Merchant Indifference Test Application –
A Case For Revising Interchange Fee Level in Poland

Jakub Górka

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Abstract

The paper presents results of an empirical study conducted in Poland aimed at estimating costs of cash and card payments acceptance at physical points of sale and determining the level of interchange fees (IF) in card-based transactions conformant with the merchant indifference test (MIT), also known as the tourist test or the cost-avoided test.

Calculations were based on data obtained from a survey of more than 1000 merchants of all sizes from different branches of economy active in retail trade (consumer-to-business domain). The sample of companies was statistically representative at national level.

The MIT may currently be considered as a preferred method of IF assessment in the economic literature, as well as by the European Commission. To the author's knowledge, the application of MIT on the basis of primary data from the merchants survey was the first such attempt in the economic literature.

The MIT explores the question whether a merchant would refuse a card payment if he were certain that a non-repeat customer who is about to pay at the cash register had enough cash in his pocket. The test is passed if accepting the card does not increase the merchant's operating costs.

The level of interchange fees in Poland compliant with the tourist test would help accelerate the growth of card acceptance network and make merchants indifferent to the choice of payment method by consumers (cash vs card). The level of IFs in Poland has long remained the highest compared to other countries of the European Union.

Based on the outcomes of cost calculations it can be argued that tiers of interchange fees in Poland should be low – up to 0.2% of a transaction value or even nil.

Keywords: payment costs, cash, card, merchant indifference test, interchange fee
JEL Codes: D23, D24, D61

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1. Introduction

Interchange fees (especially collectively agreed multilateral interchange fees, MIFs) have been a focal point of many debates worldwide. The views of payment stakeholders on the role of interchange fees (IFs) and their level are varied. While payment organisations and issuers tend to prefer higher IFs, merchants and acquirers would rather see them low or even non-existing. Payment regulators in all countries, who are authorised to protect consumers and competition, closely monitor the payments market and take under scrutiny the economics of business models in three and four-party card schemes. It would be hard to find a country among developed and emerging markets where antitrust authority did not conduct any investigation against Visa and MasterCard networks for setting excessive (multilateral) interchange fees or enforcing anticompetitive rules (such as blending, no-surcharge/no-discrimination rule, honour-all-cards rule).

In Poland policy makers felt concerned about high interchange fees which were regarded as one of the main factors that slowed down expansion of card accepting payment terminals and in effect inhibited non-cash circulation development in the country. The need arose to make a study on payment costs with special attention on the issue of merchant service charges and underlying interchange fees.

The article presents selected results of the Polish merchants survey and subsequent cost calculations which were made in the joint research project carried out in the second half of 2012 by:

- the Foundation For Development of Cashless Payments in Poland (FROB),
- the National Bank of Poland (NBP),
- the Faculty of Management, University of Warsaw (WZ UW)[1].

More than 1000 merchants of all sizes from different branches of economy active in retail trade (consumer-to-business domain) were interviewed in the survey. The sample was statistically representative at the national level with the exception of small rural areas.

The project aimed at:

- estimating costs of cash and card payments acceptance at physical points of sale in Poland,
- identifying barriers to the development of non-cash payments (including card transactions),
- defining degree of Polish merchants' openness to potential adoption of innovative payment methods.

An important problem addressed in cost estimations was the assessment of an efficient level of interchange fees in Poland which would help accelerate the growth of card acceptance network and make merchants indifferent to the choice of payment method by consumers (cash vs card). The merchant indifference test (MIT, also known as the tourist test or the avoided-

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[1] Millward Brown conducted the survey of merchants.

A comprehensive report written by the head of the research project is available on NBP and FROB websites. Górka J. (Dec. 2012), *Study on Acceptance of Cash and Payment Cards in Poland* (in Polish):
http://www.nbp.pl/home.aspx?f=/systemplatniczy/obrot_bezgotowkowy/obrot_bezgotowkowy.html
http://frob.pl/baza-wiedzy/badania/

The analyses, opinions and conclusions presented in the report are of the author and cannot be treated as a position of any institution involved in the research project.

cost test) was used in order to find an appropriate benchmark for the IF level. The MIT may currently be considered as a preferred method of MIF assessment in the economic literature as well as by the European Commission.

The remainder of the paper is organised as follows: Section 2 provides general background information about interchange fees and a brief literature review; Section 3 describes the methodology used in the survey on merchant's costs; Section 4 presents selected results of the survey; Section 5 gives insight into investigated cost items; Section 6 focuses on cost calculations of cash and card payments; Section 7 introduces the concept of merchant indifference test; Section 8 refers to the application of MIT to Polish data, shows recent dynamics of interchange fees in Poland and discusses regulatory interventions made in Poland and planned on the Pan-European level; Section 9 concludes followed by a glossary of cost definitions used in the study on merchants' costs.

