system to the overall stability and growth of both economies is obvious. Both the European Central Bank and the Federal Reserve System state that the primary objective of a payment system is to secure safety, efficiency and broad accessibility for market participants in order to ensure currency and financial stability.

Retail payments entail the most common payment instruments such as cards, direct debits, credit transfers and checks as well as digital and emerging payments. The focus of this paper lies on card payments, specifically on cooperative, four-party card payment networks. Thereby, transactions between consumers and retailers will form the focal point of discussion. In 2015 card payments accounted for 72% of the total number of transactions for non-cash retail payments in the USA and 3.2% in terms of total value [3]. For the European Union, the respective figures are 47% in terms of

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number of transactions processed and 1% in terms of total value of transaction [2].

The importance (significant impact on social welfare), structure (cooperative card networks are two-sided markets; premature classification of interchange fee as horizontal price fixing may be socially detrimental) and complexity (determination of optimal interchange fee levels relies on a range of economic models; lack of empirical data to support theoretical findings) have attracted attention within the research community and formed the basis for regulatory involvement in credit and debit card markets. The largest and most recent (effective as of December 9, 2015) regulation impacting the European Union has been the regulation of interchange fees for card-based payment transactions [5]. All four-party, consumer card payments, including national debit schemes, are multilaterally set within the European Economic Area, to a weighted average maximum of 0.3% for credit cards and 0.2% for debit cards, effectively resulting in revenue losses of several billion EUR to issuing banks. Deloitte LLP estimates total losses of 3.7 billion EUR for issuers in seven major European Union markets (Spain, France, Germany, Italy, UK, Netherlands and Poland) directly resulting from the regulation [6]. Confirmatory, empirical evidence can also be found in economic literature [7].

Following a prohibition of cross-border multilateral interchange fees due to a restriction of competition in the sense of Article 101(1) Treaty on the Functioning of the European Union (TFEU) [8], Mastercard and later Visa Europe determine *compliant* multilateral interchange fees and propose these for the Member States of the European Union. Payment card associations consider the interchange fee as an essential tool for financial adjustment in order to reduce the imbalance between costs associated with issuing and acquiring. This adjustment is made with the aim to increase demand for payment card services. Further, they recognise efficiency advantages in setting a multilateral interchange fee compared to thousands of different bilateral agreements between the card scheme and issuers [9]. To determine a benchmark for assessing efficiency justifications brought forward by card associations, the European Commission launches a study to measure merchants' costs of processing cash and card payments [10]. The results are used to compute, based on a methodology known as the *tourist test* or *merchant indifference test* [11], efficient fees for several different scenarios, ultimately resulting in above interchange rates.

In the USA, the Federal Reserve Board, directed by the Durbin Amendment of the Dodd-Frank Act, issues the final rule on debit cards on 20 July 2011 coming into effect on 1 October 2011 [12]. Alongside several regulatory measures on routing and payment processing, a cap is established on debit card interchange fees charged by financial institutions

with more than 10 billion USD in assets. Based on the (controversially discussed) issuer cost methodology of determining efficient interchange fees [13], for eligible issuers debit card interchange rates are capped at a base fee of 0.21 USD per transaction to cover issuer's processing costs, plus an additional adjustment of five basis points (0.05%) to cover potential fraud losses and a 0.01 USD per transaction fee for fraud prevention.

The major outcome of the regulation is a re-distribution of profits between participants in the payment chain. Issuers' annual revenues from interchange fees dropped by 5.4 billion USD, whilst exempt banks' revenues increased by 198 million USD. Merchants, in general, have greatly benefited from the regulation although for merchants selling small-ticket items (up to 15 USD) the merchant service charge (MSC) has increased, causing an adverse effect. Small-ticket transactions are believed to make up more than one-quarter of all transactions generated via debit cards. For consumers, no evidence is provided as to potential savings being passed-on in form of price reductions. However, a clear trend is evident in the reductions in reward programmes for debit cards and an increase in fees for checking accounts [14].

Although these are the most noteworthy regulations by scale and size, others that have been executed in recent history have disrupted payment industries in countries such as Australia [15], Spain [16] and Switzerland [17]. Hayashi and Maniff provide a global overview of initiated investigations and actions taken by public authorities in card payments markets [18]. This has prompted further research regarding the consequences of such actions, caused by public authority involvement. Especially card issuing banks remain within the focus of discussions as they are mainly impacted by interchange regulations. First, revenues from interchange fees are impacted severely; second, issuers do not (continue to) exert an evident and direct influence on the determined level of interchange fees, thus finding themselves in a position where prices for supplied goods are effectively controlled by external factors.

Research within the field of cooperative card payment systems has thus far primarily relied on assumptions and inferences when dealing with economic questions. Most scientific work lacks empirical evidence and market observations, mainly due to the unavailability of systematic data. By drawing upon empirical data from (1) the European Central Bank's Statistical Data Warehouse (<http://sdw.ecb.europa.eu/>), (2) two selected market intelligence firms, providing financial and economic research services based on proprietary data, namely Timetric (<http://www.timetric.com/>) and The Nilson Report (<https://www.nilsonreport.com/>) and (3) a selected data set from Elavon Financial Services, DAC (<https://www.elavon.com/index.html>), a global acquiring bank, this paper aims to complement



theoretical models with industry observations and thereby allow for a preliminary comparison and evaluation of existing findings. Questions to be addressed in this paper include:

1. How has intra-system concentration within issuing and acquiring markets developed over the course of the last 10 years? Can issuers be classified as more powerful members of card associations?
2. What roles do intra- (issuing and acquiring markets) and inter-system (Visa versus Mastercard; international card schemes versus national card schemes) competition play in the setting of interchange fees? Can a statistical relationship be identified between the level of interchange fees and the degree of competition within issuing and acquiring markets?
3. Are preliminary consequences of the enacted regulations observable within card payment networks?

This paper deals with motives and effects of regulatory involvement in cooperative card payment networks across the European Union and USA. It aims to draw a bridge between the theoretical framework of two-sided markets and observable industry characteristics. Unlike the majority of previous studies, it departs from a pure theoretical view and empirically assesses the influence of intra- and inter-industry concentration (rather than market externalities) in acquiring, issuing and card scheme markets, on the setting of interchange fees. Findings will allow for a preliminary assessment of the applicability of established theoretical models and regulatory consequences in card payment markets across the European Union and USA.

The paper proceeds as follows. Section 2 provides an overview of participants, fees and functioning of payment markets. Section 3 reviews relevant literature on economics of card payment networks and highlights the lack of empirical data in this field. Section 4 introduces the data set and methodology to determine the influence of intra- and inter-system concentration on the pre-regulated setting of interchange fees. Section 5 discusses results with a reference to the main questions raised in this paper. Section 6 concludes.

Functioning of card payment networks

Card payment markets can be classified as networks and as such exhibit network effects or network externalities. The value of membership to one user is positively affected when further users join and enlarge the network, which gives rise to positive-feedback effects or adoption externalities. As the success of the system depends on two parties simultaneously interacting with each other, network owners can

cross-subsidise pricing structures between them so as to increase overall usage and profits. In fact, network ownership is most effective in overcoming network externalities if the network sponsor captures some of the benefits derived from a larger network. Conversely, the equilibrium in network markets can diverge from the social optimum and draw attention from policy makers to attempt and regulate these markets. However, the likelihood is that regulators will lack the necessary information to achieve the goal of maximising social surplus, as systematic empirical research and data are lacking in this field [19].

Cooperative card payment markets are represented by five major parties, namely cardholders and merchants, their respective issuing (cardholder) and acquiring (merchant) banks as well as the card association. Card associations such as Visa or Mastercard are in charge of setting the interchange fee, thereby remaining in line with regulations set by national legislation and governments [20, 21]. Initially formed as membership-owned organisations in the 1960s by participating issuing and acquiring banks, both have become publicly traded companies; Mastercard in 2006 and Visa in 2008 [22]. The privatisation of both card associations was finalised with the acquisition of Visa Europe by Visa Inc. in 2016 [23].

Whereas the sole focus of member-owned card organisations has been the revenues of its (issuing and acquiring) members and the increasing size of the network, as of 2006 and 2008, respectively, both Visa and Mastercard carry their own revenue targets. Whilst profits continue to largely depend on above two metrics, the motivation to alter other fee components, such as issuer and acquirer scheme fees, is larger. This concern has been raised publicly but remains to be investigated [24].

Issuing banks primarily focus on the issuance and product characteristics of payment cards. Acquirer banks can act both as technical and commercial intermediaries at the point of sale by linking the merchant to the payment network and enabling the acceptance of card payments. Merchants generally rent or buy payment terminals from their acquirers or payment service providers and pay a fee (MSC) to the acquirer. The facilitation of card payments conveys a certain number of advantages which can result in higher perceived net benefits including the promotion of better services and avoidance of missed sales from consumers who do not carry sufficient cash [25]. Cardholders or consumers generally pay an annual fee to their issuing banks in order to obtain a payment card. Cardholders profit from an additional convenience benefit of not having to carry large amounts of cash or visit the automated teller machine (ATM) to conduct purchases, interest-free periods on their payments (deferred debit cards), flexibility in managing cash balances (credit cards) and payment traceability [25].



The interchange fee is a transfer payment, settled by the acquirer towards the issuer and ultimately charged towards the merchant. It balances demand from the different network participants and allocates costs in a proper fashion. It is used as a mechanism to equalise marginal benefits and costs for the issuing side as the sum of accrued fees from card products is generally lower than the marginal costs incurred. The network impact of alterations in the size and structure of the interchange fee will largely depend on the pass-through of costs by each member and is thus closely related to the competitive characteristics within each industry segment. Card associations, issuing and acquiring banks, merchants and consumers cooperate within the system but also compete at different levels. In a proprietary (three-party) environment, the interchange fee is set by the same party that acquires it. Card association, issuer and acquirer are essentially one organisation. This applies to payment networks such as American Express and Diners.

Figure 1 shows the interactions between the market participants in a cooperative card network. Besides interchange fees, there are up to four additional fees that can be found in a cooperative card transaction, namely the MSC, the cardholder fee and two scheme fees paid by the respective issuer and acquirer to the card associations. Scheme fees are charged for the membership in the card network, whereby the size of the fees is generally negatively correlated to the number of cards issued and/or the number of transactions acquired. Economies of scale tend to play a significant role for both issuers and acquirers. Scheme fees are a source of profit for the card association and a direct cost to both issuers and acquirers [26]. Whilst the MSC is significantly driven by the level of interchange fees, other cost elements include the acquirer scheme fee as well as an acquirer profit margin, generally referred to as the processing fee [27].

The interchange fee has historically been set by card associations. In recent history, there has been growing involvement by national governments and legislative

authorities to influence the setting and level of interchange fees for payment transactions. The interplay of different actors regarding the interchange fee, the efficient setting of a privately versus socially optimal interchange fee and the economics of card payments in general have been addressed widely in recent literature.

Economics of card payment networks

Baxter was first to conceptualise the economics within four-party payment systems. Assuming a perfectly competitive market, he asserts that the demand for a private good, in this case card payments, will be dependent on each group's evaluation of the good's marginal utility. Four-party card transactions will take place as long as the marginal utility of consumers and merchants is higher than the marginal costs incurred by issuers and acquirers. Activities performed by one bank or another do not directly imply that the associated costs will also be borne by the bank performing them. According to Baxter, the interchange fee is an efficient balancing mechanism for equilibrating cooperative payment markets compared to a complete set of bilaterally negotiated agreements and should thus not be regarded as a form of horizontal price fixing. Also, it avoids the free-rider problem that increases with the number of participants within the network [28].

By building on Baxter's findings, Rochet and Tirole perform a comparative welfare analysis between the privately (bank profit maximising) and socially (welfare-maximising) interchange fee and include strategic consumer and merchant behaviour in their model. The model assumes market power on the issuing side and competitiveness on the acquirer side. If card issuers are the dominant party within card organisations, an interchange fee will be set that is higher than socially optimal and ultimately lead to card utilisation above the socially optimal level. System competition increases merchant resistance and may reduce social welfare by lowering the interchange fee. Abolishing the no-surcharge rule (Article 11 of the regulation on interchange fees for card-based payment transactions deals with surcharging and steering rules) [5] and allowing merchants to levy additional fees for card payments would result in a neutral interchange fee and card utilisation below the socially optimal level [29].

Interchange fees are set by the network in order to maximise total profit for its members; cardholder fee and MSC on the other hand result from competition within issuing and acquiring markets. It cannot be assumed that interchange fees are systematically inflated (or deflated) by card associations. The three main reasons why it is not in

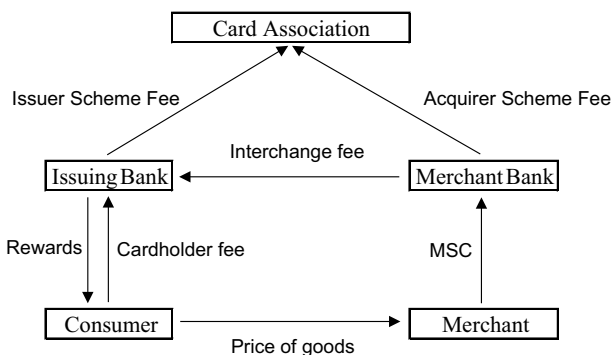


Fig. 1 Payments within a cooperative card network



the interest of card associations to set interchange fees that deviate markedly from social optima stems from *network externalities*, as extensive demand reductions from one side of the market will spill-over to the other; *intra-system competition*, as much of the increases in interchange fees will be competed away and passed through from issuing banks to cardholders; and *inter-system competition*, which can alter the price structure and allocation of fees between the two sides of the market in the presence of market power [30].

Schmalensee advises that any market involvement should be viewed critically as it is highly unlikely that regulators will have sufficient information to implement a socially optimal interchange fee. He investigates the functioning of payment card systems as a moral hazard problem within a two-stage game between acquirers and issuers. The model is based on a market composed of profit-seeking, imperfectly competitive acquiring and issuing banks, although he asserts that acquiring markets have shown to be highly competitive. Due to externalities, the size of the value-maximising interchange fee will be dependent on the system's objectives, differences in costs, intensity of competition and in demand elasticities of issuers and acquirers, as well as on differences in spill-over effects between them. The more intense the competition on either side of the system, the less sensitive the unit mark up on that side of the system to changes in the interchange fee will be [31]. The price charged by one side of the platform towards the other depends on what the other side is willing and or able to bear, whereby the price is inversely related to the other side's elasticity of demand [32]. Schmalensee points out that member banks' voting power in cooperative card associations is more sensitive to issuing volume than to acquiring volume, failing, however, to provide any empirical proof of this [31].

Whilst the interchange fee is primarily to be regarded as an instrument to achieve the right structure of fees between consumers and merchants, the overall fee level will be dependent on competition between members of the network and between different payment systems. The privately optimal (profit maximising) and output-maximising interchange fees coincide only where no asymmetry in pass-through of costs exists between issuers and acquirers. The profit-maximising interchange fee is set at a different level than the output-maximising interchange fee in order to increase equilibrium profits for the side of the market where they will be competed away less, ultimately benefiting the party that has greater control over the setting of interchange fees. An asymmetric pass-through of fees can result in restricted output and inflated members' profits. Wright concludes that empirical evidence is necessary to resolve the different scenarios [33].

Weiner and Wright are first to discuss issuer concentration as a potential driver of interchange fees, albeit noting that in order to adequately assess an empirical relationship a multivariate approach is necessary, supported by a richer data set. An overview of interchange fee developments and issues is presented, alongside a preliminary analysis of possible contributing factors, including the use of inflated interchange fees to spur investments and foster innovation by network members. They conclude that interchange fees are determined by a multitude of factors, including the relative degree of pass-through by issuers and acquirers as well as merchant competition for consumers and competition between different payment systems. The level of competition within issuer and acquirer markets does not only influence the overall level of fees but also the relative success of expanding one side versus the other. The relationship between the interchange fee and these factors is rather complex, requiring a multivariate approach on a country-by-country basis to allow for better control of other influencing factors [34].

Highlighting the danger of applying one-sided logic when making inferences on two-sided markets, Guthrie and Wright discuss the prevalent argumentation of regulatory authorities suggesting that the lack of competition between card schemes is a possible cause of high interchange fees. They show that the reverse conclusion may in fact be the true, i.e. that reducing system competition may drive down interchange fees and move them closer to the efficient level. Competition and the attempt to get consumers to switch to holding a card exclusively can ultimately lead card schemes to set interchange fees which are too high even for their own good. Further, any regulation of interchange fees can be undermined by a differentiated treatment of proprietary card schemes as these do not have to set an interchange fee to achieve their desired fee structure, ultimately resulting in a competitive advantage [35].

As it stands today, empirical research in this field is scarce and limited to a number of discussion papers and articles which have briefly addressed a potential relationship between issuer concentration and interchange fees [34, 36], the impact of interchange fees on consumers' choice of payments [9] and the determination of optimal interchange fees based on the Merchant Indifference Test [10, 37]. At the same time, the reviewed literature highlights the importance of intra- and inter-system competition when introducing models of four-party card payment systems and determining optimal interchange fees. The levels of pass-through ought to be empirically assessed prior to any regulatory involvement within cooperative card payment networks if unintended consequences of interchange fee reductions are to be avoided. These have, amongst others, been observed in previous cases of policy intervention in

the Netherlands [38], Australia [15], the USA [39]. and Spain [16].

Methodology

Industry concentration will be determined via the Herfindahl–Hirschman Index (HHI) and Concentration Ratio of the five largest firms by market share (CR5). Subsequently, the relationship between the different concentration measures and the interchange fee will be evaluated. Interchange fee data are collected for credit and debit cards and stems from Visa Europe [40] and Mastercard [41]. Relative market shares of card associations, acquiring and issuing banks are derived from a set of metrics including annual number of issued cards and/or acquired transactions. Although acquirers and issuers may have a multi-national presence and would hence compete on several markets, the degree of competition within issuer and acquirer markets is determined on a country level as consumers will generally hold bank accounts and obtain payment cards from nationally domiciled issuing banks and not from abroad. Likewise, the tendency of merchants to partner with domestic acquirers is larger than with (a relatively small number of) international acquirers.

The HHI is a statistical measure of concentration based on the structure–conduct–performance paradigm. As a heavier weight is attributed to firms with larger market shares, the HHI corresponds to the theoretical notion in economics that the greater the concentration of output in a small number of firms, the greater the likelihood that, other things equal, competition in a market will be weak [42]. The U.S. Department of Justice and the Federal Trade Commission have applied the HHI to analyse post-merger effects and changes in concentration, whereby markets are classified into three types. Unconcentrated markets will show a HHI below 1500, moderately concentrated markets between 1500 and 2500 and highly concentrated markets above 2500 [43]. The European Central Bank annually assesses the level of market concentration within the banking sector by applying the HHI and CR5 measures [44].

The relationship between the interchange fee (response variable) and issuer, acquirer, and scheme concentrations (predictor variables) will be determined via multiple regression analysis and assessed separately for debit and credit card markets. Whilst for issuer and acquirer markets concentration is calculated as the cumulated market shares of the five largest firms, inter-scheme concentration is determined via the cumulated market shares of Visa and Mastercard versus market shares of other card brands in the respective country. Intra-scheme concentration assesses the relative strength of Visa versus Mastercard and vice versa. Due to the rather complex relationship between market concentration

and interchange fees, the cross-country analysis will be complemented with a view on single countries across time to better control for other influencing factors. Given that any potential statistical dependency does not per se prove a causal relationship between the variables, other shifts or movements in the market will be taken into consideration when interpreting results.

Results and discussion

The data set consists of a total of 20 markets within the European Union, accounting for 97.5% of total card payments conducted in 2016 [2], plus Norway and Switzerland as well as the USA. According to *The Nilson Report* the USA alone accounted for 36% of global purchase transactions made with international cards [45]. The data set can hence be regarded as representative for card payment markets across the identified regions. Tables 1 and 2 (see “Appendix”) show the yearly development of issuer and acquirer concentrations within debit and credit card markets, complemented with the respective interchange fees. Whilst the interchange fees have declined for both Visa and Mastercard over time, no comparable trend is visible when observing issuer and acquirer concentration. Issuer concentration has remained relatively stable over the analysed period, whilst acquirer concentration shows abrupt decreases in 2010, followed by a relatively constant development and increases in the Median in years 2016 and 2017 for credit card products.

Acquirer markets can be classified as highly concentrated markets with the HHI averaging a Mean of over 3000 for every period and the Median dropping below the 2500 mark only at times and if, then to a minimum of 2399. Issuing markets show a lower HHI for every year. The HHI for issuing markets ranges between 2019 and 2303, implying a relative level of concentration. These are also characterised by a comparatively lower dispersion of data than acquirer markets measured by the standard deviation. A similar result can be obtained when comparing findings for credit cards on a country level. Here, the data set has been reduced to 15 countries, instead of the original 23, as only countries where data for both issuing and acquiring markets are available have been included. Table 3 shows that in all cases, except for Spain (and an ambiguous result for Norway) acquirer markets indicate a lower level of competition than issuing markets. In contrast, for debit card markets Germany, Spain, Ireland and Norway show a higher level of concentration within issuing than acquiring markets (Table 4).

Results show that acquiring markets in Europe and the USA cannot be classified as competitive and are in most cases less competitive than issuing markets. Although no



final statement can be made with regard to the strength of issuing banks compared to acquiring banks and the more or less preferential treatment of both parties by card scheme organisations, results suggest that issuing banks are in fact more elastic to changes in the interchange fee. Due to comparatively higher competition within the market, issuers (acquirers) are less (more) sensitive to interchange fee decreases (increases), which could explain the downward trend of the interchange fee (also prior to the regulatory intervention) for the respective card brands and signal the stronger power of acquirers within card networks.

This does not suggest that issuing banks do not have an incentive to increase interchange fees as the industry remains relatively concentrated. Across the complete data set, issuer markets average a Median (Mean) HHI of 1955 (1957) for credit cards and a Median (Mean) HHI of 2054 (2056) for debit cards. Acquirer markets average a Median (Mean) HHI of 3376 (3527) for credit cards and a Median (Mean) HHI of 3579 (3665) for debit cards. Findings suggest that any additional revenues arising from higher interchange fees will not be completely and immediately competed away and passed on to consumers. However, they are still, in relative terms, more competitive than acquiring markets. As any incremental profits will be competed away less on the acquiring side of the network, there is a tendency to reduce the profit-maximising interchange fee, ultimately benefiting the party that has greater control over the setting, which in this case are acquirers.