2. Background information and literature review

Interchange fees are charged by issuing banks to acquiring banks for each card payment transaction executed at a merchant outlet. They can be set unilaterally as well as agreed bi- or multilaterally between issuers within a payment scheme. In the latter case they are defined as multilateral interchange fees (MIFs) and take either a form of a percentage fee or combined fee (a fee with both – *ad valorem* and flat fee components).

Figure 1. Domestic weighted average multilateral interchange fees (MIFs) in Europe (2012)
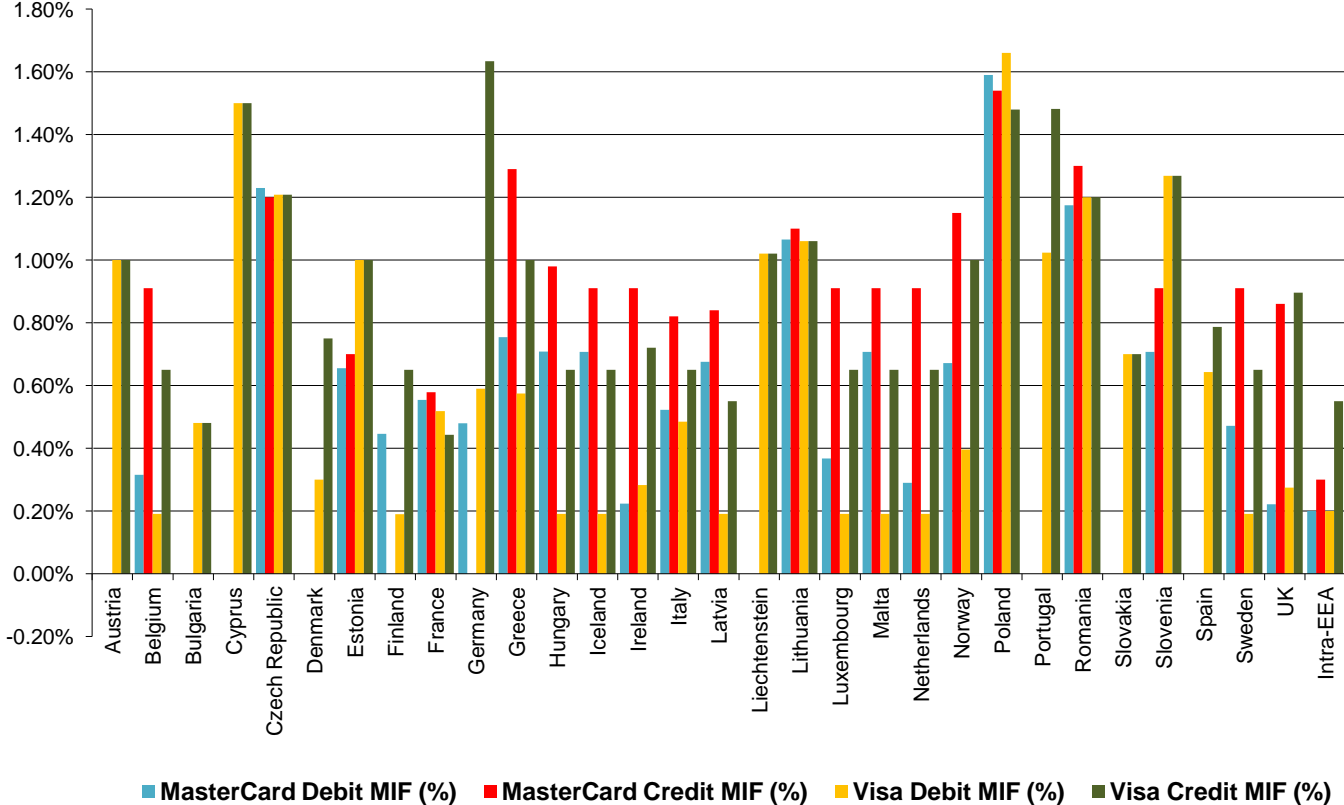
Source: based on EC data (DG Competition).

Domestic MIFs are not set on the same or similar levels across countries and they differ significantly. In 2012 MIFs in Poland stood out as the highest in the EU (the weighted average level of 1.55-1.60%). They were blamed for impeding the growth of payment accepting devices network in Poland and inflating merchants' costs (NBP 2012: 6, Maciejewski 2012: 21). Between 2003 and 2012 the number and value of non-cash card transactions in Poland soared by 635% and 406% respectively, while the number of payment terminals only by 246%. At the end of 2011 Poland had the second sparsest card payment acceptance network in the EU – 7 005 devices per one million inhabitants, while the EU average at that time was 17 584.

In order to solve the problem by means of a market compromise the National Bank of Poland set up an Interchange Fee Task Force consisting of all major market stakeholders (issuers, acquirers, payment organisations, merchants, consumers, public authorities – Polish Ministry of Finance, Office of Competition and Consumer Protection, Polish Financial Supervision Authority, the central bank itself). The IF Task Force was operating from November 2011 to March 2012 and worked out the so called Programme of Card Charges Reduction in Poland which assumed gradual decreases of interchange fees in the years 2013-2017 (the first decrease to 1.1-1.2%, the last decrease to the European average – at that time 0.70-0.84%). However, mainly due to the opportunistic behaviour of MasterCard, the compromise had failed and the regulatory legislative process was initiated.

Over the last decade the costs of payment instruments were estimated in a number of empirical studies, frequently carried out directly by central banks: the Netherlands (Bank of Netherlands 2004; Brits and Winder 2005), Belgium (Bank of Belgium 2005; Quaden 2005), Sweden (Guibourg and Segendorf 2004; Bergman *et al.* 2007; Segendorf and Jansson 2012), Portugal (Bank of Portugal 2007), USA (Garcia-Swartz *et al.* 2006a and 2006b), Australia (Simes *et al.* 2006; Reserve Bank of Australia 2007), Canada (Arango and Taylor 2009), Finland (Takala and Viren 2008; Nyandoto 2011), Norway (Gresvik and Øwre 2003; Gresvik and Haare 2009), Hungary (Turjan *et al.* 2011), Denmark (Bank of Denmark 2012), Germany (Krüger and Seitz 2014) and the most comprehensive study of the European Central Bank with the involvement of 13 national central banks from the European Union (Schmiedel *et al.* 2012). The studies concentrated on retail payments efficiency measured from the perspective of private costs incurred by different entities engaged in the payment process and from the macro perspective of social costs embracing all parties' private costs after netting out reciprocal transfers of charges. Those studies did not directly deal with the economics of fees, such as the merchant service charge or the interchange fee, which underpin the payment system and guide decisions of payment stakeholders.

However, there is another strand of theoretical economic literature that evolved on the optimal pricing of card payments. First in the early 1980's Baxter built a model of two-sided markets where he argued that contrary to traditional markets there was a rationale behind setting an interchange fee which would balance demand for card services of two distinct user groups: merchants and consumers characterised by different degree of price elasticity (Baxter 1983). Simplified assumptions used in the Baxter model have been relaxed in other papers. Wright (2004) allowed for heterogeneity on both sides of the market. Rochet and Tirole (2002, 2003) proved that with lacking possibility of merchants to surcharge, the actual levels of interchange fees can be higher than socially optimal. An extensive overview of economic

literature on interchange fess can be found in Verdier (2009), Börestam and Schmiedel (2011), Bolt (2013).

The pivotal issue raised in the economic literature as well as by antitrust authorities was the adequate level of MIF which would bring both sides on board without creating market failure whereby issuers would be able to extract economic rents through introducing high interchange fees which in turn, via merchant service charges, would be passed on by acquirers to retailers. In such a case instead of positive externalities brought about by active cardholders merchants would face negative ones. All consumers, whatever payment method they used, would have to internalise higher costs of payments through higher prices of goods and services.

Up until ca 2008 in order to determine an appropriate MIF tier a supply side approach was popular taking account of three cost categories (Börestam and Schmiedel 2011: 32):

- processing cost,
- payment guarantee cost,
- free funding cost.

Payment organisations argued that these costs justified the usage of interchange fees by issuers. This reasoning was shared by antitrust authorities, including the European Commission, for some time, but it was later noticed that the supply side approach did not have a good theoretical basis (Wright 2012: 28), because it did not relate directly to those parties of the market whose costs and benefits should be balanced, i.e. merchants and consumers. Furthermore banks and payment organisations tended to inflate their costs without providing compelling justification. Therefore the economists and regulators welcomed a new method of MIF assessment developed by Rochet and Tirole (2007, 2011), which was based on retailers' costs and benefits well internalising the position of consumers (for more on the concept of merchant indifference test see section 7). The new method was considered suitable for the purpose of finding a benchmark for interchange fees, promoting the use of more efficient payment instruments and preventing abuses in the market (Börestam and Schmiedel 2011: 19). It is remarkable that international payment organisations agreed for the tourist test methodology in antitrust proceedings undertaken against them by the European Commission (EC vs. MasterCard 2007, EC vs. Visa 2008 cases) and thus withdrew from pushing for the supply side approach.