Below overview shows the regression formulas that have been run. In line with the paper's objectives, only cases prior to the interchange fee regulations in the European Union and USA have been included. Cases where variables are missing have been excluded listwise. Due to the nature of the analysis, outliers have not been removed from the data set. The fact that regression analysis is neither distributionally robust nor outlier resistant has been acknowledged. Multicollinearity is not observable (Variance Inflation Factor below 1.6 at all times), and initial results are confirmed by findings from a stepwise regression. Table 5 summarises main results for the complete data set. Differentiated results per country and year are not included due to insignificance and lacking robustness, primarily caused by the low number of data points (8 cases per country and 9 cases per year).

$$\begin{aligned} \text{Interchange Visa Credit}_t &= a * \text{Issuer Concentration Credit } C5_t \\ &+ b * \text{Acquirer Concentration Credit } C5_t \\ &+ c * \text{Inter Scheme Concentration Credit } C2_t \\ &+ d * \text{Intra Scheme Concentration Credit Visa}_t + \text{Constant} \end{aligned}$$

$$\begin{aligned} \text{Interchange MasterCard Credit}_t &= a * \text{Issuer Concentration Credit } C5_t \\ &+ b * \text{Acquirer Concentration Credit } C5_t \\ &+ c * \text{Inter Scheme Concentration Credit } C2_t \\ &+ d * \text{Intra Scheme Concentration Credit } MC_t + \text{Constant} \end{aligned}$$

$$\begin{aligned} \text{Interchange Visa Debit}_t &= a * \text{Issuer Concentration Debit } C5_t \\ &+ b * \text{Acquirer Concentration Debit } C5_t \\ &+ c * \text{Inter Scheme Concentration Debit } C2_t \\ &+ d * \text{Intra Scheme Concentration Debit Visa}_t + \text{Constant} \end{aligned}$$

$$\begin{aligned} \text{Interchange MasterCard Debit}_t &= a * \text{Issuer Concentration Debit } C5_t \\ &+ b * \text{Acquirer Concentration Debit } C5_t \\ &+ c * \text{Inter Scheme Concentration Debit } C2_t \\ &+ d * \text{Intra Scheme Concentration Debit } MC_t + \text{Constant} \end{aligned}$$

Formula 1 Regression formulas

Within credit card markets, the main drivers of the interchange fee are inter-scheme concentration (overall impact 45–47%) and acquirer concentration (overall impact above 34–35%). Both predictors are significant at the 1% level and negatively correlated with the interchange fee. Results are consistent across both regression models, which are characterised by a medium to high goodness of fit, explaining 58–63% of the total variance. Markets that are characterised by a relatively high (increasing) acquirer and inter-scheme concentration, are *ceteris paribus* characterised by a relatively low (decreasing) interchange fee. Results are in line with prevailing theory and characteristics of two-sided markets. Acquirers will have an interest in decreasing the interchange fee as this will result in a decrease in MSCs (plus a potential additional revenue if cost decreases are not passed through completely), leading to a higher merchant card acceptance. Acquirers can be classified as more powerful members of card associations and will, with an increasing market concentration, drive interchange fees down.

In countries where Visa and Mastercard have a relatively high market share compared to other card brands, a lower interchange fee is set as the focus lies on expanding merchant acceptance rather than card issuing. This can be achieved by setting a lower interchange fee. This strategy is in line with the overall goal of maximising card acceptance and profit. Conversely, in countries where Visa and Mastercard have a relatively low market share, a higher interchange fee is set in order to incentivise card issuers, with the focus on expanding overall cardholding and usage.

Interchange fees in debit card markets are primarily influenced by issuer concentration (overall impact 41–42%) and inter-scheme concentration (overall impact 24–31%). Both predictors are significant at the 1% level. Contrary to credit



card markets, issuer concentration is negatively and inter-scheme concentration positively correlated with the corresponding interchange fee. Markets that are characterised by a relatively high (increasing) issuer concentration, are ceteris paribus characterised by a relatively low (decreasing) interchange fee. At the same time, a relatively high (increasing) inter-scheme concentration is an indicator for high (increasing) interchange fees. Results are consistent across both regression models which are characterised by a low to medium goodness of fit with, explaining 33–53% of total variance.

Most debit card markets across Europe are characterised by a peculiarity, namely the fact that, alongside Visa and Mastercard a national debit scheme is present. When this is the case, international card schemes tend to have a marginal market share, which can be observed in following countries (non-exhaustive list): Belgium (0%), Norway (0%), Portugal (0%), Germany (9%) and Italy (34%). Also, they are faced with conflicts of interest when partnering with card issuers. These will generally market their own domestic card schemes rather than competing, international ones. As a consequence, card associations will focus on expanding merchant acceptance (also driven by international cardholders conducting purchases in the respective market), rather than card issuance. With an increasing merchant acceptance, interchange fees are increased to incentivise card issuers.

In relatively concentrated issuer markets, the likelihood of market entry and displacement of national debit schemes (major source of revenue for issuers) is very low. Markets characterised by a lower issuer concentration will be more competitive and receptive to the issuance of alternative card products, hence why the interchange fee will tend to be higher in these markets. In this case, with a decreasing issuer concentration, the focus of card schemes on card issuance compared to card acceptance will increase, whereby a higher interchange fee will develop.

Conclusions

This paper has demonstrated that alongside market externalities, concentration is a statistically significant driver of interchange fees. So far, the widespread belief was that issuing markets are characterised by low competition and a high concentration. There have been previous debates if concentration may be a cause of high and above socially optimal interchange fees. This paper has shown that acquiring markets are in fact (highly and) more concentrated and that interchange fees have been decreasing prior to regulatory involvement across the European Union. The findings presented in this paper highlight the importance of empirical data when developing complex

economic models of cooperative card payments markets. Policy intervention ought to be based on industry data and verifiable models; in contrary, goals and grounds of regulations can be undermined resulting in adverse consequences of regulatory involvement within two-sided markets. Apart from a re-allocation of profits from issuers to merchants, no immediate social benefits of the enacted regulation are observable; ultimate consequences remain to be seen. This paper calls for a more conservative regulatory involvement.

These results do not allow for an ultimate statement on the power distribution of issuers versus acquirers as members of card associations, however due to the comparatively higher competition within the market, issuers (acquirers) are less (more) sensitive to interchange fee decreases (increases), which could explain the downward trend of the interchange fee (prior to the EU regulation) for the respective card brands and signal the stronger position of acquirers within card networks. As any incremental profits will be competed away less on the acquiring side of the network, there is a tendency to reduce the profit-maximising interchange fee, ultimately benefiting the party that has greater control over its setting, which in this case are acquirers.

The increases in concentration within acquiring markets can, to a large extent, be attributed to the market consolidation, driven by recent merger and acquisition activity. Noteworthy undertakings have been observed in The Netherlands where acquirers Equens (46% market share) and Atos Worldline (9%) merge. In Norway Nets (53%) acquires the acquiring business of Nordea (19%); the transaction also being valid for Denmark and Sweden. In Switzerland SIX Payments (62%) acquires Aduno (11%). In the USA Global Payments (3%) acquires Heartland Payment Systems (3%), and Vantiv (17%) acquires Worldpay (3%).

The EU-wide regulation has prompted acquirers to realign their strategies in order to adapt to the new conditions constituting a level-playing field within payment markets. Hereby, not only commercial considerations (interchange reduction) play a role but also, amongst numerous others, regulations impacting licensing (cross-border acquiring), the separation of scheme and infrastructure, price transparency as well as treatment of the *Honour all cards* and *No-surcharge* rules [5]. Given the comparatively higher concentration within acquiring versus issuing markets, a further consolidation, prompted by policy intervention, is most likely undesired by the European Commission, highlighting this as a further unintended consequence of the regulation.

Considering the relatively high concentration within acquirer markets, only a partial pass-through of savings from acquirers to merchants can be expected. The risks associated with this have been identified by the European Commission and addressed within *Article 9—Unblending*



of the *Regulations on interchange fees for card-based payment transactions* [5]. However, the adjustment of pricing structures towards merchants does not per se assure a reduction in card processing fees, certainly not to a full extent. The likelihood that these savings will then be passed on to consumers so as to achieve the socially desired outcome is even lower.

Meanwhile, there is growing concern over the introduction of new acquirer assessment or scheme fee components and structures as well as noteworthy increases in existing fees [24, 46, 47]. These fees are imposed by the card associations and will reduce savings by merchants accrued from the interchange fee cap. There is also concern that these may be used as a mechanism to compensate for issuer losses or circumvent the regulation. Reduced issuer revenues may also impact innovation and development within card payment markets; a further potential unintended consequence of the policy intervention.

Several grounds and objectives of the EU interchange fee regulation are controversial and not in line with findings of this paper. First, no confirmatory evidence can be found with regard to a (partial) compensation of issuer revenues due to an increased merchant acceptance [48] as set out by the European Commission [10, 49]. Second, the claim that national debit schemes have been detrimentally impacted by disproportionately higher interchange fees in the past contradicts findings within this paper. Third, whilst the promotion of integrated EU-wide services, efficiencies and innovation is a key objective, the European Commission fails to acknowledge a potential use of interchange fees to develop payment market infrastructures and spur innovation,

especially visible in South-Eastern Europe with regard to contactless payment acceptance [50].

Finally, a market observation that has not been considered in any research of cooperative card payments thus far, is the widespread manifestation of issuer-acquirers across Europe. As these entities will participate in both issuing and acquiring activities within the payment chain, their role, interests, strategic behaviour and influence on the setting of interchange fees will be different to entities operating in a single market segment. Across Europe, a total number of 34 acquirers located in following countries also act as card issuers (acquiring market shares in brackets): Austria (54%), Czech Republic (97%), Estonia (74%), France (93%), Germany (8%), Italy (54%), Netherlands (51%), Norway (42%), Poland (21%), Spain (25%), Sweden (67%), Switzerland (20%), UK (19%). In the USA, 5 large acquirers with a cumulated market share of 59% also act as card issuers.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Appendix

See Tables 1, 2, 3, 4 and 5.



Table 1 Development of issuer and acquirer concentration within credit card markets

Year	Issuer Concentration HHI Credit						Acquirer Concentration HHI Credit						Interchange MC Credit			Interchange Visa Credit		
	Valid N	Minimum	Median	Mean	Maximum	SD	Valid N	Minimum	Median	Mean	Maximum	SD	Valid N	Median	Mean	Valid N	Median	Mean
2008	23	929	2196	2303	5353	1057	10	1008	4016	4406	8599	2716	23	1.20	1.34	23	1.25	1.32
2009	23	949	2068	2195	5315	961	10	1028	4069	4330	8841	2574	23	1.20	1.33	23	1.00	1.27
2010	23	1068	2042	2246	5275	993	15	1545	2418	3571	10000	2318	23	1.20	1.31	23	1.00	1.26
2011	23	756	2181	2238	5245	1003	15	1491	2399	3480	10000	2294	23	1.20	1.30	23	1.00	1.23
2012	23	781	2082	2269	5213	1072	15	1502	2408	3475	10000	2223	23	1.20	1.31	23	1.00	1.23
2013	23	800	2173	2249	5185	1027	15	1486	2424	3322	8192	1842	23	1.20	1.31	23	1.00	1.21
2014	23	777	2043	2184	5173	948	15	1446	2428	3291	7571	1748	23	1.20	1.19	23	0.95	1.11
2015	23	711	2086	2141	5166	940	15	1426	2634	3364	8027	1822	23	1.20	1.08	23	0.95	1.10
2016	23	748	2115	2130	5160	933	13	1459	3318	3847	10000	2464	23	0.30	0.50	23	0.30	0.49
2017	14	1093	2132	2019	2906	631	6	1524	3493	3574	6406	1659	22	0.30	0.44	22	0.30	0.43

Table 2 Development of issuer and acquirer concentration within debit card markets

Year	Issuer Concentration HHI Debit						Acquirer Concentration HHI Debit						Interchange MC Debit			Interchange Visa Debit		
	Valid N	Minimum	Median	Mean	Maximum	SD	Valid N	Minimum	Median	Mean	Maximum	SD	Valid N	Median	Mean	Valid N	Median	Mean
2008	23	160	2208	2166	3497	738	10	1008	4016	4406	8599	2716	23	0.85	0.82	23	0.75	1.02
2009	23	143	2186	2106	3410	690	10	1028	4069	4330	8841	2574	23	0.85	0.82	23	0.76	0.99
2010	23	139	2188	2140	3460	720	15	1452	2507	3818	10000	2748	23	0.85	0.81	23	0.79	0.98
2011	23	135	2155	2066	3465	702	15	1357	2492	3755	10000	2714	23	0.83	0.73	23	0.54	0.83
2012	23	140	2173	2069	3373	694	15	1333	2480	3705	10000	2645	23	0.83	0.73	23	0.52	0.74
2013	23	126	2162	2073	3463	705	15	1315	2465	3557	9125	2340	23	0.78	0.72	23	0.48	0.71
2014	23	112	2168	2084	3554	711	15	1329	2454	3518	9018	2249	23	0.48	0.58	23	0.42	0.63
2015	23	105	2197	2107	3585	727	15	1300	2463	3466	9137	2284	23	0.42	0.56	23	0.41	0.61
2016	23	94	2193	2104	3575	726	13	1302	2474	3964	10000	2850	23	0.20	0.23	23	0.20	0.28
2017	14	1380	2209	2223	3555	687	6	1547	2756	3739	9137	2759	22	0.20	0.20	22	0.20	0.23

Table 3 Issuer and acquirer concentration within credit card markets

Country	Issuer Concentration HHI Credit						Acquirer Concentration HHI Credit					
	Valid N	Minimum	Median	Mean	Maximum	SD	Valid N	Minimum	Median	Mean	Maximum	SD
AT	9	2297	2673	2633	2831	170	9	4032	5483	5797	8599	1361
BE	10	1773	1861	1859	1949	62	9	7571	8192	8819	10000	1134
CH	10	1921	2069	2049	2115	60	9	4073	4450	4660	6773	821
DE	10	1212	1306	1296	1377	55	7	2160	2175	2178	2212	18
DK	10	2096	2395	2329	2462	141	10	5595	6105	6388	8841	1041
ES	10	1884	2162	2259	2977	361	9	1280	1795	1712	1944	227
FR	10	1713	1762	1766	1847	46	9	2096	2260	2252	2358	67
IE	10	2667	2765	2773	2875	69	8	2634	3013	3007	3518	261
IT	10	1093	1129	1131	1175	25	6	1858	1912	1907	1939	35
NL	10	2196	2931	2843	3100	343	8	3318	3340	3430	4074	261
NO	10	2209	2355	2331	2434	76	8	2209	2293	2745	3581	667
PL	10	983	1084	1185	1722	235	7	2260	2311	2314	2384	49
SE	10	2682	2904	2900	3103	140	10	3341	3411	3632	4823	523
UK	10	1108	1150	1159	1261	50	10	2399	2426	2666	3647	512
US	9	711	781	835	1068	119	10	1008	1473	1397	1547	204

Table 4 Issuer and acquirer concentration within debit card markets

Country	Issuer Concentration HHI Debit						Acquirer Concentration HHI Debit					
	Valid N	Minimum	Median	Mean	Maximum	SD	Valid N	Minimum	Median	Mean	Maximum	SD
AT	9	1872	2079	2063	2199	121	9	4032	5483	5797	8599	1361
BE	10	1338	1370	1365	1380	14	9	7571	8192	8819	10000	1134
CH	10	1948	2058	2031	2085	52	9	4073	4450	4660	6773	821
DE	10	2544	2706	2717	2884	117	7	2207	2291	2286	2343	46
DK	10	2365	2423	2413	2452	30	10	7467	9134	8994	9492	565
ES	10	1623	1972	2137	3497	592	9	1280	1663	1629	1767	147
FR	10	1522	1538	1549	1611	29	9	2096	2296	2278	2358	73
IE	10	3063	3171	3166	3237	58	8	2663	3039	3008	3518	258
IT	10	1391	1482	1483	1604	67	6	1718	1750	1759	1814	36
NL	10	2542	2767	2755	2901	129	8	3027	3075	3075	3131	38
NO	10	3348	3464	3479	3585	86	8	2454	2477	2477	2507	17
PL	10	1460	1569	1574	1770	91	7	2285	2313	2330	2397	41
SE	10	2186	2410	2374	2494	112	10	3871	3913	4048	4823	311
UK	10	1447	1675	1609	1732	129	10	2129	2285	2522	3647	591
US	9	94	135	128	160	21	10	1008	1322	1297	1547	166

Table 5 Cross-country regression analysis

Method	Coefficients					Model	ANOVA	
	Dependent variable	Independent variables					<i>R</i> ²	Sig.
Enter	Interchange Visa Credit	Issuer Concentration C5			106	0.193	0.007	0.631
		Acquirer Concentration C5				−0.471	0.000	
		Inter-Scheme Concentration C2				−0.599	0.000	
		Intra-Scheme Concentration Visa				0.079	0.232	

Table 5 (continued)

Method	Coefficients					Model R^2	ANOVA	
	Dependent variable	Independent variables	N	Stand. Beta	Sig.		F	Sig.
Stepwise	Interchange Visa Credit	Inter-Scheme Concentration C2	106	−0.582	0.000	0.599	76.819	0.000
		Acquirer Concentration C5		−0.412	0.000			
Enter	Interchange MasterCard Credit	Issuer Concentration C5	106	0.123	0.093	0.599	37.664	0.000
		Acquirer Concentration C5		−0.421	0.000			
		Inter-Scheme Concentration C2		−0.580	0.000			
		Intra-Scheme Concentration MC		−0.110	0.110			
Stepwise	Interchange MasterCard Credit	Inter-Scheme Concentration C2	106	−0.570	0.000	0.578	70.425	0.000
		Acquirer Concentration C5		−0.407	0.000			
Enter	Interchange Visa Debit	Issuer Concentration C5	99	−0.509	0.000	0.376	14.131	0.000
		Acquirer Concentration C5		−0.196	0.055			
		Inter-Scheme Concentration C2		0.305	0.001			
		Intra-Scheme Concentration Visa		−0.237	0.012			
Stepwise	Interchange Visa Debit	Issuer Concentration C5	99	−0.587	0.000	0.325	23.061	0.000
		Inter-Scheme Concentration C2		0.269	0.003			
Enter	Interchange MasterCard Debit	Issuer Concentration C5	99	−0.628	0.000	0.527	26.214	0.000
		Acquirer Concentration C5		0.052	0.532			
		Inter-Scheme Concentration C2		0.454	0.000			
		Intra-Scheme Concentration MC		−0.348	0.000			
Enter	Interchange MasterCard Debit	Issuer Concentration C5	99	−0.667	0.000	0.429	36.008	0.000
		Inter-Scheme Concentration C2		0.341	0.000			

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TITLE: REGULATING THE UNCONTROLLABLE: THE DEVELOPMENT OF CARD SCHEME
FEES IN PAYMENTS MARKETS IN LIGHT OF RECENT POLICY INTERVENTION

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ABSTRACT

After more than three decades of research and legal cases pursued by the European Commission and national regulators, interchange fees for four-party consumer card transactions are capped on December 9, 2015 across the European Union. Since then the development of card scheme fees has been a raising concern for merchants. Due to their nature, these fees have not been dealt with in research or covered by the Interchange Fee Regulation (IFR). This paper aims to assess the recent development of card scheme fees within four party card payment networks by relying on survey data obtained from 104 merchants across the European Union. Findings show that for half of the merchant population card scheme fees have increased since the regulation. Further concerns related to transparency of fees, pass-through of savings to retailers and subsequently consumers and the development of commercial cards are discussed. In light of the European Commission's scheduled review of the impacts of the policy intervention in 2019 (Article 17 of the IFR), this paper evaluates alternative arrangements for the setting of card scheme fees with a focus on the legal basis for a potential regulation. Findings shall provide a ground for further interaction between academics, practitioners and policy-makers.

KEYWORDS: Card Scheme, Regulation, Interchange Fees, Pass-through, Two-Sided Markets, Card Payments.

JEL: D04, D43, K21, L13, L41

INTRODUCTION

The last three decades have seen a growing interest in the economics of card payments markets as two-sided networks by research communities across the globe. Simultaneously, competition regulators have been analysing the contractual arrangements between the four parties within cooperative card networks in relation to the interchange fee. The resulting (most noteworthy) market interventions have been interchange reductions for credit cards in Australia (Stillman et al., 2008), debit cards in the United States (Federal Reserve System, 2011), and both credit and debit cards across the European Union (Council of the European Union & European Parliament, 2015). A comprehensive overview of initiated investigations and actions taken by public authorities in card payments markets across the globe can be found in (Hayashi & Maniff, 2018). Issuing banks across the European Union (EU) have incurred total losses of 4.2 billion Euro in revenues year-on-year as a result of the regulation (Veljan, 2018a). To what extent these have been passed on or recouped from consumers and/ or mitigated by external factors such as increasing card usage, remains to be addressed.

In none of these cases have card scheme fees been dealt with, although they have played a role in the determination of regulated interchange fees.² This applies to the cost-based approach taken in Australia and the United States as well as the merchant indifference test methodology (Rochet & Tirole, 2006b, 2011) deployed by the European Commission (EC).

Interchange fees are utilised as an equilibrating pricing mechanism to overcome externalities within payment markets such as asymmetries of demand between consumers and merchants, differences in costs to service consumers and merchants, or both. Most economists and antitrust authorities agree that an interchange fee may be necessary (especially with regard to *credit* cards; countries such as Switzerland and Denmark have operated successful debit card schemes without an interchange for multiple years) to balance the demands of consumers and

² In the context of this paper, card scheme fees are considered any fees charged by the card associations towards acquiring and/ or issuing banks.

merchants resulting in higher social welfare. However, the socially optimal (versus privately optimal) level of the fee remains a subject of debate (Bolt, 2013). A card network seeking to maximise profits by increasing the number of card transactions has an incentive to encourage over-usage (above socially optimal level at times when alternative means of payment may be more economically efficient) of credit cards by convenience users provided merchants are still willing to accept such transactions. The card network does this by setting interchange fees high enough (above socially optimal level) to induce issuers to offer rewards or cash-back bonuses (Rochet & Wright, 2009).

Contrary to interchange fees, card scheme fees are agreed via private contracts between issuing/ acquiring banks and the respective card association. As such they are not publicly accessible but ultimately form part of the Merchant Service Charge (MSC) and total cost of card processing for retailers. The MSC consists of three core components which are interchange fees, card scheme fees and a (acquirer) processing fee. Whilst in general, fee structures and tiers are multilaterally agreed in accordance with processed transactions, bilateral agreements do exist. However, the reporting transparency of card scheme fees towards merchants continues to be a controversially discussed topic.

Imposed by card associations such as Visa and Mastercard within cooperative card payment networks, this paper aims to shed light on the role of scheme fees, specifically their development in terms of size and complexity since the enactment of the Interchange Fee Regulation (IFR). This is assessed by evaluating survey data collected by *EuroCommerce* from 104 European merchants during 2018. EuroCommerce is the retail, wholesale and international trade representation to the European Union. Its members include national commerce federations in 31 countries, Europe's 27 leading retail and wholesale companies, and federations representing specific sectors of commerce (EuroCommerce, 2018). Findings will enable an evaluation if inflated scheme fees or the introduction of new fee structures have been reducing

merchant (and subsequently consumer) benefits from interchange fee reductions. Further, alternative arrangements for the setting of card scheme fees and legal grounds for a potential regulation in relation to Articles 101 and 102 Treaty on the Functioning of the European Union (TFEU) (European Union, 2012) and the IFR (Council of the European Union & European Parliament, 2015) will be discussed. Results shall support the EC's assessment of the regulatory impacts on fees and costs for retailers and cardholders; revenues for card associations, issuers and acquirers; as well as merchant pass through of fee reductions towards consumers (European Commission, 2018).

The paper is organised as follows. First an overview of the economics of four-party card payment markets will be provided, followed by a review of antitrust in relation to Visa and Mastercard. The methodology and data set will be described in Section 4. Results of the survey, specifically the development of scheme fees, transparency, issuance of commercial cards and levels of pass through from acquirers to retailers and subsequently consumers will be presented in Section 5. Section 6 discusses potential actions to be taken and suggestions for the EC's approaching regulatory review. A final section concludes.

ECONOMICS OF CARD PAYMENT NETWORKS

Card payment markets can be classified as two-sided markets and differentiated by the number of network participants (Bolt & Chakravorti, 2008). For further information see also (Prager et al., 2009). American Express or Diners operate a three-party system and simultaneously act as the network, issuer and acquirer. As three-party networks can set different prices towards merchants and cardholders, an explicit interchange fee is not necessary to overcome the market externalities. Visa and Mastercard operate four-party or cooperative card payment networks. Both card issuing and card acquiring banks are separate (privately or publicly held) member organisations of the network. The two markets are brought together by the card association and

balanced by the interchange fee (Rochet & Tirole, 2006a). Below figure outlines the flow of payments for both card networks.

[Insert Figure 1 here]

Card associations offer authorisation, payment processing, settlement, and associated services linked to simplicity, security and ease of payment by effectively connecting acquiring and issuing banks to the same network from a legal and technological perspective. Additionally, card schemes define new card products and most importantly are in charge of setting the interchange fee; in line with regulations set by national legislation (Mastercard Inc., 2018; Visa Inc., 2018). Initially formed as membership-owned organisations in the 1960s by participating issuing and acquiring banks, both have become publicly traded companies; Mastercard Inc. in 2006 and Visa Inc. in 2008 (U.S. Government Accountability Office, 2009).

Whereas the sole focus of member-owned card organisations would have been the profits of its members and the increasing size of the network, as of 2006 and 2008 respectively both Visa and Mastercard carry their own revenue targets. Whilst scheme profits continue to largely depend on the number and volume of transactions, the motivation to alter other fee components, such as issuer and acquirer scheme fees, is larger. By increasing these, card associations can positively impact profits or alter distribution of costs between issuing and acquiring banks. This concern has been raised publicly with regard to merchant charges multiple times across Europe; see amongst others (Jones, 2017); (Pinhammer, 2017); (British Retail Consortium, 2017); (Godwin, 2018).

Issuing banks decide on the card portfolio (brand) and primarily focus on the issuance and product characteristics of payment cards, whereby these processes tend to have a low degree of specificity. The acquirer bank can act both as technical and commercial intermediary at the point of sale by linking the merchant to the payment network and enabling the acceptance of card payments. In order for card transactions to be processed the acquirer needs to be in

possession of a licence issued by the card associations. Shared processes (between issuer and acquirer) include authorisation of payments, routing and switching as well as fraud management (Huch, 2013). Consumers' are incentivised to use cards based on several benefits including the convenience of cash substitution, interest-free periods, payment traceability and potential value-added services such as insurances or rewards programmes. Merchants also benefit from cash substitution as this eliminates handling/ depositing costs, reduces delays at the counter and the risks of hold-up, whilst allowing the ability to track consumer payments through enhanced reporting (Tirole, 2011).

However, the main benefit (and equally concern) of merchants related to card payments is the avoidance of missed sales. Whilst evidence shows that consumers tend to spend higher amounts when paying with cards compared to cash (European Commission, 2015), they also benefit from the credit functionality which facilitates a higher spending power (Bolt et al., 2011). In turn, merchants compete amongst each other for cardholders as they feel *obliged* to accept at least the cards of the largest two card schemes (Visa and Mastercard) if they want to avoid the risk of losing their business to competing merchants. This element of *must-take* raises the interchange fee above the socially optimal level and forces merchants to internalise the costs associated with card acceptance (Vickers, 2005).

The interchange fee is a profit stream to issuing banks. In competition for cardholders, issuing banks would tend to pass-through some of these profits to cardholders in form of rewards, cash-back programmes or air miles, thereby incentivising cardholders to utilise card payments even more due to a financial benefit, resulting in a usage externality. This reward on top of the convenience benefit further negatively influences merchant's price elasticity and ability to turn card payments down (Rochet & Tirole, 2002). Within the two-sided framework, there is an inherent dysfunctionality which impacts card scheme competition. Visa and Mastercard are inclined to increase benefits towards issuers whilst competing for their

partnership. With increasing competition, prices and costs of card processing tend to inflate for merchants. Thus, scheme competition can in fact increase (rather than decrease, as would be the common rationale regarding most industries) prices for goods (Guthrie & Wright, 2007).

The degree of pass-through of benefits and costs on either side of the network (issuing or acquiring) depends on the degree of competition within the respective market. Whilst a common belief existed within the research community that acquiring markets are highly competitive and issuing markets tend to exert market power (Rochet & Tirole, 2002; Schmalensee, 2002), recent empirical research has shown that across the EU and United States acquiring markets exhibit a low degree of competition and are in fact less competitive than issuing markets which are characterised by a moderate degree of competition (Veljan, 2018b).

Only in special circumstances will interchange fees be neutral and internalise the externalities relating to credit card acceptance, namely if merchants can freely and at no costs surcharge consumers for the use of card payments or if retail markets are perfectly competitive (Gans & King, 2003). Surcharging refers to the act of imposing an additional charge or providing a rebate for the use of a specific payment instrument. It is generally used to steer consumers towards a more preferential payment instrument or to balance costs for the acceptance of a costlier payment instrument. For further information see (Rysman & Wright, 2014); (Wright, 2012); (Rochet & Tirole, 2002); (Zenger, 2011). As the recent Directive on payment services (PSD2) prohibits surcharging (Article 62) for regulated cards (European Parliament & Council of the European Union, 2015) and given that surcharging has proven to be economically inefficient for merchants due to its limited feasibility (Rysman & Wright, 2014), this notion will be disregarded as an alternative for the handling of scheme fees.

Card scheme fees can consist of numerous cost components such as development funds, regulator fees, authorisation and settlement fees as well as compliance programs, depending on country of merchant and issuer, type of payment, merchant industry as well as security level

(Elavon Financial Services, 2017). As scheme fees, in the same manner as interchange fees form part of the MSC³, above findings relating to pass through will also apply to scheme fees. Issuers with market power may not be passing on potential reductions in scheme fees to their cardholders fully and likewise acquirers with market power may be charging their merchants higher scheme fees than they are incurring. Card scheme fees have been disregarded in economic theory and policy debates primarily because they are not publicly accessible and based on private contracts between issuing/ acquiring banks and the respective card association (one-sided market) and as such do not constitute collusive behaviour at first sight. Further, their impact on overall card processing costs to merchants has been comparatively low in a pre-regulated environment, as highlighted by below example.

According to (MasterCard International Inc., 2008-2017) the pre-regulated interchange fee in Germany (2015) for a secured, domestic Mastercard credit transaction was 1.40%. The international acquirer (SIX Payment Services (Austria) GmbH, 2017) provides an indicative scheme fee of 0.13% for a transaction with above card. Assuming a processing fee of 0.06% (European Commission, 2015), the total MSC equates to 1.59%, with the acquirer scheme fees accounting for 8%. Notwithstanding any potential scheme fee increases, in a post-regulated environment with an interchange fee of 0.3%, the acquirer scheme fee will account for 20% of the total MSC, i.e. a substantially higher proportion.

ANTITRUST IN CARD PAYMENT NETWORKS

Socially efficient pricing in multi-sided platforms may result in setting the fees for consumers on a particular market side (for instance card issuing) below measures of average variable or marginal costs. By disregarding the multi-sided nature of the card market, antitrust analysis⁴

³ The MSC consists of three core components which are interchange fees, card scheme fees and a (acquirer) processing fee.

⁴ For a comprehensive overview on antitrust in multi-sided platforms see Evans and Schmalensee (2012). Bourguignon et al. (2014) discuss regulation in relation to surcharging. Ding and Wright (2017) provide

might erroneously conclude that below-cost and discriminatory pricing is predatory (Evans, 2003). This theory is applicable to advertising platforms as much as payment platforms, whereby any influences on the pricing of one side of the market will cause spill over effects on the other (Weyl, 2010). However, demand elasticities of the network participants are inversely related to the size of the platform, meaning that as the platform grows in size, network participants will become less elastic to pricing changes due to the dependence on the platform, thereby reducing impacts of spill overs. The lack of competition in payments markets, especially between card associations (monopoly networks) and the inverted nature of competition between card associations for issuing banks generally leads to the setting of interchange fees above the socially optimal level (Rochet & Wright, 2009). Although these findings were originally identified for interchange fees, they can be applied to acquirer and issuer scheme fees as they too form part of the total MSC charged towards merchants.

Further, antitrust and economic analysis have previously identified a market distortion related to the setting of interchange fees across the EU. This was identified in the presence of scheme fees. If it can be established that any increases in acquirer scheme fees or cross-subsidisation of scheme fees to the benefit of card issuers has in its foundation the effect to compensate issuers for recent revenue losses associated with interchange fees, then such actions shall be sanctioned by the EC in line with Article 5 (see below) of the IFR (Council of the European Union & European Parliament, 2015).

“Prohibition of circumvention

For the purposes of the application of the caps referred to in Articles 3 and 4, any agreed remuneration, including net compensation, with an equivalent object or effect of the interchange fee, received by an issuer from the payment card scheme,

theoretical evidence in support of a regulation of interchange fees based on card associations’ systematic bias towards the setting of excessive interchange fees even when they can price discriminate.

acquirer or any other intermediary in relation to payment transactions or related activities shall be treated as part of the interchange fee.”

Without an insight into the development of issuer and acquirer scheme fees (and other financial transactions between issuing banks and card associations) since the enforcement of the IFR and the privatisation of Visa and Mastercard in Europe, it cannot be claimed that any recent movements in card scheme fees are de facto a means to circumvent policy regulation. However, due to the potentially detrimental effects arising from increased card scheme fees on merchants and consumers, it is a development that requires further investigation, especially if deemed to be socially undesirable. Card associations have a vested interest in increasing their own profitability and the profitability of card issuers as there is a risk that these may start issuing competing card brands or enter into partnerships with three-party card networks (European Commission, 2007). As issuers compete for cardholders, they must ensure that the provided card benefits are attractive so as to avoid consumers migrating to competing issuers.

Historically, only a single case exists where scheme fees have formed part of the legal discussions within the EU. Following the EC's 2007 decision that Mastercard's cross-border multilateral interchange fees did not comply with the EC Treaty rules on restrictive business practices (infringement of Article 81), Mastercard provisionally repealed its cross-border multilateral interchange fees in June 2008. In October 2008 Mastercard also revised its acquirer pricing structure, resulting in acquirer scheme fee increases and the introduction of new fee components. Only shortly afterwards, in July 2009 these increases were repealed and brought in line with pre-October 2008 scheme fee levels in the European Economic Area (EEA). According to Commissioner Kroes: *“The increases inflated the costs of the acquiring banks, which made the savings due to the repeal of the MIF impossible to pass on to merchants”* (European Commission, 2009a). With the introduction of the *merchant indifference test* or *tourist test* (Rochet & Tirole, 2006b, 2011) methodology, further guidance was provided on the

justification of interchange fee levels (Börestam & Schmiedel, 2011). The Appendix provides an overview of antitrust cases brought forward by the EC against Visa and Mastercard including an overview of the legal assessment conducted for the application of Article 101(1) TFEU (European Commission, 2009b); likely of most interest to legally inclined readers.

DATA AND METHODOLOGY

The relevant data on the development of card scheme fees within four party card payment networks, transparency of fees to merchants, pass-through of savings to retailers and subsequently consumers and the development of commercial cards is collected by EuroCommerce from 104 merchants operating under different legal entities across the EU via an online survey during the period between January and April, 2018. The survey comprises six sections (*Your company profile, Visa & MasterCard Interchange fees in consumer card operations, Commercial cards, Merchant Service Charges, Choice of Card Products & Application Selection and Transparency*) and 38 questions in total. The respondent population consists mainly of Retail (68%) and Wholesale (11%) shops, both in an online and shop environment, Travel Providers (7%), and Hotels and Restaurants (6%). Operations in all EU countries are covered with the majority of data (50%) covering France, Germany, Italy and the United Kingdom. The underlying data stems primarily from 2017 (79%) and mixture of 2016 and 2017 (20%). Only one respondent bases findings exclusively on 2016 data.

The merchant population includes businesses with an annual turnover ranging from €1 million and/ or a single outlet to over €10 billion and/or over 2500 outlets. 53% of all firms generate a total annual turnover in excess of €1 billion and operate on average 200 or more sales outlets. Further, 72% of responding merchants operate sales with 500 or more payment terminals in total. This shows that large merchants are over-represented in the data set. This can be linked to scale economies, as the impact of changes in costs of card processing will be correlated to merchant size and processing volume. Also, it may be an indicator that there is

still a lack of information within the small and mid-size business segments when it comes to card processing.

The majority of merchants (67 in total) report that only 10% or less of their card sales stems from cardholders outside of the EU/ EEA. Whilst this would indicate that any regulatory intervention related to the EU or EEA would have major impacts on the total costs of processing for these merchants, only 9% of them have ever contacted any authority responsible for the oversight and implementation of the IFR. In contrast, 83% of respondents are aware that such an authority exists. This hints towards a lacking involvement of merchants regarding policy interventions within card payment markets and may be systemic for small and medium enterprises (SME). However, it should be noted that some merchants react through their trade organisation on any potential issues of concern.

RESULTS

This section will present survey results related to *developments in card scheme fees, transparency, pass-through and commercial cards*. As it stands today only 55% of all merchants have observed a reduction in their overall MSC since the IFR entered into force on December 9, 2015.⁵ For the remaining respondents average fees have either increased or stayed the same. European merchants have, on average, seen a reduction in interchange fee levels for consumer cards from 2015 (credit: 0.75%; debit: 0.39%) to 2016 (credit: 0.3%; debit: 0.18%) (Veljan, 2018a). Increases of existing fee components and the introduction of new fee structures by both Visa and Mastercard have reduced these benefits for half of the merchant population.

If we hypothetically assume that all merchants have been processing via the Interchange Plus Plus (IC++)⁶ pricing methodology and have thereby automatically observed a full pass-

⁵ The paper acknowledges that a population of 104 merchants across Europe is not a statistically representative sample of the European retail, hospitality and travel sectors. Whilst a broader data sample is necessary to derive general results across the industry, findings within this paper provide key insights into the issues related to card scheme fees that need to be addressed in future research, amongst others by regulators such as the EC.

⁶ Interchange Fee + Acquirer Scheme Fees + Processing Fee.

through of these savings from acquirers, it remains questionable if card scheme fees could have fully eradicated these savings within 2 years' time. Conversely, if we assume that all merchants have been processing on a blended pricing and only seen minimal pass-through of these reductions initially, the question remains if acquirer re-pricings (which are a common phenomenon in the industry) would have continued to be exercised, thereby diminishing these savings again. Also, merchants in this instance would have been unable to identify the root-cause of these pricing increases. Therefore, the answer most likely lies in one of the other observed factors, namely *transparency*, *pass-through* and/ or *commercial cards*.

Evidence on average MSC is lacking on a European level, as non-regulated cards continue to be a matter of the member states. Looking at the example of Germany, we observe a gradual decline of the average MSC for Mastercard from 1.62% in 2014, 1.40% in 2015, to 0.98% in 2016 and 0.66% in 2017 for merchants with a turnover between 5 and 100 million Euro (EHI Retail Institute, 2019). However, Germany is also a market characterised by the highest average pre-regulated interchange fee (1.49%) for consumer credit cards across Europe. A reduction of this magnitude (0.96%-points) leaves more pricing flexibility for card associations with regard to other cost components than would be the case for a country such as The Netherlands where the average pre-regulated interchange fee for credit cards was 0.48%.

If merchants had the possibility to benchmark their total costs of processing for card payments with national averages, it would allow for deeper insights and increase negotiation power with acquiring banks. Such an initiative could be launched by the European Central Bank in conjunction with national banking authorities. In Australia the Reserve Bank publishes statistics on the average MSC for the different card schemes and products on a quarterly basis (Reserve Bank of Australia, 2019).

Transparency of reporting and costs structures remains a potential area of development as 12% of all survey respondents are not able to assess the impact of the development in card

scheme fees at this point in time. This raises concerns with regard to the success of the implementation of Article 9 (Unblending)⁷ of the IFR (Council of the European Union & European Parliament, 2015) and the overall transparency regarding the reporting of card processing costs.

In fact, just over half of all respondents have advised that their pricing structure has reached the desired level of detail and clarity, with the acquirer providing information on all cost components of the MSC, i.e. interchange, scheme and processing fees. For 16% of the merchant population the level of detail has increased but continues to lack certain components. For 1 in every 5 respondents there has been no change in the reporting structure. So far, the EC has not shared any information on how the implementation of Article 9 of the IFR has been monitored or what measures will be taken in the future to ensure that acquirers fulfil the stipulated requirements.

The ultimate goal (amongst others) of the IFR is an increase in efficiency and social welfare, through the reduction of transaction costs to consumers (European Parliament & Council of the European Union, 2015). The economics of pass-through have been analysed at length in theory; empirical research remains scarce but is of considerable importance when evaluating regulatory impacts. For one, in order to shed light on the two hypothetical scenarios discussed above, it is key to assess acquirer pass-through to merchants. For another, an assessment of the ultimate pass-through by merchants to consumers is critical to ultimately assess the regulatory impact on social welfare.

4 out of 5 merchants claim that they have seen a full pass-through of savings on interchange fees from their acquirers. In this case, for the majority of merchants stating that

⁷ Unblending refers to the act of splitting out the individual cost components of the MSC, thereby transparently reporting to the merchant the charges for interchange fees, card scheme fees and acquirer service fees. These charges should be differentiated by card products, unless specifically requested otherwise by the respective merchant. The goal behind Article 9 is to enhance reporting transparency to merchants, thereby ensuring higher pass-through of savings from acquirers to merchants.

their MSC has reached or even surpassed pre-regulated levels (45% of all respondents), a mixture of factors such as the introduction of new fee structures and/ or the increase in existing fee structures as well as a potential migration to unregulated card products, has completely eradicated the initially observed cost reductions. Further, 15% are not aware if and to what extent a pass-through has occurred.

On the consumer side 15% of all respondents are aware of directly passed through savings to consumers; either through price reductions or through promotions which would not have occurred otherwise. The European Commission (2013) acknowledges this potential drawback but stresses that the isolation of the impact of a specific cost element on the overall pricing policy of a retailer is difficult as many other factors play a role in the evolution of prices. Besides the argument that competition in retail markets shows to be higher than in banking and the fact that some U.S. retailers (such as Home Depot) have actually announced price decreases directly related to the interchange regulation in the U.S., a reference to economic theory and basic market mechanisms is provided. If retailers are pricing products profitably, all cost components are included. Without a historical interchange fee, these prices would be lower. Although not every cost reduction would result in an identifiable decrease in prices immediately, merchants may use these savings to make investments, innovate or improve their services in another way, thereby indirectly passing on these benefits to consumers.

A numerical example may highlight above complexities and shed further light on the magnitude of savings. On an average basket of 49 Euro in Germany, a merchant would have observed reductions of processing costs of 14 cents. In any other European market, this reduction would have been even less. Also, the 14-cent saving would have been spread across all items in the basket. Further, the treasury, finance or payments department within the business would have had to liaise with all the respective marketing functions to assess direct pass-

through of savings. This seems rather unrealistic. Contrary to the U.S.⁸ and Australia⁹, thus far no academic research exists contradicting above argumentation in Europe.

A potential migration from regulated consumer cards to commercial cards as well as pricing increases related to unregulated card products is a further aspect that is to be reviewed by the EC in their regulatory assessment¹⁰ (European Commission, 2018b). The impact of commercial cards on total costs of card processing differ across the merchant portfolio. A noteworthy share (in excess of 10%) of such cards within the overall card portfolio can only be recorded for 20% of all responding firms, whilst for the vast majority these cards account for less than 2% of their total transaction volume. However, 60% of all firms have observed an increase in volume on commercial or corporate cards, whilst 40% are not aware or unable to quantify this. The level of increase ranges from single digit percentages (17% of respondents) to increases of over 60% (6% of respondents) with a relatively equal distribution across all ranks.

In its opinion on the IFR and the PSD [1], the European Economic and Social Committee (2013) strongly supports the inclusion of commercial cards within the regulation in order to prevent a promotion of those cards by card associations. It sees an inherent risk of banks steering their customers towards an increased usage of commercial cards which seem to be easily accessible and promoted even to one-man businesses. Also, non-regulated business cards which are issued to employees can in many cases be used for non-business purposes, thereby implicitly circumventing the regulation of consumer cards.

In addition to the cost impacts caused by movements within the payment mix, 43 respondents claim that they have seen an increase in total card fees for commercial cards,

⁸ See Evans et al. (2013)

⁹ See Chang et. al. (2005)

¹⁰ In Article 17 of the IFR the EC commits to submitting a report on the application of the regulation, thereby looking into the appropriateness of the levels of interchange fees. In particular the development of fees for payers, the level of competition among payment card providers and payment card schemes, the levels of merchant pass-through and the effects of commercial cards and surcharging practices are to be considered.

without providing further information as to the origin of such increases (interchange fee versus scheme fee increases). 36 merchants have not observed a development within their portfolio and 25 are unable to assess this. Although recent studies show that surcharging has the greatest impact on consumer behaviour when choosing a method of payment (European Economic and Social Committee, 2013) and a third of responding merchants claim that the respective country, they are basing their response on allows surcharging for commercial cards, only 12% of all respondents either decline, surcharge today or plan to surcharge commercial cards in the future. 84% of merchants will continue to accept commercial cards without surcharging, mainly due to operational and customer service reasons.