While theoretical literature on interchange fee models and methods of their assessment flourished, there was not enough empirical research. Models lacked testing (Leinonen 2011: 12, Börestam and Schmiedel 2011: 18). Only lately have some empirical studies been carried out.

In cases against Visa (2008) and MasterCard (2007) the European Commission conducted simplified MIT-compliant calculations on the basis of data collected in cost studies of the central banks in the Netherlands (Brits and Winder 2005, EIM 2007 – see Pleijster and Ruis 2011), Belgium (Bank of Belgium 2005) and Sweden (Bergman *et al.* 2007). Pursuant to calculations MIF benchmarks were defined (0.2% for debit cards, 0.3% for credit cards). The EC did not make the calculations public.

In February 2014 the EC announced preliminary results of its study on merchants' costs of processing cash and card payments, which delivered further evidence supporting the MIF benchmarks set earlier (EC 2014). The EC collected data for this study through a

commissioned survey of more than 250 large retailers in 10 EU member states accounting for approximately 87% of retail turnover in the EEA. The relevant costs applied in the tourist test included labour, service and payment instrument specific equipment costs.

Other empirical studies were performed prior to the above mentioned study of the EC: the Polish one presented in this paper (2012), and the ones carried out by Layne-Farrar (2013) and Jonker and Plooij (2013).

Layne-Farrar compared the interchange fee suggested by the tourist test with that set by the Durbin Amendment (DA) which capped debit card IFs at 21 cents per transaction plus 5% of the transaction amount in the USA. Layne-Farrar made calculations on a case by case basis for a variety of merchants (quick service restaurants, discount stores, supermarkets, retail gas stores, convenience stores, travel retail stores). She found that what mattered mostly in calculations was the average transaction size and an alternative payment instrument to debit cards. For cash-centric merchants the DA cap seemed to be too high or about right (at venues with higher average transaction sizes) while for merchants who honoured cheques the DA cap looked too low. The results imply that cash, unlike cheques, was still a cost competitive instrument compared to debit cards.

Jonker and Plooij using Dutch cost data for 2002 and 2009 showed that for such countries as the Netherlands, characterised by decreasing costs of debit cards and increasing costs of cash, the tourist test methodology may lead to growing costs for merchants, assuming that MSCs would rise along with interchange fees. The MIT conformant level of MIF would grow from 0.2% to 0.5% of the average debit card transaction value. According to Jonker and Plooij the tourist test is not a universal method of MIF assessment for regulatory purposes in all countries since it is heavily dependent on market characteristics. Moreover, what needs to be further researched is the rate of passing through changes of MIFs on merchant and consumer fee levels.

Using tools of econometric modelling Chakravorti *et al.* (2009) demonstrated a positive impact of interchange fee reductions on the growth of card acceptance network in Spain, thus positively verifying the passing through effect. Ardizzi (2013) empirically investigated that decreasing of MIFs in Italy led to a shift towards payment card transactions in lieu of cash at points of sale although he could not affirm that a zero MIF level would be optimal for the development of electronic payments. Some economists went a step further proposing to eliminate interchange fees altogether (Gans 2007, Leinonen 2011). Leinonen argued that MIFs make merchants less willing to promote card payments instead of cash. It is not enough to render merchants indifferent by setting MIFs at the tourist test compliant level. Abandoning MIFs in debit card transactions eliminates cross-subsidisation of cash. Leinonen supports the idea of transparent cost-based pricing. In this respect he is accompanied by numerous other economists who are proponents of changing opaque pricing conventions into more transparent ones (De Grauwe *et al.* 2006, Enge and Øwre 2006, Bergman *et al.* 2007, Humphrey *et al.* 2008, Van Hove 2008).

3. Survey methodology

Data in the study on merchants' costs of accepting cash and card payments in Poland were obtained on the basis of a standardised questionnaire comprising well over 100 detailed questions which were asked in anonymous Computer Assisted Personal Interviews (CAPI) by a professional market research institute.