DISCUSSION

Based on above findings, the majority of surveyed merchants across the EU have been confronted by an increase in card scheme fees. Results provided with regard to *transparency*, *pass-through* and *commercial cards* shall serve as a basis for further research¹¹ and should be regarded as preliminary insights for the EC's upcoming IFR review, scheduled for 2019. The increases in card scheme fees have led to a reduction in commercial benefits associated with the recently enforced IFR. The inability of merchants to surcharge card transactions in order to compensate for cost increases is related to the operational complexities associated with surcharging; to a regulatory limitation on the surcharging of regulated cards (European Parliament & Council of the European Union, 2015) as well as to merchants' reluctance due to competition for consumer business. As merchants are left to internalise (increasing) card scheme fees, the question needs to be raised as to how these fees are to be handled and controlled going forward.

¹¹ The (Payment Systems Regulator, 2018) has initiated a market review into the supply of card-acquiring services in the United Kingdom covering, amongst others, the topics *transparency of reporting* and *pass-through towards merchants*.

This paper discusses three arrangements related to the setting of scheme fees within card payment markets; in a similar approach to (Frankel & Shampine, 2006) who provide several alternative payment arrangements for interchange fees. For one, if acquirer and issuer scheme fees would be equalised, merchants and consumers would be assured equal fees via their respective (acquiring and issuing) banks, assuming fully or at least equally competitive markets. Also, the regulatory pressure on card associations would be reduced as one aspect of the circumvention clause (preferential treatment towards issuers versus acquirers) would be mitigated as well as one aspect of Article 101(1d) TFEU, namely the preferential treatment of trading parties and the application of dissimilar conditions.

A second potential approach is related to the structuring of card scheme fees, rather than their actual size. In an environment in which these fees would constitute pure costs to acquirers and would not be automatically passed on to merchants as part of the IC++ pricing methodology, acquirers would be more inclined to negotiate them downwards with the card associations so as to remain competitive towards merchants. Also, acquirers have historically benefited from decreases in interchange and card scheme fees (pass-through below 100%) and may seek to obtain such benefits again, thereby potentially retaining some of the cost reductions which merchants will observe (Capgemini, 2012).

Although this may seem like a reversal of conventional thinking and contradict the recent initiatives by regulators in card payment markets, it is rather an optimised approach, incorporating the benefits of blended and fully transparent pricing models. Whereas initially European merchants were left in the dark as to what cost components constitute their overall fees, today the fee breakdown is relatively transparent and has also seen a regulatory cap on the historically largest cost component, namely interchange fees. Today, merchants are faced with complexities and transparency regarding card scheme fees. For one, these cannot be contractually bound as they are set by card associations, for another, merchants cannot gain

insight into these fees as they constitute agreements between acquiring banks and card associations. Merchants are left to trust the respective acquiring bank when amending card scheme fees, as these can be amended without (or on relatively short) notice (lack of regulation). Even when going out to market to assess and compare fee structures, no contractual commitment is provided by acquiring banks that the quoted fees will actually be imposed and not altered in the short-to-mid-term.

Whilst this approach may not affect the size of scheme fees immediately, it would increase competitiveness within the market and may potentially lead to acquirers combining their buying power towards Visa and Mastercard to control scheme fee levels. Also, ad-hoc and short-term pricing increases towards merchants would be excluded as these could be prohibited within contractual agreements. Whereas interchange fees would remain out of scope of the agreement (as regulated), scheme fees and acquirer processing fees would be bundled and contractually committed to merchants for a certain timeframe. The actual split between these two cost components would become somewhat irrelevant for merchants, as they constitute costs to acquiring banks.

Whilst the adoption of the IC++ pricing has increased the level of transparency for merchants, it has also increased complexity. A large proportion of merchants, especially SMEs continue to find this reporting structure challenging, especially in terms of reconciliation. This is why a blended pricing mechanism or an Interchange Plus (IC+) pricing methodology can ensure more control of acquirer card scheme fees than is observable today.

Finally, policy intervention and regulation is the third alternative to control the development of card scheme fees. The paper identifies three potential legal approaches which could be pursued to ensure that these fees are set at an economically and/ or socially efficient level. These are Article 5 of the IFR (Council of the European Union & European Parliament, 2015) related to circumvention; Article 101(1) TFEU related to horizontal agreements between

undertakings and Article 102 related to the abuse of a dominant position. The applicability of Article 5 of the IFR has been briefly evaluated within this paper. A final assessment is not possible; mainly due to limited availability of actual data relating to issuer and acquirer scheme fees. Such an analysis shall be performed by the competent regulatory authorities. The goal of this paper is to merely showcase all of the legal grounds for a potential policy intervention.

At first sight, Article 101(1) may not seem to be applicable in this context as card scheme fees within four-party card networks are determined by two separate, publicly traded corporations, namely Visa and Mastercard. However, in previous cases (34579) the EC determined that the ownership structure of the card associations is immaterial for the application of Article 101(1) TFEU as the member banks continue to exhibit an influence and share a common interest in the setting of interchange fees (European Commission, 2007). Although card associations are the only beneficiaries of scheme fees, a common interest in their setting continues to exist. This leaves potential to set scheme fees in a similar manner to interchange fees in a pre-regulated environment, i.e. a disproportionate share of the costs to be absorbed by the side of the market which exhibits lower demand elasticities. This results in acquirer scheme fees being set at a higher level than issuer scheme fees. Also, acquirers have had little interest in opposing interchange fee increases in the past as these were generally passed on to merchants (European Commission, 2007). A similar risk exists in relation to scheme fees. The Appendix discusses the applicability of Article 101 (1) with regard to the regulation of card scheme fees.

Article 102 TFEU deals with abusive exclusionary conduct by dominant undertakings and prohibits the impairment of genuine, undistorted competition on the common market. Such abuse may in particular be expressed in directly or indirectly imposing unfair purchase or selling prices or unfair trading conditions (European Union, 2012). Dominance is defined as a position of economic strength enjoyed by an undertaking and allowing it the power to behave to an appreciable extent independently of its competitors, customers and ultimately consumers

(European Commission, 2011). Both Visa and Mastercard have a dominant market position on the European card payments market.¹² More sophisticated approaches seek to determine whether the firm under consideration prices above marginal costs by a significant degree. However, as seen earlier no necessary relationship must exist between pricing and marginal costs within two-sided markets (Evans, 2003).

As with Article 101 TFEU, the claims put forward by a dominant undertaking that its conduct is justified, objectively necessary and produces substantial efficiencies which outweigh any anti-competitive effects on consumers is also investigated by regulatory authorities. Equally, Article 101(3) TFEU and the four cumulative conditions are used to assess this condition. In any case one cannot disregard the economics of multi-sided markets and the opportunities for different kinds of anti-competitive conduct within these markets. Such platforms provide social value by internalising externalities among different customer groups and, in some cases, by creating products and services that could not exist without such intermediation (Evans, 2003). A socially efficient outcome of such an intermediation is key to the long-term success of the platforms as well as its users.

CONCLUSIONS

As this paper has demonstrated, recent policy intervention has caused different market reactions within the European card payment industry. Based on survey data, collected from 104 European merchants, findings highlight concerns related to *transparency*, *pass-through*, *commercial cards* and *developments in card scheme fees*. Card scheme fees are based on agreements between four-party card associations and the respective issuing or acquiring banks. In recent

¹² From the 62.79 billion payment transactions conducted with international payment cards across Europe in 2016, Visa (67.4%) and Mastercard (31.2%) jointly accounted for 61.89 billion or 98.57% (HSN Consultants, 2017a). However, numerous European economies are characterised by national card schemes. In 2016, Visa (54%) and Mastercard (24%) together accounted for 78% of the total value of card payments across Europe, including such schemes (European Central Bank, 2017). Further, out of 50.2 billion face-to-face card payment transactions processed by the 32 largest European acquirers, 91% were associated with a Visa or Mastercard network and 9% with a differing, national network; predominantly Dankort, Bancontact, Cartes Bancaires, Pago Bancomat and Girocard (HSN Consultants, 2017b).

times, increasing fee levels and the introduction of new fee components have been observed for European merchants, both of which are having detrimental effects on the total costs of card processing and the benefits associated with the IFR. Given that this is a growing concern and in light of the EC's pending review of the impacts associated with the IFR in 2019, this paper discusses above concerns and provides three alternatives on how current developments in card scheme fees can be addressed.

These are an equalisation of issuer and acquirer scheme fees, a structural pricing change to increase acquirer involvement regarding the setting of scheme fees and policy intervention. The legal grounds of a potential policy intervention are assessed based on previous antitrust cases in card payment markets. Three possible legal approaches are identified, based on Article 5 of the IFR (Council of the European Union & European Parliament, 2015), Article 101 TFEU and Article 102 TFEU (European Union, 2012). Acknowledging the importance of socially efficient and functioning card payment markets, results suggest that there is a need to address the role and development of card scheme fees within card payment markets.

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APPENDIX

[Insert Table 1 here]

All of the above cases are based on an infringement of Article 101(1) TFEU (equivalent to Article 81 of the EC Treaty (European Union, 2002) and only in a single case was an exemption granted under Article 101(3) TFEU (European Commission, 2009b). Further, all cases (apart from case 37860) are related to the setting of interchange fees.

First, the relevant market in terms of product and geographical scope is identified to determine whether the relevant party has sufficient market power. In the EC's case (29373)

against Visa (European Commission, 2002), two separate product markets are distinguished, namely the inter-system (competition between payment systems) and intra-system (competition between issuing and acquiring banks) market. Whilst competition within both markets is impacted by the setting of interchange fees, the focus is set on the market for payment cards in general. In a later case (34579) against Mastercard (European Commission, 2007), the EC differentiates between the two sides of the market based on the services provided and identifies the acquiring side of the network (acquiring bank, merchant, consumer) as the relevant market. In terms of geographical scope, the relevant market to be considered is national. Both Visa and Mastercard are considered to have a strong position within the relevant markets and sufficient market power for the setting of interchange fees to exert a substantial economic impact within the EEA. With regard to regulating card scheme fees, the relevant market in terms of product and geographical scope is most likely to be determined as the market for payment cards in general, encompassing inter- and intra-system competition on a national level.

Second, any potential competitive restrictions need to be assessed in line with Article 101(1) TFEU in order to identify if the level of interchange fees is the result of an agreement between undertakings, decisions by associations of undertakings or concerted practices that result in the prevention, restriction or distortion of competition. In all of the above cases was the setting of interchange fees regarded either as a decision of an association of undertakings or as agreements between undertakings, even after the privatisation and public listing of the card associations. In the EC's view the member banks (previous shareholders of the card associations) remained in charge of governance even after the initial public offering and continue to profit from shared interests with Visa and Mastercard related to the setting of interchange fees (European Commission, 2007). Further, in all of the above cases the EC concludes that an appreciable restriction of competition is the result of the setting of interchange fees as these effectively set a floor for the price that merchants must pay for accepting payment

cards (European Commission, 2014). In line with the findings for interchange fees, card scheme fees could be found to restrict competition by effectively setting a floor for the price that merchants must pay for accepting payment cards. Although card scheme fees are formally based on private agreements, it can be assumed that card associations would not treat member banks from the same side of the market divergently. Any potential dissimilar conditions applied to either side of the network, thereby placing the other side at a competitive disadvantage is also covered under Article 101(1) TFEU.

Third, agreements which fall under Article 101(1) TFEU may benefit from an exemption if they satisfy the four cumulative conditions set out in Article 101(3) TFEU. Likewise, this may be applicable to card scheme fees. Article 101(3) requires that interchange fees (European Union, 2012):

- a. contribute to improving the production or distribution of goods or to promoting technical or economic progress,
- b. while allowing consumers a fair share of the resulting benefit, and
- c. prove to be indispensable and not replaceable by a less restrictive arrangement, whilst
- d. not eliminating competition in respect of a substantial part of the products concerned.

In the first case (29373) brought forward by the EC against Visa, an exemption under Article 101(3) was granted, due to the fact that within the *relevant payment cards market* no alternative, less restrictive interchange fee arrangement could be identified which would achieve similar advantages and benefits to consumers. Visa had introduced a proposal for a modified intra-regional multilateral interchange fee based on three main cost categories which the EC regarded as objective and transparent (European Commission, 2002). These were processing costs associated with the transaction, a payment guarantee towards the merchant and a free funding

period to the benefit of cardholders. In all subsequent cases, both Visa and Mastercard were unsuccessful in empirically verifying the benefits associated with interchange fees, especially since several national schemes were successfully operating without an interchange fee at the time.

Similar to interchange fees, card scheme fees may contribute to technical and economic progress if card associations are utilising parts of the (additional) revenues to invest in payment innovations. Examples of such contributions are the introduction of more convenient methods of payment such as contactless, or a more secure payment environment with the introduction of EMV; both of which are beneficial to cardholders. Europay International, Mastercard and Visa (EMV) refers to specifications defining how financial transactions ranging from contact, contactless, to mobile and QR code are conducted. Contact EMV chip cards support cryptographic functions to prevent counterfeiting of cards and additional functions that make them more secure than traditional magnetic-stripe cards (EMVCo, LLC, 2018). The core question is related to indispensability, i.e. if such contributions would be possible without scheme fees, with lower scheme fees or with differing fee structures and mechanisms. With regard to competition, card scheme fees can foster and eliminate it to a certain extent, depending on the side of the network. Card associations will be inclined to reduce card scheme fees for issuing banks in order to raise attractiveness of the network. This will not apply to acquiring banks as these are bound to process transactions from all major card associations whilst competing for merchant business. Further, scheme fees are regarded as pass-through costs and transferred to merchants by default; thereby potentially eliminating competition.

Taking into consideration historical antitrust cases within card payment networks, the most probable outcome of a case based on Article 101(1) is a cost-based evaluation in relation to any direct benefits associated with card scheme fees. Although no methodology exists today that could be deployed, the result of such an assessment is most likely to be a cap on scheme

fee components at an objective and transparent level. One alternative result, in line with the IFR could be the enforcement of publicly accessible, harmonised, European wide scheme fees, rather than country-specific fee structures. This would reduce complexity and create a level-playing-field for acquirers. Even so, the applicability of certain fee components may continue to be related to specific transaction characteristics such as payment channel, security level, currency or the use of value-added services.

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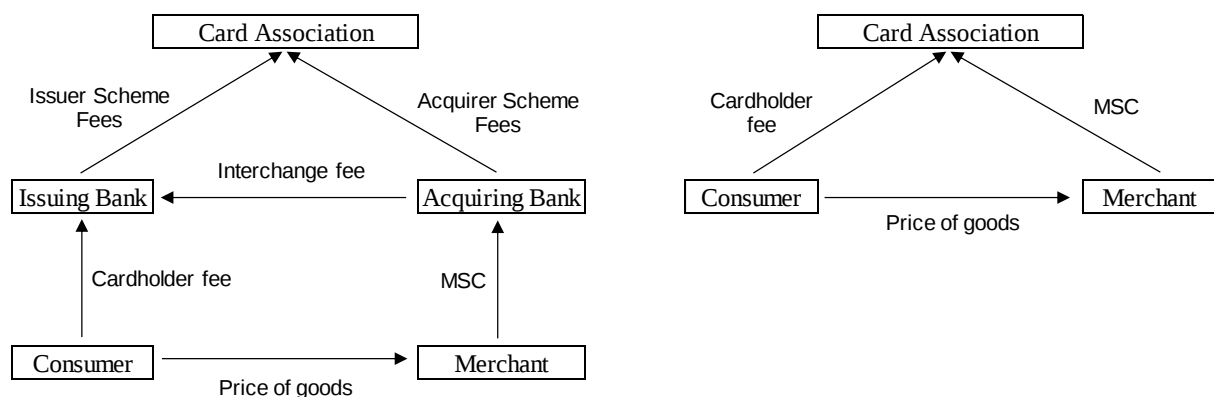
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FIGURES

Figure 1. Flow of payments within a three- and four-party card network



TABLES

Table 1. Antitrust cases brought forward by the European Commission against Visa and Mastercard (European Commission, 2018a).

Note: Table constructed using the European Commission's Antitrust/ Cartel Cases Search tool.

Case Number	Last Decision	Title	Legal Basis	Decision
29373	09.08.2001	Visa International	Art. 101 (1) TFEU	Exemption under Art. 101 (3) TFEU
37860	03.10.2007	Morgan Stanley Dean Witter/ Visa	Art. 101 (1) TFEU	Infringement; Art. 101 (3) TFEU not applicable
34579	19.12.2007	MasterCard I	Art. 101 (1) TFEU	Infringement; Art. 101 (3) TFEU not applicable
39398	06.03.2008	Visa MIF	Art. 101 (1) TFEU	Infringement; Art. 101 (3) TFEU not applicable
40049	09.04.2013	MasterCard II	Art. 101 (1) TFEU	Pending

TITLE: AN EVENT STUDY ANALYSIS OF THE IMPACTS OF THE EUROPEAN INTERCHANGE FEE REGULATION*

RUNNING TITLE: THE EUROPEAN INTERCHANGE FEE REGULATION: AN EVENT STUDY

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ABSTRACT

One of the key success factors of the regulatory involvement by the European Commission in card payment markets across Europe is the reduction of merchant service charges for retailers and final prices for goods and services for consumers. In light of the European Commission's scheduled review of the impacts of the policy intervention, this paper evaluates the usability of the event study analysis to determine the impacts of the interchange fee regulation. Findings show that 1 April 2009 is the single, statistically significant date in relation to the regulation. Contrary to common rationale, positive excess returns are recorded for issuers (9%-pts), pure issuers (9%-pts), and merchants (4.8%-pts), primarily driven by previous uncertainty of investors around a potential ban on interchange fees. As a consequence, total market capitalisation for the retail industry increased by 11.2 billion Euro. This results in a partial pass-through rate of 46% from acquirers to merchants. The event study is deemed a suitable methodology to complement existing research techniques in this field. In order to determine ultimate pass-through to consumers, further investigation on the prevalent manifestation of issuer-acquirers needs to be conducted.

KEYWORDS: Card Payments, Regulation, Event Study, Interchange Fees, Pass-through, Two-Sided Markets.

JEL: D22, G14, G28, F23

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I INTRODUCTION

After more than three decades of research and legal cases pursued by the European Commission (EC) and national regulators, interchange fees for four-party consumer card transactions are capped¹ on December 9, 2015 across the European Union (EU)². In their proposal³ the EC outlines several market observations that underline the necessity of a regulatory involvement, which at the point in time is already being adopted domestically in several European markets (Poland, Hungary, Italy and United Kingdom (UK) amongst others). In parallel, national competition authorities pursue on-going antitrust law enforcement proceedings related to the matter in countries such as Germany, Italy and UK.

The overarching goal is the development of an EU-wide market for (card) payment transactions. This is to be achieved by five core measures which are (1) the enablement of consumers and retailers⁴ to attain accurate information on fees paid in relation to payment transactions thereby avoiding inefficient prices and subsequently (2) allowing retailers and consumers to make better informed choices of payment instruments. (3) The facilitation of EU wide pricing strategies of retailers for products and services; (4) the promotion of efficiency and innovation in the field of card payments to foster integrated, EU wide services by reducing entry barriers (high interchange fees), ultimately leading to (5) a reduction of merchant service charges and a subsequent reduction in final prices for goods and services for consumers.

Article 17 of the Interchange Fee Regulation (IFR)⁵ requires the EC to submit a report on its application, examining in particular the appropriateness of the levels of interchange fees and steering mechanisms.⁶ In particular the report shall assess the regulation's technical, economical and legal effects on five core areas.⁷ First, the development and interrelation of fees and costs for cardholders and retailers are to be assessed. Findings⁸ show that card issuers suffered immediate revenue losses of several billion Euro. Confirmatory, empirical evidence can also be found in economic literature.⁹ In their *Study on the application of the Interchange Fee Regulation*, the EC finds that issuer losses resulting directly from the regulation accumulated to 2.7 billion Euro, albeit acknowledging that this figure may be understated due to the fact that some countries had already reduced interchange fees prior to the benchmark year of 2015.¹⁰ How these funds have been redistributed across the payment chain, in particular between acquirers, retailers and consumers remains to be addressed.

¹ Council of the European Union and European Parliament, 'REGULATION (EU) 2015/ 751 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL - of 29 April 2015 - on interchange fees for card-based payment transactions' (2015) Official Journal of the European Union No. 123 <<https://publications.europa.eu/en/publication-detail/-/publication/62bab217-fdf3-11e4-a4c8-01aa75ed71a1>> accessed 1 January 2020.

² A comprehensive overview of initiated investigations and actions taken by public authorities in card payment markets globally can be found in F Hayashi and JL Maniff, 'Public Authority Involvement in Payment Card Markets: Various Countries: August 2018 Update' (2018) <https://www.kansascityfed.org/media/files/publicat/psr/dataset/pub-auth_payments_var_countries_august2018.pdf> accessed 1 January 2020.

³ European Commission, 'Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on interchange fees for card-based payment transactions' (2013) <<https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2013:0550:FIN:EN:PDF>> accessed 1 January 2020.

⁴ The words merchant(s) and retailer(s) are used interchangeably within this article. Whilst the regulation impacted a vast range of market participants, this paper focuses mainly on business-to-consumer retailers as these would have observed a disproportionately larger impact resulting from the regulation.

⁵ Council of the European Union and European Parliament, 'REGULATION (EU) 2015/ 751 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL - of 29 April 2015 - on interchange fees for card-based payment transactions' (2015) Official Journal of the European Union No. 123 <<https://publications.europa.eu/en/publication-detail/-/publication/62bab217-fdf3-11e4-a4c8-01aa75ed71a1>> accessed 1 January 2020.

⁶ For further information on Regulatory Impact Analysis, see OECD, 'Regulatory Impact Analysis' (2019) <<https://www.oecd.org/regreform/regulatory-policy/ria.htm>> accessed 2 January 2020.

⁷ Article 17 of the IFR further stipulates the analysis of six other areas to a lesser extent. These are: technical requirements, co-badging, special provisions for interchange fees for domestic debit card transactions, cross-border acquiring, separation of card schemes and processing and interchange fees for medium and high value debit card transactions.

⁸ Deloitte estimates total losses of 3.7 billion Euro for issuers in seven major European Union markets (Spain, France, Germany, Italy, United Kingdom, Netherlands and Poland) directly resulting from the regulation. Deloitte LLP, 'Payments disrupted - The emerging challenge for European retail banks' (2015) <<https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/financial-services/deloitte-uk-payments-disrupted-2015.pdf>> accessed 1 January 2020.

⁹ A Veljan, 'A critical review of the European Commission's Multilateral Interchange Fee Regulation' (2018) Journal of Payments Strategy & Systems Vol. 12, No. 3.

¹⁰ European Commission, 'Study on the application of the Interchange Fee Regulation' (2020) <<https://ec.europa.eu/competition/publications/reports/kd0120161enn.pdf>> accessed 24 April 2020.

Second, the sector evolution, including competition between issuers and card associations is to be reviewed. Research shows confirmatory evidence of a statistical relationship between intra- and inter-system concentration and the pre-regulated setting of interchange fees as well as a post-regulatory market consolidation within the payments industry.¹¹ Contrary to its previous findings and the prevalent assumption within the research community, the European Commission also finds that acquirer markets are more (and in most cases highly) concentrated than issuer markets which are characterised by a moderate degree of concentration.¹²

Third, revenues for card associations and card issuers are to be addressed. Whilst the immediate monetary impact on issuers has been addressed above, there is a continuous claim that due to an increase in merchant card acceptance and an extraordinary volume growth driven by a changing payment behaviour, these losses will be (at least partially) offset.¹³ To compensate for above losses, card issuers across the EU would need to process 80 per cent more debit and credit card volume. Given that card payment markets have historically grown at an average of 9 per cent following previous interchange reductions, it seems highly unlikely that such a growth in card acceptance is achievable in the short to mid-term.¹⁴ The real value of total card payments increased at an average rate of 7 per cent from 2015 to 2018.¹⁵ Further, research suggests that payment habits tend to dictate consumer behaviour rather than fees of payment instruments.¹⁶ Oppositely, findings show revenue and profitability increases for the two card associations Visa and Mastercard¹⁷, partially driven by increasing card scheme fees across Europe since the implementation of the IFR.¹⁸ The EC provides confirmatory evidence on these findings. For one, card payment markets did not grow (post- IFR) in a statistically significant manner in terms of volumes, card issuance or card acceptance. For the other, card association revenues stemming primarily from scheme fees have substantially increased by 550 million Euro, although findings do not suggest a compensation of interchange fee losses via increased (decreased) acquirer (issuer) scheme fees.¹⁹

Fourth, the use of commercial cards and relating surcharges is to be analysed. An increased issuance and the steering of consumers towards non-regulated (exempted) cards has been observed²⁰ and publicly addressed.²¹ Whilst there is no evidence of a significant change in costs for processing applied to commercial cards, the EC finds that there has been an increase in both the issuing and use of commercial cards since the IFR entered into force.²²

Finally, an assessment of merchant pass-through of fee reductions (from acquirers to retailers and ultimately consumers) is to be performed. Given the relatively complex structure of card payment networks,

¹¹ A Veljan, 'Influence of intra-and inter-system concentration on the pre-regulated setting of interchange fees within cooperative card payment networks' (2018) Journal of Banking Regulation.

¹² European Commission, 'Study on the application of the Interchange Fee Regulation' (2020) <<https://ec.europa.eu/competition/publications/reports/kd0120161enn.pdf>> accessed 24 April 2020.

¹³ European Commission, 'Survey on merchants' costs of processing cash and card payments' (2015) <http://ec.europa.eu/competition/sectors/financial_services/dgcomp_final_report_en.pdf> accessed 1 January 2020.

¹⁴ These findings are derived from A Veljan, 'A critical review of the European Commission's Multilateral Interchange Fee Regulation' (2018) Journal of Payments Strategy & Systems Vol. 12, No. 3. By building a data set on national interchange fees and card processing volumes in a pre- and-post regulatory environment, the paper finds that for issuing losses to be compensated fully within a twelve-month period, given the stipulated interchange fees for debit (0.2%) and credit (0.3%) cards, issuers would need to process on average 80% more card volume.

¹⁵ European Central Bank, Statistical Data Warehouse: Payments Statistics [full report] (2019) <<http://sdw.ecb.europa.eu/reports.do?node=1000004051>> accessed 1 January 2020.

¹⁶ Deutsche Kreditwirtschaft, 'Position on the Proposal for a Regulation of the European Parliament and of the Council on interchange fees for card-based payment transactions' (2013) <https://die-dk.de/media/files/GBIC_Position_MIF_EN_20131212_dPNfid_r8YBDbt.pdf> accessed 2 January 2020.

¹⁷ Mastercard Inc., 'Annual Reports' (2019) <<https://investor.mastercard.com/investor-relations/financials-and-sec-filings/annual-reports/default.aspx>> accessed 1 January 2020. Visa Inc., 'Financial Information' (2020) <<https://investor.visa.com/financial-information/quarterly-earnings/default.aspx>> accessed 1 January 2020.

¹⁸ A Veljan, 'Regulating the uncontrollable: The development of card scheme fees in payments markets in light of recent policy intervention' (2020) Research in Law and Economics.

¹⁹ European Commission, 'Study on the application of the Interchange Fee Regulation' (2020) <<https://ec.europa.eu/competition/publications/reports/kd0120161enn.pdf>> accessed 24 April 2020.

²⁰ A Veljan, 'Regulating the uncontrollable: The development of card scheme fees in payments markets in light of recent policy intervention' (2020) Research in Law and Economics.

²¹ C Godwin, 'Payments Intelligence extract: scheme fee increases, another uphill battle for merchants' (2018) <<https://cmspi.com/eur/blogs/payments-intelligence-extract-scheme-fee-increases-another-uphill-battle-for-merchants/>> accessed 1 January 2020.

²² European Commission, 'Study on the application of the Interchange Fee Regulation' (2020) <<https://ec.europa.eu/competition/publications/reports/kd0120161enn.pdf>> accessed 24 April 2020.

this question remains to be addressed in economic literature and policy debates.

Thus far, the research community and policy regulators have primarily relied on two methodologies to address merchant pass-through within card payment markets.²³ One frequently utilised method are questionnaires and in-depth interviews. However, these are prone to error as their results are highly subjective and in general do not provide a measure of materiality. Acquirers have an interest to showcase higher (rather than lower) pass-through rates towards merchants to avoid further regulatory involvement²⁴. Merchants have an interest in capping card scheme fees, thereby reducing overall merchant service charges (MSC)²⁵ whilst being able to demonstrate social benefits stemming from consumer price reductions.²⁶ Also, given the interrelatedness of merchant product pricing with a multitude of other internal and external factors, an assessment of pass-through towards consumers becomes highly speculative and is often too complex to conduct. Card payment costs are only one of numerous cost components to merchants whilst they are the core revenue stream for acquirers.

An alternative methodology is the usage of proxies, thereby estimating the elasticity of pass-through, i.e. how much retail prices change in response to merchants' cost savings²⁷ and applying these across the industry. However, only limited research exists on this subject and results can strongly vary across time, sector or region, making its usability questionable. Within card payment networks, an inherent difficulty exists around measuring retailer pass-through towards consumers. Once we depart from perfect competition and constant returns to scale pass-through becomes an empirical question.²⁸

This paper aims to address the lack of empirical research with regard to pass-through (in particular from acquirers to retailers and subsequently consumers) within cooperative card payment networks across Europe. An event study is performed to assess the impacts of the European IFR. Results shall (1) determine the usability of event study analysis to complement existing methodologies when addressing pass-through, (2) provide empirical evidence of the re-distribution of funds and enable an evaluation if cost savings have been passed on to merchants and consumers through lower prices, thereby achieving one of the fundamental goals of the regulation and (3) support the EC's assessment²⁹ of the regulatory impacts on fees and costs of card payment processing.

The paper is organised as follows. First an overview of the economics of four-party card payment markets will be provided, followed by a review of the event study methodology and its application across the United States (US) and Europe. The data sourcing process and ultimate data set, including selection of key event dates will be described in Section 4. The technical and statistical background of the performed event study will be introduced in Section 5. Section 6 presents the results of the study with regard to the European IFR. Section 7 discusses key findings in relation to pass-through with a holistic view of European payment

²³ See also European Commission, 'Study on the application of the Interchange Fee Regulation' (2020) <<https://ec.europa.eu/competition/publications/reports/kd0120161enn.pdf>> accessed 24 April 2020. The EC primarily derives pass-through rates from a meta-study and complements findings with interviews; whereby risks and potential pitfalls of both techniques are acknowledged.

²⁴ The Payment Systems Regulator, 'Market review into the supply of card-acquiring services: Draft Terms of Reference' (2018) <https://www.psr.org.uk/psr-publications/consultations/mr18_1.1_draft_tor_card_acquiring_services> (accessed 1 January 2020) initiated a market review into the supply of card-acquiring services in the United Kingdom, covering amongst others topics such as *transparency of reporting and pass-through towards merchants*.

²⁵ Interchange fees, scheme fees and acquirer processing fees all form part of the MSC or discount rate charged towards the merchant. Whilst interchange fees historically accounted for the vast majority of costs, scheme fees have been growing rapidly in recent times. Merchants and their representative bodies have been vocal about the fact that scheme fees continue to reduce the financial benefits of the IFR. See A Veljan, 'Regulating the uncontrollable: The development of card scheme fees in payments markets in light of recent policy intervention' (2020) Research in Law and Economics for further insights.

²⁶ P Jones, '18 months on – Impact of the Interchange Fee Regulation on the European Union cards market' (2017) European Payments Council AISBL <<https://www.europeanpaymentscouncil.eu/news-insights/insight/18-months-impact-interchange-fee-regulation-european-union-cards-market>> accessed 2 January 2020.

²⁷ R J Shapiro, 'The Costs and Benefits of Half a Loaf: The Economic Effects of Recent Regulation of Debit Card Interchange Fees' (2013) <https://www.sonecon.com/docs/studies/Report_on_Interchange_Fees-RShapiro-October_2013.pdf> accessed 2 January 2020.

²⁸ D S Evans, H H Chang, and S Joyce, 'THE IMPACT OF THE U.S. DEBIT-CARD INTERCHANGE FEE REGULATION ON CONSUMER WELFARE' (2015) Journal of Competition Law & Economics, Vol. 11, No. 1 assess pass-through rates on both sides of the network when determining the impact of the Debit Card Interchange Fee Regulation in the U.S. on consumer welfare.

²⁹ European Commission, 'Call for Tenders: Support Study on the application of the Interchange Fee Regulation' 2018 <<https://etendering.ted.europa.eu/cft/cft-documents.html?eTenderingPublic=IGxqS230tcOABWg0RX-bp0HFNIGJN17Zwuk7R1EETydrxAYndvrt!1739191041?cftId=3319>> accessed 2 January 2020.

markets. A final section concludes.

II ECONOMICS OF FOUR-PARTY CARD PAYMENT NETWORKS

Card payment markets can be classified as networks and as such exhibit network externalities.³⁰ They are set up as two-sided markets, as they bring together two groups of end-users, namely merchants and cardholders.³¹ By setting a balancing price, the platform can effectively cross-subsidise between the parties and influence overall performance. This balancing price is not only a mechanism to favour one side over the other but rather an essential tool to bring the two sides together as the network can only function if these interact simultaneously.³² Baxter was first to conceptualise the economics within four-party payment systems.³³ The interchange fee is described as an efficient balancing mechanism for equilibrating cooperative payment markets compared to a complete set of bilaterally negotiated agreements.

The price determination of interchange fees is dependent on the price elasticities of the parties involved. It is set to maximise the profit of the network participants and represents a socially efficient way to recover and allocate common costs.³⁴ The more intense the competition on either side of the system, the less sensitive the unit mark up on that side of the system to changes in the interchange fee will be.³⁵ The price charged by one side of the platform towards the other depends on what the other side is willing and or able to bear, whereby the price is inversely related to the other side's elasticity of demand.³⁶

The price structure is generally set to favour cardholders over merchants. Costs are allocated disproportionately due to the lower price elasticity on merchants' side³⁷, mainly driven by the fact that there is an element of *must-take* (cards) in today's payment environment.³⁸ Issuing banks' profits and competition for cardholders increase with interchange fees. Issuing banks compete for consumers via services such as rewards, cash-back programmes or air miles, by which consumers are incentivised even more to utilise card payments. This reward on top of the convenience benefit of using cards further negatively influences merchant's price elasticity and the ability to turn card payments down.³⁹ Below figure shows the flow of payments (bold arrows) within a four-party card network. Cost savings and potential pass-through of these flow in the opposite direction (non-bold arrows). Assuming regulatory compliance, interchange fee savings would be passed on from issuers fully to acquirers. The subsequent pass-through by acquirers to merchants and finally consumers (dotted arrows) is dependent on a multitude of factors and can range between 0% and 100%.

Card associations such as Visa or Mastercard are in charge of setting the interchange fee, whereby the maximum weighted average charges for consumer cards have been determined by national legislation and governments.⁴⁰ Whilst competing for partnerships with issuing banks, both card associations are inclined to increase benefits towards issuers. With increasing competition, interchange fees will rise, causing costs of card processing to increase for merchants. Thus, scheme competition can in fact increase (rather than

³⁰ M L Katz and C Shapiro, 'Systems Competition and Network Effects' (1994) *Journal of Economic Perspectives* Vol. 8, No. 3.

³¹ W Bolt and S Chakravorti, 'Economics of payment cards: A status report' (2008) DNB Working Papers No. 193 survey theoretical literature on payment cards. For further information see also R A Prager et al., 'Interchange Fees and Payment Card Networks: Economics, Industry Developments, and Policy Issues' (2009) *Finance and Economics Discussion Series* No. 23.

³² J-C Rochet and J Tirole, 'Platform competition in two-sided markets' (2003) *Journal of the European Economic Association* Vol. 1, No. 4.

³³ W F Baxter, 'Bank Interchange of Transactional Paper: Legal and Economic Perspectives' (1983) *The Journal of Law and Economics* Vol. 26, No. 3.

³⁴ J Wright, 'The determinants of optimal interchange fees in payment systems' (2004) *Journal of Industrial Economics* Vol. 52, No. 1.

³⁵ R Schmalensee, 'Payment Systems and Interchange Fees' (2002) *The Journal of Industrial Economics* Vol. 50, No. 2.

³⁶ J-C Rochet and J Tirole, 'Two-Sided Markets: A Progress Report' (2006) *The RAND Journal of Economics* Vol. 37, No. 3.

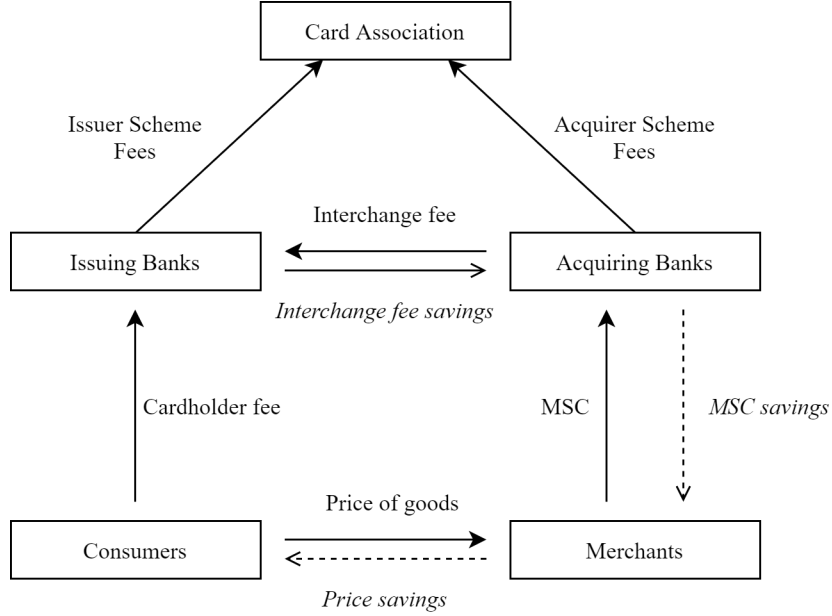
³⁷ A Börestam and H Schmiedel, 'Interchange fees in card payments' (2011) *OCCASIONAL PAPER SERIES* No. 131 <<https://www.ecb.europa.eu/pub/pdf/scpops/ecbocp131.pdf>> accessed 1 December 2018.

³⁸ J Vickers, 'Public Policy and the Invisible Price: Competition Law, Regulation, and the Interchange Fee' (2005) *Competition Law Journal*, No. 4.

³⁹ J-C Rochet and J Tirole, 'Cooperation among Competitors: Some Economics of Payment Card Associations' (2002) *The RAND Journal of Economics*, Vol. 33, No. 4.

⁴⁰ Mastercard Inc., 'What We Do' (2019) <<https://www.mastercard.us/en-us/about-mastercard/what-we-do.html>> accessed 2 January 2020. Visa Inc., 'About Visa' (2020) <<https://www.visa.co.uk/about-visa.html>> accessed 2 January 2020.

Figure 1: Flow of payments and savings within a four-party card network



decrease, as would be the common rationale with most industries) consumer prices.⁴¹ Issuing (cardholders) and acquiring (merchants) banks each represent one side of the market and are charged scheme fees as part of the network participation. Equally, consumers and merchants pay a fee for the services provided by their respective banks.

Let us assume a consumer purchases goods worth 100 Euro in the EU and settles the transaction with a domestic, consumer credit card. Whilst the consumer would be charged 100 Euro, the merchant would receive a net amount, after the deduction of the MSC. The MSC itself consists of three major components, namely interchange fees (0.30%)⁴², scheme fees (0.15%)⁴³ and an acquirer processing fee (0.06%)⁴⁴, amounting to a total of 0.51 Euro, of which 0.30 Euro would be paid to the issuing bank, which itself would need to deduct a fraction to settle the issuer scheme fees. The other two components, i.e. 0.15 Euro and 0.06 Euro respectively, are attributed to the card association in form of acquirer scheme fees and to the acquiring bank for the provisioning of card payments.

If the interchange fee is reduced to 0.20%, the acquirer would immediately recognise these cost reductions as additional profits, whilst the MSC towards the merchant may (partially) or may not be amended. Without any changes, the differential of 10 basis points would be fully recognised as additional profit by the acquirer. In contrary, if savings were fully passed-through to merchants, one needs to assess as to what degree and when these savings may (partially) or may not be passed on to consumers in form of price reductions.

Thus, from the perspective of acquirers, a decrease in interchange fees will lead to a decrease in their costs and ultimately in the MSC. This will apply in a scenario with a single or with multiple acquirers, although the

⁴¹ G Guthrie and J Wright, ‘Competing Payment Schemes’ (2007) The Journal of Industrial Economics, Vol. 55, No. 1 present a model of competing payment schemes and address implications for other two-sided markets. The rationale of inflated interchange fees and finally MSC lies in the inherent dysfunctionality related to card scheme competition for card issuers. Whilst common rationale would suggest decreasing prices with increasing scheme competition, within payment markets a monopolistic card association would actually set interchange fees lower than a competing card association. For further background see also European Commission, ‘Study on the application of the Interchange Fee Regulation’ (2020) <<https://ec.europa.eu/competition/publications/reports/kd0120161enn.pdf>> accessed 24 April 2020.

⁴² Mastercard Inc., ‘Interchange’ (2019) <<https://www.mastercard.co.uk/content/dam/mccom/eng/interchange/documents/Germany.pdf>> accessed 2 January 2020.

⁴³ SIX Payment Services, ‘Scheme Fees’ (2019) <<https://www.six-payment-services.com/dam/classic/downloads/scheme-fees/Scheme-Fees-Germany.pdf>> accessed 2 January 2020.

⁴⁴ European Commission, ‘Survey on merchants’ costs of processing cash and card payments’ (2015) <http://ec.europa.eu/competition/sectors/financial_services/dgcomp_final_report_en.pdf> accessed 2 January 2020.

pass-through rate will depend upon competition within the segment. If pass-through is less than perfect, the decreased interchange fee will result in additional acquirer profits. Similarly, from the perspective of issuers, a decrease in interchange fees will immediately decrease issuer profits and ultimately lead to a decrease in benefits or services towards cardholders. This will occur in a scenario with a single or with multiple issuers, whereby the cost impact will depend on the degree of competition.⁴⁵

In addition, two noteworthy characteristics of the European card payments market add a further layer of complexity to the determination of pass-through rates amongst the network participants. The first is an evident and increasing acquirer market consolidation driven by merger and acquisition (M&A) activity (particularly in a post-regulatory environment), and the second is the widespread manifestation of issuer-acquirers across Europe.⁴⁶ Issuer-acquirers act (often simultaneously) on both sides of the network, making a clear distinction of interests, strategies, and in particular financial impacts very difficult.

III APPLICATION OF EVENT STUDY METHODOLOGY

Event studies measure the financial effect of a given economic event on the value of a firm. Using financial market data, an event study can assess the impacts of an announcement or occurrence within the marketplace on security prices. The methodology dates back as far as 1933⁴⁷, with the most prominent piece of research being published in 1969⁴⁸, whereby the methodology deployed today remains essentially the same. It is based on the notion of (semi-strong) market efficiency⁴⁹ at least with respect to publicly available information and several fairly unrealistic statistical notions such as individual abnormal returns being independent of each other and identically distributed, most of which can however be relatively easily solved for.⁵⁰

Event studies have seen a vast range of applications, ranging from mergers and acquisitions, earnings or macro-economic announcements to legal (liability) and regulatory cases. Whilst the methodology is implicitly accepted by the U.S. Supreme Court, it has its limitations, especially related to regulatory changes as these are often debated in the political arena over time, whereby accompanying monetary effects will be gradually incorporated into security prices. Thus, insignificant results can often be attributed to the absence of distinct event dates.⁵¹

Due to their widespread acceptability, the existence of operational standards, the known rate of error, the ability to test hypotheses and the ability to determine any event study's admissibility as the basis for expert testimony based on the *Daubert* guidelines, event studies are regarded as a highly objective methodology for calculating the magnitude of damages and the materiality of an event in U.S. courts. Compared to other methods of calculating financial impacts which tend to be based on an idiosyncratic viewpoint, the measurement of security prices has the benefit of being based on numbers which, being determined by the collective decisions of all investors in the market, are both objective and present a consensus. Notwithstanding bubbles, volatility and irrational exuberance, in a market economy market value (discounted present value of future cash flows) will always be the primary metric of a firm's worth.⁵²

In Europe, the event study analysis is not as prominently utilised as in the U.S., however there are vast

⁴⁵ S E Weiner and J Wright, 'Interchange fees in various countries: developments and determinants' (2005) Review of Network Economics Vol. 4, No. 4.

⁴⁶ A Veljan, 'Influence of intra-and inter-system concentration on the pre-regulated setting of interchange fees within cooperative card payment networks' (2018) Journal of Banking Regulation. Given that historically commercial banks tended to have their own acquiring businesses and the fact that banks continue to be heavily involved in the card acquiring business, the majority of consolidation within the acquiring market will have a financial impact on the card issuing market. In 2018, over 70 M&A deals took place within the global payment space, amounting to a transaction value of 29.4 billion Euro. During the first quarter of 2019 transactions amounted to 87.1 billion Euro already. See Ernst & Young Global Limited, 'Three M&A waves reshaping the banking payments acceptance segment' (2019) Payments Vol 23. <https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/banking-and-capital-markets/ey-global-banking-and-capital-markets-global-payments-newsletter-volume-23-final.pdf> accessed 25 April 2020.