The survey was carried out in three stages:
1. Stage I – preparation (June - July).
2. Stage II – interviews with merchants (August - September).
3. Stage III – checking and working out the outcomes (October - November).

Apart from work on the questionnaire which was subject to extensive consultations with various market participants (the central bank, commercial banks, acquirers, merchants, consumers), stage I also involved a pilot study, training for pollsters from the research institute and sampling. The sample was selected disproportionately and varied using employment and branch of economic activity criterion. Interviews were held all across Poland (as broken down into 8 macroregions by the Central Statistical Office of Poland, GUS). With the view to ensuring representativeness, the outcomes were weighted with the real structure of business population, based on data provided by GUS and the Polish Classification of Economic Activities 2007 (PKD 2007), reflecting the European Classification of Economic Activities (NACE). The study comprised 7 PKD branches/sections from retail trade and services sector (consumer sale). The businesses were broken down according to employment criterion into small- (employing up to 9 people), middle-sized- (employing from 10 to 49 people) and large enterprises (50 employees and more).

In order to encourage entrepreneurs to provide reliable answers based on financial documents maintained in their companies (invoices, print-outs from sales application, terminal print-outs, contract with acquirer) they were presented a cover letter signed by the parties involved in the project: the National Bank of Poland, Foundation for the Development of Cashless Payments and the Faculty of Management of the University of Warsaw. Before each interview respondents were shown the letter by pollsters. Sometimes the complexity of the study required several contacts with individual businesses to obtain all answers and/or fill out the missing data.

Stage III involved checking the correctness of outcomes (the so called validation), as well as statistical description of respondents' answers and carrying out cost analysis of cash and cards payments based on data obtained in the study.

Pursuant to the study objectives only costs at physical points of sale were estimated, while remote payments were not subject to an in-depth analysis.

According to data of the Central Statistical Office of Poland (GUS) there were a total of 3.9 m businesses in 2011 in Poland. This includes all business entities entered in the REGON register (Register of the National Economy). Depending on the source, the number of active companies on the Polish market was 1.7 − 1.8 m in general, and 1.1 − 1.3 m in the industries covered by the study.

The study sample comprised 1006 companies. Respondents were senior officers responsible or co-responsible for decisions on acceptance of payments methods and related issues (in practice company owners, CFO's, chief accountants, senior managers) who

provided their answers with the support of a salesman/cashier. Sample selection involved stratification by:

        a.   branch of economic activity,
        b.   size of employment,
        c.   territorial distribution.

As it was necessary to draw conclusions with regard to branches (PKD sections) and size of employment, researchers opted for a disproportionate sample structure, meaning that the share of companies from specific branches and of specific size did not reflect the real market structure. Proportional sampling would not have provided the right sample size in all of the strata (branch and size of employment).

Table 1. Studied population size (registered entities) and structure of the study sample by branches

Branch (PKD section 2007)*	Size of business population**	Percentage share of the branch in the whole studied population	Unmodified n: number of enterprises in the sample proportional to the share of enterprises in the population	Actual n in the sample – realised interviews
G. Wholesale and retail trade, repair of motor vehicles and motorcycles	1 060 041	48%	483	345, including 6 interviews with chains
H. Transportation and storage	252 820	11%	111	111
I. Accommodation and food service activities	122 299	6%	60	116
M. Professional, scientific and technical activities	336 822	14%	141	117
Q. Human health and social work activities	193 265	8%	80	109
R. Arts, entertainment, recreation	67 207	3%	30	111
S. Other service activities	235 720	10%	101	97
Sum	2 268 174	100%	1006	1006

* The sample only covered retailers (B2C transactions).
**Population size of companies registered in the REGON register. Branch structure which was used to weigh the data was based on the structure taken from REGON register, which involved all registered entities. Since no other source was available, it was assumed that that the structure of active entities was the same as for all registered companies.

For the total sample of n = 1006 the estimation error was +/-3% with significance level of 95%. Higher share of trade (section G) in the sample was due to a much higher share of businesses from this section in the total population covered by the study, and thus due to the statistical significance of this section as regards the study objectives. The realized sample n=345 provided for a good basis for conclusions, with estimation error of +/- 5.6%. In other branches the share in the sample was similar, which ensured only a slightly higher estimation error (+/- 9%) and a good basis for comparisons between branches.