⁴⁷ J C Dolley, 'Characteristics and Procedure of Common Stock Split-Ups' (1933) Harvard Business Review Vol. 11.

⁴⁸ E F Fama et al., 'The Adjustment of Stock Prices to New Information' (1969) International Economic Review Vol. 10, No. 1.

⁴⁹ E F Fama, 'Efficient capital markets: A review of theory and empirical work' (1970) The Journal of Finance Vol. 25, No. 2.

⁵⁰ J J Binder, 'The Event Study Methodology Since 1969' (1998) Review of Quantitative Finance and Accounting Vol. 11.

⁵¹ A C MacKinlay, 'Event Studies in Economics and Finance' (1997) Journal of Economic Literature Vol. 35.

⁵² D I Tabak and F C Dunbar, 'Materiality and Magnitude: Event Studies in the Courtroom' (1999) National Economic Research Associates No. 34.

examples where it has been applied in research⁵³ and legal cases⁵⁴. Its primary advantage over alternative procedures is the fact that it can indicate causality (cause-effect) with a statistical probability⁵⁵, thereby quantifying the risk of interplay of confounding factors. In general, all event studies tend to follow a similar approach. First, the data sample is defined, including event (date), securities to be analysed and news sources. From this, confounding events are excluded to control for systemic bias. The final event list with asset price data is collated and the methodology for calculating (average and abnormal) returns is defined. Finally, the estimation and event windows are determined and the analysis run. A subsequent test for statistical significance is performed.

IV DATA

The regulation of interchange fees for card-based payment transactions⁵⁶ was adopted on 29 April 2015, after a procedural process that was conducted in five stages, beginning with a consultation on 11 January 2012.⁵⁷ The regulation was preceded by five antitrust cases brought forward by the EC against Visa and Mastercard⁵⁸ on the basis of Article 101 (1) Treaty on the Functioning of the European Union (TFEU)⁵⁹, with the initial accusation of anti-competitive behaviour (EU against Visa) dating back to 16 October 2000.⁶⁰ These antitrust procedures did not follow the classical investigation process of cartels or other anti-competitive behaviour, whereby surprise inspections or so called dawn raids would occur and cause immediate public reactions⁶¹; rather they have been transparently debated in multi-instance courts with opposing decisions being made on different occasions. Further, they have been pursued against the card associations, which were initially formed as member-owned (by acquiring and issuing banks) organisations in the 1960s and subsequently privatised; Mastercard, Inc. in 2006 and Visa, Inc. in 2008⁶². Finally, the interchange fee is a revenue stream towards issuers, rather than card associations. This adds a further level of complexity with regard to monetary impacts on securities and public interpretation.

In order to control for the risk of unrecognised, distinct event dates and the influence of confounding factors, the regulation is decomposed into separate procedural stages that have taken place in the political arena over the course of 15 years. Confounding events include any occurrences which may have had an influence on security prices. These can range from capital events (stock splits and structural changes), damage suits and earnings announcements to dividend and executive changes.⁶³

Initially, all event dates are recorded that have a (in-)direct link to any antitrust investigations against Visa and Mastercard related to domestic and cross-border/ Intra-EEA interchange fees. These (24 events) range

⁵³ See amongst others J B Bushnell et. al., ‘Profiting from Regulation: An Event Study of the European Carbon Market’ (2009) American Economic Association <<https://www.aeaweb.org/conference/2010/retrieve.php?pdfid=74>> accessed 4 January 2020; F Loipersberger, ‘The Effect of Supranational Banking Supervision on the Financial Sector: Event Study Evidence from Europe’ (2017) <https://epub.ub.uni-muenchen.de/34610/1/discussion_paper_banks.pdf> accessed 4 January 2020 and M Mateev and K Andonov, ‘Do European bidders pay more in cross-border than in domestic acquisitions? New evidence from Continental Europe and the UK’ (2018) Research in International Business and Finance Vol. 45.

⁵⁴ L Müller, ‘Proving Causation with an Event Study in Capital Markets Law’ (2015) Aktuelle Juristische Praxis Vol. 24.

⁵⁵ As a rule, hypothesis tests of an empirical nature require a minimum statistical significance of 95%.

⁵⁶ Council of the European Union and European Parliament, ‘REGULATION (EU) 2015/ 751 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL - of 29 April 2015 - on interchange fees for card-based payment transactions’ (2015) Official Journal of the European Union No. 123 <<https://publications.europa.eu/en/publication-detail/-/publication/62bab217-fdf3-11e4-a4c8-01aa75ed71a1>> accessed 1 January 2020.

⁵⁷ EUR-Lex, ‘Document 32015R0751’ (2015) <<https://eur-lex.europa.eu/legal-content/EN/HIS/?uri=CELEX:32015R0751>> accessed 12 January 2020.

⁵⁸ A Veljan, ‘Regulating the uncontrollable: The development of card scheme fees in payments markets in light of recent policy intervention’ (2020) Research in Law and Economics.

⁵⁹ European Union, ‘Consolidated Version of the Treaty on the Functioning of the European Union’ (2012) <<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:12012E/TXT&from=EN>> accessed 12 January 2020.

⁶⁰ The Wall Street Journal, ‘EU Objects to Fees on Retailers Charged by Visa International’ (2000) <<https://www.wsj.com/articles/SB971697634627171391?mod=searchresults&page=13&pos=19>> accessed 12 January 2020.

⁶¹ G Langus et. al., ‘The effect of EU antitrust investigations and fines on a firm’s valuation’ (2010) <http://ftp.zew.de/pub/zew-docs/veranstaltungen/Macci/SummerInstitute/Papers/SI_Motta.pdf> accessed 13 January 2020.

⁶² U.S. Government Accountability Office, ‘GAO-10-45 Credit Cards: Rising Interchange Fees Have Increased Costs for Merchants, but Options for Reducing Fees Pose Challenges’ (2009) <<https://www.gao.gov/assets/300/298664.pdf>> accessed 13 January 2020.

⁶³ Y Konchitchki and D E O’Leary, ‘Event study methodologies in information systems research’ (2011) International Journal of Accounting Information Systems Vol. 12.

from 16 October 2000 and the initial accusation of anti-competitive behaviour against Visa to 9 December 2015 when the regulation formally entered into force. Subsequently, seven key events are selected based on pre-defined criteria⁶⁴ and analysed separately via event studies in order to detect even minor monetary effects that may have had a gradual and/ or phased impact on security prices. The selected event dates are searched for confounding events that may have had an influence on results; none are identified.⁶⁵

The respective weekdays are matched with the event dates. In cases where the information release occurred outside of bank working hours, the subsequent working day is considered. Several dates have been omitted based on selection criteria such as relevance or information contained. Also, each event is documented with the respective media coverage at the time, ranging from globally recognised information sources such as The Wall Street Journal (WSJ), Financial Times (FT), Reuters and CNBC to Finextra, which is a news portal focusing on financial technology and the official website of the EC.

Table 1: Event Dates

Event Date	Background
12.06.2008	Mastercard temporarily repeals its cross-border interchange fees, i.e. sets these to 0% after litigation by EC.
01.04.2009	Interim agreement between Mastercard and EC that cross-border interchange fees will be reduced to 0.3% for credit and 0.2% for debit cards as part of litigation process.
26.04.2010	Visa agrees to trial the EC proposal on interchange fees and reduces these to 0.2% for domestic and cross-border debit transactions after litigation by EC.
08.12.2010	EC makes Visa's commitments to cut interchange fees for debit cards legally binding as part of litigation process.
31.07.2012	Antitrust complaint by EC regarding Visa's domestic and cross-border credit card fees. Expectations are that these will be reduced to 0.3%.
17.07.2013 24.07.2013	EC proposal for a regulation of domestic and cross-border interchange fees for debit (0.2%) and credit (0.3%) card payments across Europe.
03.04.2014	Amendments on proposed regulation adopted by European Parliament.

⁶⁴ The initial composition of events is based on the publicly accessible outline of regulatory procedure by the regulator. See EUR-Lex, 'Document 32015R0751' (2015) <<https://eur-lex.europa.eu/legalcontent/EN/HIS/?uri=CELEX:32015R0751>> accessed 12 January 2020 for further information. These findings are enriched by means of a systematic literature review within the data bases of prominent media sources. Expert interviews are conducted with random representatives from regulatory bodies, retail trade representations and global merchants with the aim of identifying further (hidden) events, potential information leakage as well as assessing robustness of preliminary sample. Preliminary statistical analyses are conducted to assess the volatility of key metrics (including stock returns) during the selected period. This approach ensures the identification of any initially missed distinct event dates. Based on the extent of media coverage, inclusiveness of any figures (this is key in order for investors to assess potential impact on revenues and incorporate this in security prices) and causality, especially preceding and succeeding occurrences) key event dates are identified.

⁶⁵ For instance, on 24 August 2015 a stock market crash impacted security prices globally. See Business Insider, 'Market Mayhem' (2015) <<https://www.businessinsider.com/us-markets-sell-off-aug-24-2015-2015-8?r=DE&IR=T>> accessed 20 January 2020 and R Foroohar, '4 New Truths from the Stock Market Crisis of 2015' (2015) TIME USA, LLC <<https://time.com/4008762/stock-market/>> accessed 20 January 2020. This and similar events would need to be accounted for and dealt with accordingly within the analysis.

Across Europe a total of 21 retailers (with a market capitalisation of 568 billion Euro), 43 issuers (811 billion Euro) and 16 extracted pure issuing banks (315 billion Euro) are identified and included in the data set.⁶⁶ The largest European issuing (by number of issued cards) and acquiring (by processed card volume) banks across Europe are identified via the Nilson report.⁶⁷ The set is enhanced with proprietary data from a market intelligence firm providing financial and economic research services.⁶⁸ The initial data set contained a total number of 230 issuers and 375 acquirers, most of which are excluded due to private ownership, change of legal entity or engagement in M&A activity during researched time frame.

The largest European retailers are selected by retail revenue.⁶⁹ From a total of 250 largest retailing firms across the globe, only 21 public retailers, domiciled in Europe are included in the data set, due to similar complexities. The majority of companies are excluded due to private ownership, merchants engaging primarily in business-to-business activities (and thus not seeing extraordinary impacts from the regulation; see Nestlé as an example) or being part of M&A activity over the considered time span and lacking data due to changes of entity or legal form. A separate analysis of acquirers is neglected as less than five acquirers are identified across Europe that are publicly listed and have no engagement in card issuing.

The relevant data in form of daily stock returns (closing prices) is collected from 2 January 2008 to 31 December 2015 from Yahoo Finance.⁷⁰ As a market proxy the EURO STOXX 50 index is selected, covering the 50 largest stocks from 11 Eurozone countries.⁷¹ The data quality is assessed, whereby any missing values and outliers are replaced by their mean (average). The Interquartile Range (IQR) method is applied to detect outliers.

V ECONOMETRIC MODEL

The selected event window $[t_1, t_2]$ ranges ± 1 days around the event day.⁷² Selecting a short-horizon event window has the advantage of focusing on the informative content of the event whilst allowing for leakage of information prior to the event and slightly belated responses after the event.⁷³ Information overflow can occur due to insider information and investor reactions can be the result of a developmental process depending on the time of issuance of the announcement and their interpretation. In line with prevailing theory for event studies dealing with daily data, the estimation window $[T_1, T_2]$ has a range of one year (ca. 250 trading days) prior to the event window, starting one year before the event and ending one day before the event window or in our case two days before the event date.⁷⁴ The actual length of the estimation windows may vary by a few days depending on the availability of data within the sample. In accordance with prevailing theory,

⁶⁶ See Appendix for full list including descriptive statistics. Issuers are classified as firms engaged in issuing and acquiring services simultaneously, whilst pure issuers are classified as firms without an operational or ownership engagement in acquiring markets. Whilst the sample is not representative for smaller firms across the three industries (large firms are over-represented), the sample size can be considered material given total market capitalisation of each group.

⁶⁷ HSN Consultants, Inc., 'Europe's Top Acquirers' (2016) THE NILSON REPORT Issue 1087 and HSN Consultants, Inc., 'Europe's 50 Largest Debit & Credit Card Issuers' (2016) THE NILSON REPORT Issue 1089.

⁶⁸ Global Data Plc, 'Timetric' (2018) <<https://www.globaldata.com/timetric/>> accessed 26 April 2020.

⁶⁹ Deloitte, 'Global Powers of Retailing' (2017) <<https://www2.deloitte.com/content/dam/Deloitte/global/Documents/consumer-industrial-products/gx-cip-2017-global-powers-of-retailing.pdf>> accessed 26 April 2020.

⁷⁰ Verizon Media, 'Yahoo! Finance' (2020) <<https://finance.yahoo.com/>> accessed 22 January 2020.

⁷¹ STOXX Ltd, 'Euro Stoxx 50' (2020) <<https://www.stoxx.com/index-details?symbol=sx5e>> accessed 22 January 2020.

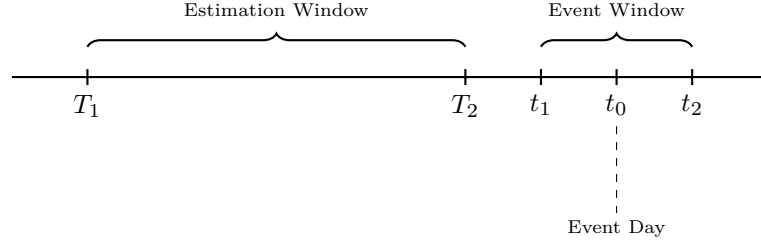
⁷² Information presented in this section relates to final results obtained via the preferred (and deemed most suitable) econometric model. For the sake of robustness, several models (market model versus constant mean return model; OLS versus WLS regression) are tested and the analysis amended (event window adapted from a single day to $[-1; +1]$, $[-2; +2]$ and $[-15; +15]$). Whilst results are consistent with regard to the different models deployed, an extension of the event window has not resulted in the identification of any other significant event dates. For further discussion on the selection of event windows see K R Ahern, 'Sample selection and event study estimation' (2009) *Journal of Empirical Finance* Vol. 16, No. 3 and E F Fama, 'Market Efficiency, Long-Term Returns, and Behavioral Finance' (1997) <<http://dx.doi.org/10.2139/ssrn.15108>> accessed 27 April 2020.

⁷³ Y Konchitchki and D E O'Leary, 'Event study methodologies in information systems research' (2011) *International Journal of Accounting Information Systems* Vol. 12.

⁷⁴ In line with J J Binder, 'The Event Study Methodology Since 1969' (1998) *Review of Quantitative Finance and Accounting* Vol. 11. For each event, a separate data set of 250 records (one trading year) is deemed sufficiently large for the regression model to make robust estimations. Increasing the estimation window for multiple years could lead to misleading results, amongst others by increasing the likelihood of confounding factors leading to increased volatility of the stocks, especially during an economic environment as prevalent in the period 2008 - 2009. See also T Duso, et al., 'Is the event study methodology useful for merger analysis? A comparison of stock market and accounting data' (2010) *International Review of Law and Economics* Vol 30 who use a 240 day estimation period.

the estimation and event window do not overlap. This is to avoid a potentially disproportionate influence of the event returns on the normal return measure, which could detrimentally impact the significance and explanatory power of the model.⁷⁵

Figure 2: Estimation and Event Windows



In order to determine the effect of the announcements on security prices, an estimation method for the calculation of expected returns needs to be determined. This paper captures the relationship between the return on individual stocks and the expected return on the market portfolio R_{it} using the Ordinary Least Squares (OLS) Market Model⁷⁶ based on the mathematical approach of Brown and Warner.⁷⁷

The null hypothesis to be tested is that the mean abnormal return for the event day is statistically equal to zero.

$$H_0: \bar{A}_{t_0} = 0$$

Rejecting the null hypothesis would suggest that the event had an abnormal effect on returns to shareholders for the selected group of companies, i.e. issuers, pure issuers and retailers. In this case further analysis is conducted to determine causality and assess the magnitude of the impact. To assess the statistical significance of the abnormal return A_{t_0} a test statistic is run as the ratio of t_0 mean abnormal returns to its estimated standard deviation, whereby the standard deviation is estimated from the time series of mean abnormal returns.

An advantage of using test statistic to make inferences on the statistical significance of the abnormal return is that in short-window event methods it is not highly sensitive to the benchmark model of abnormal returns or other assumptions regarding the cross-sectional or time-series dependence of abnormal returns.⁷⁸ Findings show that for tests using daily returns no significant impact is observable when correcting for cross-correlation and auto-correlation; rather higher explanatory power can be achieved when ignoring cross-sectional dependence than when running test-statistics which account for potential dependence.⁷⁹ The critical t-test value for a two-tailed statistical significance with a confidence level of 95% is 1.96. In order to control for the effects of heteroskedasticity on inference, a heteroskedasticity-consistent standard error (HCSE) estimator of OLS parameter estimates is implemented. This approach allows for the regression model to be estimated using OLS, as an alternative method of estimating standard errors is employed; one that does not assume homoskedasticity.⁸⁰

⁷⁵ A C MacKinlay, 'Event Studies in Economics and Finance' (1997) Journal of Economic Literature Vol. 35.

⁷⁶ For the sake of robustness, a comparative analysis is run using the *constant mean return model*. Comparable results are obtained.

⁷⁷ S J Brown and J B Warner, 'Using Daily Stock Returns: The Case of Event Studies' (1985) Journal of Financial Economics Vol. 14.

⁷⁸ Y Konchitchki and D E O'Leary, 'Event study methodologies in information systems research' (2011) International Journal of Accounting Information Systems Vol. 12.

⁷⁹ S J Brown and J B Warner, 'Using Daily Stock Returns: The Case of Event Studies' (1985) Journal of Financial Economics Vol. 14.

⁸⁰ A F Hayes and L Cai, 'Using heteroskedasticity-consistent standard error estimators in OLS regression: An introduction and software implementation' (2007) Behavior Research Methods Vol. 39, No. 4.

VI RESULTS

Based on the seven key event dates analysed, the (interim) agreement between Mastercard and the EC to reduce cross-border interchange fees to 0.3% for credit and 0.2% for debit cards on 1 April 2009 is the only significant event. The t-test values range from 4.9 to 8, allowing for the classification of this event as statistically significant at a confidence level of 99%. Whilst it is possible to state with a very large certainty that the results are not caused by chance, the rejection of the null hypothesis does not allow for an ultimate conclusion that the findings may not be driven by other (unknown) factors, as this risk is prevalent in any form of event study. The average (three-day cumulative) abnormal returns for 2 April 2009 range from 4.8%-pts (7%-pts) for retailers to 9%-pts (18%-pts) for issuers and 9%-pts (18.2%-pts) for pure issuers, whilst for all other considered event dates the average abnormal returns (AAR) never surpass $\pm 3.2\%$ -pts and t-values do not surpass ± 2.9 . Below table (2) shows the results for the three-day event window. A complete set of results can be found within table A2 in the Appendix. Figure 2 shows the development of returns for a 30-day (-15 to +15 days) window surrounding the event.⁸¹

Table 2: Results of event study for statistically significant event

Date	Retailers			Issuers			Pure Issuers		
	AAR	CAAR	t-test	AAR	CAAR	t-test	AAR	CAAR	t-test
2009-03-31	0.005	0.005	0.551	0.044	0.044	3.901	0.054	0.054	4.557
2009-04-01	0.016	0.021	1.612	0.037	0.082	3.250	0.029	0.084	2.414
2009-04-02	0.048	0.070	4.937	0.090	0.180	7.990	0.090	0.182	7.647

Assuming rational investor behaviour, this study uses stock returns as a proxy for future profits. These are suitable indicators to determine if and how markets reacted to the implementation of the IFR. Taking no (NPT), full (FPT) and partial (PPT) pass-through into consideration, seven possible post-event scenarios can have occurred, only one of which would have seen no impact on downstream security prices (full pass-through by both acquiring banks and retailers); coincidentally the one which would also represent the most desired outcome from a regulatory perspective. The possible scenarios are depicted in figure 4.⁸² For the sake of completeness, a possible pass-through from issuers to cardholders is also noteworthy, resulting in two ultimate impacts to the consumer through changes in card fees and/ or benefits and prices of goods.

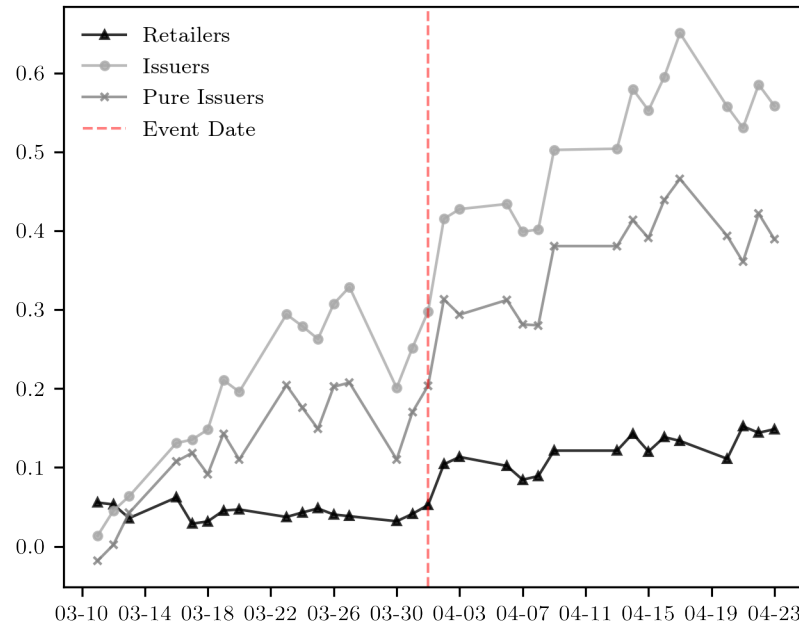
Full pass-through as well the complete absence of pass-through are based on the notion of perfect versus non-existent competition and can be characterised as theoretical concepts in economic research, rather than observable occurrences in the markets. Whilst a separate, mathematical calculation of pass-through for each of the market participants is not feasible, primarily due to the lack of results for acquiring banks, we find that the regulatory announcement has been positively interpreted by retail investors, leading to a total, industry-wide⁸³ increase in market capitalisation by 11.2 billion Euro (or 3.6%) on the event date. Correspondingly, an increase in market capitalisation by 39.7 billion Euro (or 8.5%) for selected issuers and 14.8 billion Euro

⁸¹ Whilst a relatively significant rise in CAAR can be observed for issuers and pure issuers preceding the event, there does not seem to be sufficient evidence that would hint towards information leakage/ delay of such an extent. For one, a large degree of volatility can be observed prior to the (rise on the) event (several smaller and a more significant decrease on 30 March), for the other CAAR stabilises post-event for several days before continuing its momentum. Thus, findings may be impacted and or exaggerated (see phenomenon of irrational exuberance) by an overall recovering, albeit unstable economic environment for the sector as a whole.

⁸² Assuming regulatory compliance, every acquiring bank will reap the full benefits of the IFR. In a two-staged game every acquirer will then decide if and to what extent to pass-these savings on to merchants (stage 1), which will subsequently each decide on pass-through towards consumers (stage 2). From this a total of seven pass-through scenarios towards consumers can be derived.

⁸³ The analysed portfolio within this article accounts for 44.5% of the market capitalisation of the top 100 European retailers in 2009. Figures for merchants are thus expressed as industry-wide metrics. Data is based on PricewaterhouseCoopers AG, ‘Top 100 Companies: Retail and Consumer by market capitalisation’ (2015) <<https://www.pwc.de/de/handel-und-konsumguter/assets/pwc-analyse-top-100-2015.pdf>> accessed 26 January 2020.

Figure 3: Development of CAAR over a 30-day window surrounding the event date.



(or 8.9%) for pure issuers within the data set can also be recorded.⁸⁴

An abolishment of interchange fees across Europe in 2009 would have resulted in immediate issuer losses of 8.8 billion Euro⁸⁵ or a decrease in Net Present Value (NPV) of ca. 46 billion Euro.⁸⁶ An agreement to set interchange fees at current levels would have resulted in an unexpected and immediate uplift of 4.2 billion Euro in revenues or an increase in NPV of 22 billion Euro (for simplicity, based on the same calculation method as above).⁸⁷ For acquiring banks, this consensus (disregarding any previous expectations), results in savings of 4.7 billion Euro or an increase in NPV of 24 billion Euro. Given the 11.2 billion Euro increase in market capitalisation by retailers and disregarding any potential and subsequent consumer pass-through, an acquirer-to-merchant pass-through of 46% is suggested. Disregarding increases in acquirer scheme fees, the EC determines a pass-through rate of 45% towards merchants for the three year period between 2015 and 2017. Thus, consumer benefits directly related to the IFR can be determined between 0 and 12.8 billion Euro, depending on the competition within the acquiring and retail sectors, notwithstanding any negative

⁸⁴ The total, daily market capitalisation is determined as a product of stock price and the number of outstanding shares for each firm within the three groups. The absolute increase in market capitalisation, representing the net present value of future expectations, is determined as the difference between the total capitalisation on the event day and the previous day; the same is true for the relative figures.

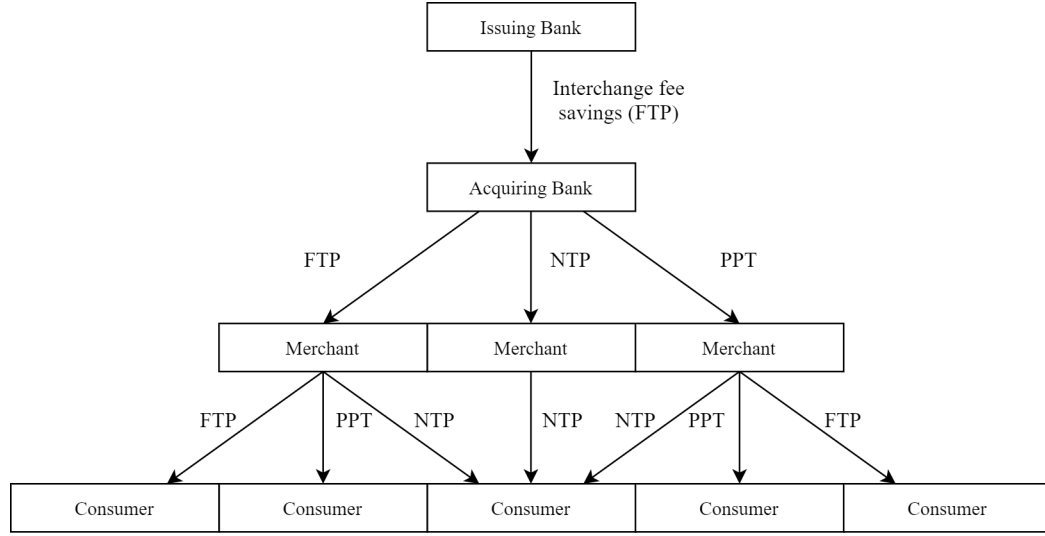
⁸⁵ Calculation based on A Veljan, 'A critical review of the European Commission's Multilateral Interchange Fee Regulation' (2018) Journal of Payments Strategy & Systems Vol. 12, No. 3 and European Central Bank, 'Statistical Data Warehouse' (2020) <<http://sdw.ecb.europa.eu/home.do>> accessed 21 January 2020.

⁸⁶ Calculation based on a time period of ten years. Discount rate of 20% applied based on the yearly performance of Euro Stoxx 50 index for 2009. See Finanzen.Net GmbH, 'Euro Stoxx 50' (2020) <https://www.finanzen.net/index/euro_stoxx_50/historisch> accessed 21 January 2020.

⁸⁷ Assuming investor expectation within the issuing market was that interchange fees would be abolished and immediate revenue loss of 8.8 billion Euro (equal to 46 billion Euro in NPV or total losses in the long run) would be realised by issuers. Given that interchange fees were not abolished and actually merely reduced resulting in estimated losses between 4.6 and 4.7 billion Euro, this caused an unexpected uplift in the NPV and future revenue expectations of 22 billion Euro. Thus, although issuers suffered an immediate net loss between 4.6 and 4.7 billion Euro on the event day, given that the market expectation was that this loss would be as high as 8.8 billion Euro (this being already incorporated in the stock prices), an increase in market capitalisation on the event day for both issuers and pure issuers is not contradictory per se.

impacts being passed-through on the issuing side of the network.⁸⁸

Figure 4: Possible post-event pass-through scenarios



VII DISCUSSION

To the untrained eye, the results of this event study analysis may seem to lack causality. Whilst they are statistically significant, the observation of increasing security prices for all network participants does not visibly align with common rationale⁸⁹, nor with comparable research utilising this methodology.⁹⁰ However, when reviewing the historical developments leading up to the event, as well as the legal background and complexities related to European card payment markets, a logical and coherent conclusion can be drawn.

On 9 August 2001 the last decision was made with regard to case Visa International (29373). Albeit stemming from agreements between undertakings, that result in a distortion of competition, interchange fees are exempted under Article 101(3) TFEU on the basis that no alternative, less restrictive arrangement can be identified that would achieve similar advantages and benefits to consumers. Subsequently three further antitrust cases against Visa and Mastercard are decided over the course of six months; from October 2007 to March 2008. All of the cases find that interchange fees indeed distort competition, contrary to the initial finding however, no exemption is granted under Article 101 (3) TFEU.⁹¹

From this transition in interpreting the role and legitimacy of interchange fees we can derive the first compelling argument in favour of our findings. Between October 2007 and March 2008, three legal cases (37860, 34579, 39398) found that interchange fees constituted an infringement of Article 101 (3) TFEU.

⁸⁸ Assuming regulatory compliance, any interchange fee reductions would be immediately passed through from issuers to acquirers. Thus, any issuer losses de-facto have to equal acquirer benefits; in this case resulting in immediate acquirer revenues of 4.7 billion Euro (due to rounding) or a NPV increase of 24 billion Euro. Our findings show that market capitalisation for retailers has increased by 11.2 billion Euro. As stated previously, in order to determine the ultimate consumer benefit an empirical analysis of the development in market capitalisation within the acquiring market is essential. Given the increase in market capitalisation of the retail industry, consumer benefits directly related to the IFR can be estimated between 0 and 12.8 billion Euro, depending on actual pass-through rates within acquiring and retailing markets.

⁸⁹ For the avoidance of doubt, findings of this paper are not suggesting that issuers (or their revenue position) benefited from the IFR. Issuers as well as pure issuers suffered revenue losses as a direct consequence of the regulation. These losses however, were less than what investors expected and as such resulted in a positive uplift of market capitalisation.

⁹⁰ See for instance D S Evans, H H Chang, and S Joyce, 'THE IMPACT OF THE U.S. DEBIT-CARD INTERCHANGE FEE REGULATION ON CONSUMER WELFARE' (2015) Journal of Competition Law & Economics, Vol. 11, No. 1, whereby it is noteworthy that the historical setting as well as the phase preceding the regulation are not comparable with the European card payment landscape.

⁹¹ A Veljan, 'Regulating the uncontrollable: The development of card scheme fees in payments markets in light of recent policy intervention' (2020) Research in Law and Economics.

Whilst accepting an issuer cost methodology as a benchmark for compliant interchange fees initially, the EC disallowed the approach in 2007 and embraced a new and untested methodology to assess the legal matter; *the tourist test* or *merchant indifference test*. This methodology is said to have been used as a benchmark during the interim agreement on interchange fees between Mastercard and the EC in April 2009. For this the EC also awarded a study to obtain relevant data for its undertaking in 2009.⁹² The agreement on interchange fees from April 2009 is therefore based on the very same methodology that the EC based their regulatory proposal on; one that was already publicly known at the time and applied to determine compliant interchange rates four years before the first regulatory proposal by the EC.

During the time span between the initial and the last three decisions, numerous charges, objections and litigations by the EC against the card associations are reported in the media; some of which are listed in table A1 within the Appendix. These include reports of a potential ban of interchange fees⁹³, culminating in Mastercard's decision to repeal its cross-border interchange fees in 2008, which also set the minimum fee levels for domestic transactions in several European countries⁹⁴. The EC's response⁹⁵ to the Mastercard decision reads as follows:

"Irrespective of MasterCard's move to temporarily repeal its cross-border MIF, the Commission will continue to be open to assess any new proposals from MasterCard concerning systems to ensure both efficient payments and a fair share of the benefits for consumers and retailers."

At this point an evident shift in the argumentation and negotiation regarding interchange fees in Europe is observable. From the stance that interchange fees are in fact the best (albeit anticompetitive) solution to solving network externalities within card payment markets, to the finding that these do not meet the exemption criteria under Article 101 (3) TFEU and shall, as such, be abolished and finally, just as they are repealed, the willingness of regulators to assess an efficient and fair proposal. Also, a transition from solely reviewing cross-border interchange fees to include domestic fees in line with the ambition of creating a single European payments market, is noticeable. It would be fair to assume that investor insecurity had built up during this course of events, as up to that point it is only evident that the existing interchange fees are too high and that a zero interchange fee leaves room for negotiation.

On 1 April 2009, the first (albeit interim) agreement is made between the EU and Mastercard, whereby interchange fees for cross-border credit cards are set to 0.3% and debit cards to 0.2%.⁹⁶ This event also marks the first mention of any harmonised interchange fees (i.e. concrete numbers to enable investors to form expectations about future revenue streams) for the European card payment market, determined via a common methodology and bilaterally agreed. Less than a week later the EC charges Visa with anti-competitive behaviour and a breach of competition rules with regard to the setting of its interchange fees. The public expectation is that Visa will follow Mastercard's actions.⁹⁷ Findings show that the Visa announcement is not a statistically significant event. It can be assumed that investor expectation was for an equal and fair treatment of both card associations so that any anticipated security price impacts would have been incorporated in the previous event. Also, the retail, wholesale and international trade representation to the European Union,

⁹² A D Matteis, 'The European Court of Justice Has Ruled that Interchange Fees Are Permitted if They Provide Benefits to Merchants. What are the Implications of the MasterCard Judgment for Interchange Fees in Europe?' (2014) European Payments Council Newsletter <https://www.europeanpaymentscouncil.eu/index.cfm/newsletter/article/?articles_uuid=566082C2-5056-B741-DB7B977A89660A8E> accessed 27 April 2020.

⁹³ M Jacoby, 'MasterCard Could Lose Role in Setting Bank Fees in the EU' (2006) The Wall Street Journal <<https://www.wsj.com/articles/SB115165752783495232?mod=searchresults&page=12&pos=2>> accessed 21 January 2020.

⁹⁴ L Pollock, 'MasterCard Europe Suspends Fees' (2008) The Wall Street Journal <<https://www.wsj.com/articles/SB121328413190568169?mod=searchresults&page=10&pos=13>> accessed 21 January 2020.

⁹⁵ N Kroes, 'Antitrust: Commission notes MasterCard's decision to temporarily repeal its cross-border Multilateral Interchange Fees within the EEA' (2008) European Commission <https://ec.europa.eu/commission/presscorner/detail/en/MEMO_08_397> accessed 21 January 2020.

⁹⁶ See Financial Times, 'Mastercard agrees to cut fees in Europe' (2009) <<https://www.ft.com/content/38392aaa-1eac-11de-b244-00144feabdc0>> accessed 21 January 2020 and C Forelle, 'MasterCard to Cut Fees in EU Pact' (2009) The Wall Street Journal <<https://www.wsj.com/articles/SB123857984966477741?mod=searchresults&page=10&pos=12>> accessed 21 January 2020.

⁹⁷ See Financial Times, 'Visa Europe charged with breaching rules' (2009) <<https://www.ft.com/content/f23d264e-22b3-11de-9c99-00144feabdc0>> accessed 21 January 2020 and M Dalton and P Kiviniemi, 'EU Charges Visa Over Fees' (2009) The Wall Street Journal <<https://www.wsj.com/articles/SB123902543327292827?mod=searchresults&page=10&pos=10>> accessed 21 January 2020.

EuroCommerce⁹⁸ was a party to the 2007 Mastercard case (34579)⁹⁹ and showed continuous involvement in the interchange debates. A leakage of information towards its members cannot be ruled out. This may also be a reason why no future events would have had a statistically significant impact on market returns. Contrary to the findings of the regulatory assessment of the U.S. debit card interchange fee regulation¹⁰⁰ which was characterised by multiple shifts in determining the final caps on interchange fees, it seems that within Europe a consensus was reached that the levels of interchange fees are set long term.

Based on above findings, if interchange fees had been abolished in 2009, consequential effects would have been immediate issuer losses of 8.8 billion Euro or a decrease in NPV of ca. 46 billion Euro. At the point in time and before the EC's response to Mastercard's nullification of cross-border interchange fees, given the materiality to the operating business of issuing banks and the magnitude of potential losses, this is in fact most likely to have been the investor expectation; hence incorporated in banking security prices already. Contrarily, costs of payment card processing are only one of numerous cost components for retailers. Whilst uncertainty has prevailed during the aforementioned period, the likelihood of any cost savings from interchange fees being incorporated in security prices for retailers at this point in time remains low.¹⁰¹ This is also due to the fact that any cost reductions would impact merchants only indirectly, i.e. if and when passed-through by acquirers. A lack of transparency in pricing of payment methods continues to exist today¹⁰²; in 2009 this ought to have represented an even larger issue.

In order to provide an educated forecast on the overall consumer impact of the IFR, we shall disregard the quantification of competitiveness within the merchant sector, as this is a fundamental question that will continue to play a significant role for the degree of success of any policy enactment in a business-to-consumer environment. The EC finds that retailer markets are more competitive and transparent than banking markets and in fact consider a full (100%) pass-through as viable.¹⁰³ Comparable, empirical research on the regulation of debit card interchange fees in the U.S. (from 2010) determines a pass-through rate of 49% - 53%.¹⁰⁴ Therefore, we imply a (partial) share of benefits being passed-through from merchants to consumers.

Previous findings¹⁰⁵ in this field show that issuer markets (HHI for 2009: 2127) are in factless concentrated than acquirer markets (HHI for 2009: 4069), resulting in a comparatively lower sensitivity of issuers to price decreases and a lower likelihood of increasing card fees and/ or reductions of benefits associated with card products being passed-through towards cardholders. Given that concentration within issuing markets is 48% lower than within acquiring markets and considering the pass-through rate for acquirers, we can quantify a potential price increase or reduction of card benefits from issuers towards cardholders¹⁰⁶, resulting in a negative impact of ca. 5.3 billion Euro, and thus reducing total potential benefits stemming from the

⁹⁸ EuroCommerce, 'About Us' (2020) <<https://www.eurocommerce.eu/about-us.aspx>> accessed 21 January 2020.

⁹⁹ European Union, 'Summary of Commission Decision of 19 December 2007 relating to a proceeding under Article 81 of the EC Treaty and Article 53 of the EEA Agreement' (2009) Official Journal of the European Union No. 264 <<https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2009:264:0008:0011:EN:PDF>> accessed 21 January 2020.

¹⁰⁰ D S Evans, H H Chang, and S Joyce, 'THE IMPACT OF THE U.S. DEBIT-CARD INTERCHANGE FEE REGULATION ON CONSUMER WELFARE' (2015) Journal of Competition Law & Economics, Vol. 11, No. 1.

¹⁰¹ See also European Commission, 'Study on the application of the Interchange Fee Regulation' (2020) <<https://ec.europa.eu/competition/publications/reports/kd0120161enn.pdf>> accessed 24 April 2020 for further discussion on the complexities of price formation within the retail sector.

¹⁰² A Veljan, 'Regulating the uncontrollable: The development of card scheme fees in payments markets in light of recent policy intervention' (2020) Research in Law and Economics.

¹⁰³ European Commission, 'Commission Staff Working Document Impact Assessment' (2013) <https://eur-lex.europa.eu/resource.html?uri=cellar:906ed6d3-f509-11e2-a22e-01aa75ed71a1.0001.04/DOC_1&format=PDF> accessed 26 January 2020.

¹⁰⁴ D S Evans, H H Chang, and S Joyce, 'THE IMPACT OF THE U.S. DEBIT-CARD INTERCHANGE FEE REGULATION ON CONSUMER WELFARE' (2015) Journal of Competition Law & Economics, Vol. 11, No. 1 investigate the impact on the U.S. debit card interchange fee regulation on consumer welfare. Whilst the methodological approach is comparable with regard to the event study, the paper pre-selects two contradicting events (rather than testing multiple events for significance) within the regulatory process and assesses the impact. Also, acquirer pass-through is assumed at 100%, with a focus on determining consumer (49-53%) and issuing bank pass-through (80% towards cardholders). Similarly, a final assessment lacks empirical evidence on the acquiring market.

¹⁰⁵ A Veljan, 'Influence of intra-and inter-system concentration on the pre-regulated setting of interchange fees within cooperative card payment networks' (2018) Journal of Banking Regulation.

¹⁰⁶ A pass-through rate from issuing banks towards cardholders is determined at 22%. The EC estimates a maximum pass-through of 30% - 40%. European Commission, 'Commission Staff Working Document Impact Assessment' (2013) <https://eur-lex.europa.eu/resource.html?uri=cellar:906ed6d3-f509-11e2-a22e-01aa75ed71a1.0001.04/DOC_1&format=PDF> accessed 26 January 2020.

regulation to 7.5 billion Euro.¹⁰⁷ The EC determines total consumer savings between 0 and 9.96 billion Euro in the long run.¹⁰⁸

An ultimate quantification of pass-through for acquirers and merchants cannot be performed at this stage. For one, this is due to the characteristics of the European card payments market, whereby only five pure acquirers could be identified, a widespread presence of issuer-acquirers with diverging interests is given and data is limited due to recent and increasing consolidation (M&A) activity and firms being predominantly characterised by private, rather than public ownership. For the other, prevalent pitfalls of any event study analysis such as the exclusion of non-listed (private) firms and the inherent risk of noise, i.e. unrecognised market influences on the development of returns need to be acknowledged. Finally, within the data set large firms are disproportionately represented, so that the interpretation of results shall be limited to larger, rather than smaller merchants. In light of this, our results should be interpreted with a certain amount of caution. Further insights into the European acquiring market are critical to complement existing findings; the generation of which has begun already.¹⁰⁹ The success of any fiscal intervention in network markets characterised by the aforementioned complexities will depend on the enforceability of regulatory measures. It is noteworthy that a maximum price threshold imposed on interchange fees, disregarding charges towards merchants (MSC), cannot a-priori be considered a mechanism to achieve ultimate price reductions for consumers, particularly in light of recent scheme fee developments.

VIII CONCLUSIONS

As this paper has demonstrated, recent policy intervention has caused different market effects within the European card payment industry. Based on eight years' worth of stock data collected for the largest European issuers, (extracted) pure issuers and retailers, an event study analysis is conducted to empirically determine the financial impacts of the IFR. The regulation is decomposed into separate procedural stages that have taken place in the political arena over the course of 15 years, supplemented with data on media coverage. A total of seven events is selected for the analysis.

The (interim) agreement between the EC and Mastercard to set cross-border interchange fees to 0.3% for credit and 0.2% for debit cards is the single, statistically significant event. Contrary to common rationale, the average (three-day cumulative) abnormal returns for 2 April 2009 are positive for all network participants, ranging from 4.8%-pts (7%-pts) for retailers to 9%-pts (18%-pts) for issuers and 9%-pts (18.2%-pts) for pure issuers, whilst for all other considered event dates the AAR never surpass $\pm 3.2\%$ -pts and t-values do not surpass ± 2.9 . Given high uncertainty regarding the classification of interchange fees beforehand, including a potential abolishment, a causal link between the results and the policy intervention can be assumed.

When reviewing the magnitude of the event, we find that the regulatory announcement has been positively interpreted by retail investors, leading to a total, industry-wide increase in market capitalisation by 11.2 billion Euro (or 3.6%) on the event date. Correspondingly, an increase in market capitalisation by 39.7 billion Euro (or 8.5%) for selected issuers and 14.8 billion Euro (or 8.9%) for pure issuers within the data set can also be recorded. Considering the savings for acquiring banks (equivalent to 4.7 billion Euro or an increase in NPV of 24 billion Euro), a pass-through rate of 46% from acquirers to merchants is determined. Whilst a mathematical calculation of pass-through towards consumers is not feasible, mainly due to the characteristics and widespread manifestation of issuer-acquirers across Europe, preliminary findings, under consideration of a potential pass-through on the issuing side of the network, suggest a positive regulatory impact on consumers in the region of up to 7.5 billion Euro.

In light of the EC's pending review of the impacts associated with the IFR, this paper applies an alternative methodology to determine the effects of the policy intervention on market participants. Results provide

¹⁰⁷ As per above, issuing banks are confronted with 4.6-4.7 billion Euro in immediate (24 billion Euro in the long-run) revenue losses. Given that pass-through is determined at 22%, this would result in a negative long-term impact of 5.3 billion Euro on consumers, stemming from higher annual card fees and/ or reduced rewards and benefits programs. This results in a decrease of potential consumer benefits to 7.5 billion Euro.

¹⁰⁸ European Commission, 'Study on the application of the Interchange Fee Regulation' (2020) <<https://ec.europa.eu/competition/publications/reports/kd0120161enn.pdf>> accessed 24 April 2020

¹⁰⁹ The Payment Systems Regulator, 'Market review into the supply of card-acquiring services: Draft Terms of Reference' (2018) <https://www.psr.org.uk/psr-publications/consultations/mr18_1.1_draft_for_card_acquiring_services> (accessed 1 January 2020) initiated a market review into the supply of card-acquiring services in the United Kingdom, covering amongst others topics such as *transparency of reporting and pass-through towards merchants*.

empirical evidence on the re-distribution of funds with a statistical significance, highlighting merchant and consumer benefits as a direct causal consequence. Thus, the event study analysis is deemed as an appropriate tool to complement existing methodologies when addressing the topic of pass-through within European (card payment) markets.

IX APPENDIX

Table A.1: Event dates

Event Date	Day	Stage	Description	Media coverage
16.10.2000	Monday	Initial accusation of anti-competitive behaviour (EU against Visa)	Subsequently, European Commission finds that this is within competition guidelines (24 July 2002). Visa agrees in parallel to reduce fees so that waiver / decision would apply until end of 2007.	WSJ: 16.10.2000
23.06.2006	Friday	Supplementary Statement of Objections from EC against Mastercard	Supplementary charges by the EC to a 2003 complaint against Mastercard's interchange fees. Risk of a potential ban on interchange fees by the EC. Mastercard responds publicly (30 June 2006) stating that it was not facing any fines and intended to cooperate with the EC.	WSJ: 01.07.2006
05.12.2006	Tuesday	Objections from EC against Mastercard	Mastercard cuts card fees by 60% on debit products (effective January 2008).	WSJ: 05.12.2006
19.12.2007	Wednesday	Litigation on Mastercard's cross-border card fees	First step to initiate upcoming battle on domestic interchange fees. At the point cross-border fallback fees also applied to domestic transactions in eight European countries.	WSJ: 20.12.2007 EC: 19.12.2007
12.06.2008	Thursday	Litigation on Mastercard's cross-border card fees	Mastercard temporarily repeals its cross-border interchange fees, i.e. sets these at 0%.	WSJ & EC: 12.06.2008
01.04.2009	Wednesday	Litigation on Mastercard's cross-border card fees	Interim agreement between Mastercard and EC that cross-border interchange fees will be reduced to 0.3% for credit and 0.2% for debit cards.	FT & WSJ & EC: 01.04.2009
07.04.2009	Tuesday	Litigation on Visa's cross-border card fees	EC charges Visa with anti-competitive behaviour and a breach of competition rules. Public expectation is that Visa will follow Mastercard's actions from less than a week ago with regard to cross-border interchange fees.	FT: 06.04.2009 WSJ: 07.04.2009

26.04.2010	Monday	Litigation on Visa's cross-border card fees	Visa agrees to trial the EC proposal on interchange fees and reduces these to 0.2% for domestic and cross-border debit transactions.	FT & WSJ: 26.04.2010
08.12.2010	Wednesday	Litigation on Visa's cross-border card fees	EC makes Visa's commitments to cut interchange fees for debit cards legally binding.	EC: 08.12.2010
11.01.2012	Wednesday	Publication of EC consultation paper on European payments market	Interchange fees critically assessed and determined to be barriers to payment innovation.	FT & Reuters & EC: 11.01.2012
24.05.2012	Thursday	Litigation on Mastercard's cross-border card fees	General Court decides to uphold EC's decision from 2009 in relation to Mastercard's interchange fees.	FT & WSJ & Reuters & EC: 24.05.2012
31.07.2012	Tuesday	Litigation on Visa's domestic and cross-border credit card fees	Antitrust complaint by EC regarding Visa's domestic and cross-border credit card fees. Expectation is that these are reduced to the benchmark of 0.3%.	FT & WSJ & Reuters: 31.07.2012
14.05.2013	Tuesday	Litigation on Visa's domestic and cross-border credit card fees	Visa agrees to cut credit card interchange fees for domestic and cross-border transactions to 0.3%, representing a reduction of 40% - 60%.	FT & WSJ & Reuters: 14.05.2013
17.07.2013 24.07.2013	Wednesday Wednesday	EC proposal for a regulation of interchange fees	EC proposal for a regulation of domestic and cross-border interchange fees for debit (0.2%) and credit (0.3%) card payments across Europe.	CNBC & WSJ & Reuters: 17.07.2013 Finextra & Reuters & EC: 24.07.2013
03.04.2014	Thursday	European Parliament Opinion	Amendments adopted by European Parliament on the proposed regulation.	WSJ & EC: 03.04.2014
18.12.2014	Thursday	Initial agreement to proposed regulation	Discussions and preliminary agreement between EU governments, and the economic committee of the European parliament.	Finextra & Reuters & FT: 18.12.2014

Table A.2: Results of event studies

Date	Retailers			Issuers			Pure Issuers		
	AAR	CAAR	t-test	AAR	CAAR	t-test	AAR	CAAR	t-test
2008-06-11	-0.010	-0.010	-0.990	-0.020	-0.020	-1.768	-0.024	-0.024	-2.057
2008-06-12	0.010	0.000	0.968	0.022	0.001	1.859	0.022	-0.002	1.904
2008-06-13	0.000	0.000	0.040	0.000	0.001	0.042	0.001	-0.001	0.118
2009-03-31	0.005	0.005	0.551	0.044	0.044	3.901	0.054	0.054	4.557
2009-04-01	0.016	0.021	1.612	0.037	0.082	3.250	0.029	0.084	2.414
2009-04-02	0.048	0.070	4.937	0.090	0.180	7.990	0.090	0.182	7.647
2010-04-23	0.015	0.015	2.093	0.003	0.003	0.307	0.006	0.006	0.550
2010-04-26	0.008	0.023	1.052	0.013	0.016	1.321	0.010	0.016	0.849
2010-04-27	-0.011	0.012	-1.482	-0.014	0.002	-1.370	-0.012	0.004	-1.055
2010-12-07	0.012	0.012	1.443	-0.002	-0.002	-0.147	-0.004	-0.004	-0.423
2010-12-08	-0.006	0.005	-0.772	0.008	0.006	0.768	0.000	-0.004	0.048
2010-12-09	-0.010	-0.005	-1.249	0.016	0.022	1.570	0.014	0.010	1.299
2012-07-30	0.016	0.016	1.823	0.032	0.032	2.840	0.032	0.032	2.877
2012-07-31	-0.006	0.010	-0.651	-0.013	0.018	-1.186	-0.011	0.020	-1.023
2012-08-01	-0.006	0.005	-0.632	0.007	0.025	0.591	0.011	0.032	1.004
2013-07-16	-0.006	-0.006	-0.818	-0.009	-0.009	-0.996	-0.008	-0.008	-0.774
2013-07-17	0.009	0.002	1.076	0.005	-0.004	0.514	0.008	0.000	0.816
2013-07-18	0.008	0.010	1.040	0.018	0.013	1.912	0.015	0.015	1.525
2013-07-23	-0.012	-0.012	-1.516	0.004	0.004	0.382	0.005	0.005	0.564
2013-07-24	0.000	-0.011	0.061	0.009	0.012	0.975	0.010	0.016	1.060
2013-07-25	-0.004	-0.015	-0.526	0.002	0.015	0.227	0.002	0.018	0.195
2014-04-02	0.004	0.004	0.542	0.001	0.001	0.107	0.000	0.000	0.040
2014-04-03	-0.001	0.003	-0.109	0.006	0.007	0.835	0.003	0.003	0.349
2014-04-04	-0.003	0.000	-0.464	0.007	0.014	0.935	0.005	0.008	0.645

Table A.3: Descriptive Statistics: Daily Returns - Issuers

Variable	Mean	SD	Min	Max	Cap %
HSBA.L	-0.0002	0.0122	-0.0334	0.0331	0.1837
BSD2.DE	-0.0004	0.0187	-0.0513	0.0507	0.0813
BNP.PA	-0.0001	0.0191	-0.0522	0.0527	0.0659
LLD.F	-0.0005	0.0245	-0.0676	0.0661	0.0541
INGA.AS	0.0007	0.0224	-0.0599	0.0606	0.05
ISP.MI	0.0005	0.0219	-0.0592	0.0595	0.0433
BBVA	-0.0001	0.0195	-0.0541	0.0539	0.04
ACA.PA	-0.0003	0.0225	-0.0631	0.0616	0.0388
RBS.L	-0.0006	0.0231	-0.0615	0.0608	0.0377
BARC.L	-0.0006	0.0197	-0.0555	0.0543	0.0377
SGE.F	-0.0003	0.023	-0.0638	0.0644	0.0315
CRIN.DE	0.0002	0.0241	-0.0656	0.0658	0.0312
DNB.OL	0.0001	0.0159	-0.0444	0.0446	0.0311
KBC.BR	0.0	0.0238	-0.0672	0.0675	0.0309
NDA-FI.HE	-0.0001	0.0162	-0.0447	0.045	0.0295
SEB-C.ST	-0.0002	0.0137	-0.0388	0.0387	0.0249
SVHH.F	0.0001	0.0144	-0.0394	0.0399	0.0203
DBK.DE	-0.0004	0.019	-0.0528	0.0526	0.0181
FRYA.F	0.0005	0.0137	-0.0383	0.0393	0.0174
EBS.VI	0.0002	0.0229	-0.0631	0.0631	0.0172
CABK.MC	0.0001	0.0164	-0.0432	0.0435	0.0167
DSN.F	-0.0006	0.0139	-0.0395	0.0387	0.0146
OTP.F	-0.0001	0.0223	-0.0607	0.0598	0.013
CBK.DE	-0.0011	0.0228	-0.0634	0.0611	0.01
RBL.VI	-0.001	0.0238	-0.066	0.0629	0.0088
BKT.MC	-0.0007	0.0205	-0.0542	0.0543	0.0068
SAB.MC	-0.0013	0.0151	-0.0422	0.0398	0.0057
BIRG.L	-0.0015	0.0294	-0.086	0.0838	0.0057
BCP.LS	-0.0015	0.0227	-0.0619	0.0592	0.0047
OBS.VI	0.0	0.0	-0.0001	0.0002	0.0041
EFGD.F	-0.0072	0.0397	-0.1163	0.102	0.0039
UBL.MI	-0.0008	0.0213	-0.0575	0.0567	0.0034
BAMI.MI	-0.0015	0.0251	-0.0699	0.0671	0.0032
ACBB.F	-0.0046	0.0338	-0.097	0.0884	0.0031
ETE.AT	-0.0023	0.0355	-0.1024	0.0959	0.0028
DEXB.BR	-0.0035	0.0272	-0.0836	0.0748	0.0019
MING.OL	0.0001	0.0134	-0.0365	0.0364	0.0016
TPEIR.AT	-0.0036	0.0359	-0.1016	0.0949	0.0015
TM2.F	0.0001	0.0121	-0.0336	0.034	0.0012
BPSO.MI	-0.0011	0.0156	-0.0435	0.042	0.0011
IL0A.IR	-0.0003	0.044	-0.1212	0.1226	0.0007
SAB1L.VS	-0.0005	0.0105	-0.0294	0.029	0.0004
KOMB.PR	-0.0002	0.0146	-0.04	0.0401	0.0003

Table A.4: Descriptive Statistics: Daily Returns - Pure Issuers

Variable	Mean	SD	Min	Max	Cap %
HSBA.L	-0.0002	0.0122	-0.0334	0.0331	0.4739
BSD2.DE	-0.0003	0.0186	-0.0513	0.0507	0.2098
RBS.L	-0.0007	0.0232	-0.0615	0.0608	0.0972
KBC.BR	-0.0001	0.0238	-0.0672	0.0675	0.0796
CABK.MC	0.0	0.0164	-0.0432	0.0435	0.0432
CBK.DE	-0.0012	0.0227	-0.0634	0.0611	0.0258
BKT.MC	-0.0006	0.0205	-0.0542	0.0543	0.0175
OBS.VI	0.0	0.0	-0.0001	0.0002	0.0107
UBI.MI	-0.0007	0.0212	-0.0575	0.0567	0.0087
BAMI.MI	-0.0015	0.0249	-0.0699	0.0671	0.0083
JYS1.F	-0.0002	0.0106	-0.0292	0.0292	0.0073
ETE.AT	-0.0021	0.0353	-0.1024	0.0959	0.0072
DEXB.BR	-0.0034	0.027	-0.0836	0.0748	0.005
TM2.F	0.0	0.0121	-0.0336	0.034	0.0031
IL0A.IR	-0.0003	0.044	-0.1212	0.1226	0.0017
SAB1L.VS	-0.0005	0.0105	-0.0294	0.029	0.0009

Table A.5: Descriptive Statistics: Daily Returns - Retailers

Variable	Mean	SD	Min	Max	Cap %
MOH.DE	0.0002	0.015	-0.0399	0.0399	0.3361
IXD1.F	0.0003	0.0144	-0.0383	0.0397	0.1494
RMS.PA	0.0005	0.0137	-0.0367	0.0385	0.1168
KER.PA	-0.0002	0.0149	-0.0419	0.0414	0.103
ADS.DE	0.0003	0.0143	-0.0386	0.0392	0.1002
TSCO.L	-0.0005	0.0122	-0.0341	0.0332	0.0426
AD.AS	0.0007	0.008	-0.0215	0.0225	0.0392
CA.PA	-0.0003	0.0158	-0.0427	0.0427	0.0243
JEM.F	0.0	0.0136	-0.037	0.0381	0.0159
NXG.F	0.0002	0.0132	-0.0346	0.0357	0.0135
KEK.F	0.0004	0.0111	-0.0299	0.0305	0.0092
SUY1.F	-0.0007	0.0142	-0.0372	0.0364	0.0085
KGF.L	0.0006	0.0153	-0.0411	0.042	0.0082
MA6.F	-0.0009	0.0159	-0.0428	0.0415	0.0078
DUFN.SW	0.0	0.0153	-0.0416	0.042	0.0064
CAJ.F	0.0001	0.0095	-0.0259	0.0255	0.0061
HMSB.F	0.0004	0.0119	-0.0317	0.0324	0.0047
SON.LS	-0.0003	0.0159	-0.0424	0.0425	0.0028
GAW.L	0.0001	0.007	-0.0205	0.0207	0.0025
SPD.L	0.0011	0.0175	-0.0472	0.0492	0.0021
HFD.L	-0.0001	0.0147	-0.0396	0.04	0.0008

7. Conclusions

This thesis complements prevailing economic theory on two-sided card payment markets across Europe with industry observations and enables a critical assessment of the motives and impacts of policy intervention, specifically related to the European IFR. Any regulatory intervention in the functioning of card payment markets shall be applied conservatively and only after obtaining solid, empirical evidence in addition to theoretical findings. In absence of this, regulatory measures may not only fail to achieve their ultimate goals but also cause unexpected, detrimental impacts on the industry. With regard to the IFR, a failure to prove pass-through of savings from acquirers to retailers and subsequently consumers, leading to an ultimate increase in social welfare can compromise the entire legal case and potentially dispute assumptions made. As this thesis has demonstrated, recent policy intervention has caused several and at times contradictory market reactions within the European card payment industry, insofar as the EC's motives and grounds for a regulatory involvement are concerned.

In contrast to forecasts made by the EC, results within article 1 indicate that short-term issuer losses, determined to be above 4.5 billion EUR, are not offset by increases in card volume. The statistical analysis performed as part of this thesis provides empirical evidence in support of this. A very low to low (and at times contradictory) correlation can be observed between the interchange fee and key payment metrics related to card adoption and usage. The major driver of payment patterns seem to be consumer habits and not fees for payment instruments. To compensate for losses directly associated with the regulation, issuers would have had to process 80% more card volume. The real value of total card payments increased on average by 7% yearly, from 2015 to 2018 in Europe; a number which is practically identical to pre-regulatory times. Furthermore, no quantifiable improvements in social welfare, attributable to the regulation have been put forward by the EC thus far. In addition, some unintentional increases in average interchange fees can be observed (see France in relation to credit cards and the UK in relation to debit cards).

European card payment markets continue to be segregated and heterogeneous, with only initial steps being taken towards a full unification and harmonisation. Given the different stages of development of payment markets across European jurisdictions, a single regulatory measure bears the risk of missing some of its core objectives and generating unintentional consequences. Some of these consequences can be related to innovation and new product developments which improve card payment security and convenience. A relationship between interchange and assessment fees on the one side and market investments, card adoption and acceptance penetration on the other, shall not be disregarded.

A key assumption adopted by numerous scholars and the EC in their determination of efficient interchange fees is related to concentration, specifically to highly (/perfectly) competitive acquiring markets. Article 2 proves that, contrary to widespread belief, acquirer markets show to be highly (and more) concentrated than issuer markets which are characterised by a relative degree of concentration. Due to comparatively higher competition within the market, issuers (acquirers) are less (more) sensitive to changes in the interchange fee, suggesting that issuing banks are in fact more elastic to price adjustments. This could also be one of the explanations for the downward trend of interchange fees in a pre-regulatory environment. As any incremental profits will be competed away less on the acquiring side of the network, there is a tendency to reduce the interchange fee, ultimately benefiting the party that has greater control over its setting, which in this case are acquirers. Considering the relatively high concentration within acquiring markets, only a partial pass-through of savings to merchants and subsequently consumers can be expected.

Results show that concentration, alongside externalities, has a statistically significant influence on the setting of interchange fees in credit and debit card markets. Within credit card markets, the main drivers of interchange fees are inter-scheme concentration and acquirer concentration. Interchange fees in debit card markets are primarily influenced by issuer concentration and inter-scheme concentration. The claim by the EC that national debit schemes have been detrimentally impacted by disproportionately higher interchange fees in the past is inconsistent with findings of this thesis and cannot be confirmed. A market observation that has not been considered in literature thus far and requires further analysis is the widespread manifestation of issuer-acquirers across Europe, particularly in relation to their role(s) in the payment chain, strategic interests and behaviour with regard to the setting of interchange fees.

As discussed previously, demand elasticities of network participants are inversely related to the size of the platform. A mixture of lacking and inverted competition between card associations for issuing banks generally leads to the setting of interchange fees above the socially optimal level. Although originally identified for interchange fees, these findings can be applied to card scheme fees as well, as they too form part of the MSC, ultimately charged towards merchants. Card scheme fees are based on agreements between card associations and the respective issuing or acquiring banks. Due to their nature, they have not been dealt with in research and left out of scope in the IFR. Primary data, obtained by a EuroCommerce survey, shows that increasing card scheme fees and the eradication of cost savings, stemming from the IFR are negatively impacting at least half of the European merchant population. Whereas the value of total card payment transactions has increased by 13% from 2015 to 2018 (European Central Bank, 2019), the share price of Visa, Inc. increased by 70% and Mastercard, Inc., as much as 94% (Verizon Media, 2020).

Whilst merchant pass through is observable for 80% of merchants³⁴, only 15% of respondents are aware of directly passed through savings to consumers³⁵ – a prerequisite for an increase in social welfare and the success of the IFR. Further concerns related to transparency of fees and the development of commercial cards are discussed. If merchants had the possibility to benchmark their total costs of processing for card payments with national averages, it would allow for deeper insights and increase negotiation power with acquiring banks. Similar initiatives have been observed in other legislations such as Australia. Concerns related to price increases of commercial cards, higher issuance and usage rates (*steering*) due to easier accessibility and increasing reward programs as well as the inability to surcharge these transactions due to operational complexities are evaluated. In line with the opinion of the European Economic and Social Committee (2013), this thesis finds that commercial cards shall be included in the IFR. As merchants are left to internalise (increasing) card scheme fees, the question is raised as to how these fees are to be handled and controlled going forward.

The legal grounds for a potential policy intervention are assessed based on previous antitrust cases in card payment markets. Three possible legal approaches are identified, based on Article 5 of the IFR, Article 101 TFEU and Article 102 TFEU. These are an equalisation of issuer and acquirer scheme fees, a structural pricing change to increase acquirer involvement with regard to the setting of scheme fees and policy intervention, whereby the most probable outcome of a policy intervention is a cost-based evaluation; comparable to interchange fees. The result of such an assessment that would alleviate (some of the) above mentioned concerns could be a cap on scheme fee components at an efficient level. Transparency could be increased by harmonising scheme fees, and enabling public accessibility, thereby creating a level-playing-field for acquirers, whilst allowing card associations to retain profitability by charging additional fees based on transaction characteristics. Findings suggest that there is a need to address the role and development of scheme fees within card payment markets by the regulator.

In light of the EC's pending review of the impacts associated with the IFR, article 4 finds that an alternative approach, known as the *event study* is deemed as an appropriate tool to complement existing methodologies when addressing the topic of pass-through within two-sided card payment markets. Based on seven analysed key event dates, the (interim) agreement between Mastercard and the EC to reduce cross-border interchange fees to 0.3%

³⁴ It needs to be noted that large merchants are disproportionately represented in the study; an assumption which is supported by the fact that 15% of merchants are not aware if and to what extent pass-through of savings has occurred at all. Thus, average pass-through rates for European merchants will lie at a considerably lower level.

³⁵ Acknowledging that a direct relationship between retail pricing and cost decreases is relatively hard to establish due to the nature of the business, i.e. merchants may use some of the savings from the IFR to make investments, innovate or improve their service in another way, thereby indirectly passing on these benefits to consumers.

for credit and 0.2% for debit cards on 1 April 2009 is the single and most significant event. Results provide statistically significant evidence on the re-distribution of funds, highlighting merchant and consumer benefits as a direct causal effect. As a consequence of the IFR, total market capitalisation for the retail industry increased by 11.2 billion EUR (or 3.6%) on the event date. This results in a (partial) pass-through rate of 46% from acquirers to merchants. In order to determine ultimate pass-through to consumers, further investigation on the prevalent manifestation of issuer-acquirers needs to be conducted, however consumer benefits directly related to the IFR will most probably lie in the region of up to 7.5 billion EUR. Correspondingly, an increase in market capitalisation by 39.7 billion Euro (or 8.5%) for selected issuers and 14.8 billion Euro (or 8.9%) for pure issuers within the data set is also recorded, mainly driven by high uncertainty regarding the classification and potential abolishment of interchange fees beforehand. Whilst seeming ambiguous at first sight, causality between the results and the policy intervention can be established.

The success of any fiscal intervention in two-sided markets, characterised by aforementioned complexities will depend on founded theoretical assumptions, complemented by empirical data and the enforceability of regulatory measures. A maximum price threshold imposed on a single cost component, namely the interchange fee, disregarding total charges towards merchants (scheme fees and acquirer processing fees which also constitute the MSC), cannot a-priori be considered a mechanism to achieve ultimate price reductions for consumers, especially in an environment where pass-through rates within the network have not been sufficiently analysed. Whilst the thesis has confirmed a positive regulatory impact on merchants, a final assessment of consumer benefits will depend on an evaluation of potential card fee increases or reductions in benefits by issuers towards cardholders. Several baseline assumptions utilised to calculate MIT interchange fees and to build the antitrust case have shown to be contradictory and lacking empirical proof. Findings highlight areas to be investigated in further detail within a regulatory impact assessment and suggest a regulatory review to ensure that ultimate goals of the IFR are achieved.

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