Table 2. Sample structure by size of employment

Strata by number of employees	Share of enterprises of the same size in the total business population	Unmodified n: number of enterprises in the sample proportional to their share in the total population	Actual n in the sample
- 0-9	90%	905	377
- 10-49	8%	81	378
- 50+	2%	20	251
total	100%	1006	1006

The strata 0-9 employees and 10-49 employees were of equal size which ensured the same estimation error (+/- 5%). The stratum 50 employees and more comprised 251 companies. Estimation error for this sample was +/-6%

A disproportionate sample structure provided for the possibility of inference pertaining to strata by size of employment. If sampling had reflected the real share of enterprises in the total business population, the analysis would have been impossible for middle-sized and large enterprises.

As regards the territorial breakdown, the study covered enterprises from cities of more than 10 000 inhabitants, which account for ca. 72% of the business population in Poland in the investigated sections. The majority of interviews was carried out in cities above 100 000 inhabitants. The sample was representative for the general population of active companies in the indicated branches of economic activity with the exception of rural areas. Territorial division of the sample reflected the distribution of business entities between 8 Polish macroregions. Stratification was proportional in this case.

Data from merchant study were weighted using two criteria: company size (measured by the number of employees) and branch of economic activity. The data thus obtained were representative and it was possible to make reliable inferences on the total population of companies covered by the study.

4. Selected descriptive results

The survey delivered many interesting results, some of which are presented below. The sample consisted of 1003 firms accepting cash and 359 accepting cards (card present transactions).

Figure 2. Payment instruments accepted in C2B transactions in Poland (2012).
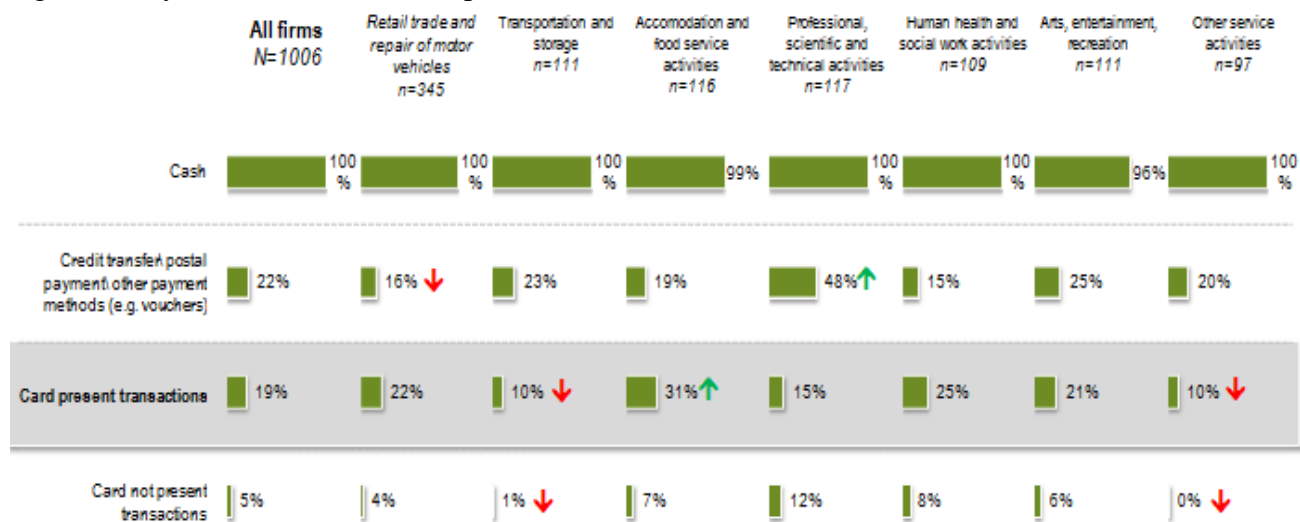
↑↓ statistically significant difference between the total and a given group of companies
Source: Survey results, n=1006.

The goal of the study was to estimate costs of cash and card payments in face-to-face transactions at physical locations. It turned out than only 19% of all merchants in Poland were accepting cards in card present transactions.

Table 3. Comparison of average number of points of sale between all firms and firms accepting cards (2012).

|	Average number of points of sale	Average number of points of sale in small firms up to 9 employees	Average number of points of sale in medium sized firms 10-49 employees	Average number of points of sale in large firms 50+ employees
All firms	1.07	1.03	1.52	4.65
Firms accepting cards	1.31	1.15	1.73	6.53

Source: Survey results, n=1006.

The bigger the firm, the wider was its point of sale network. Companies accepting cards, regardless of their size (small, medium, large):

- had more points of sale,
- were characterised by higher sales and higher number and value of cash transactions

compared to companies which only accepted cash.

Figure 3. Average share of payment methods in the total number of transactions (2011).
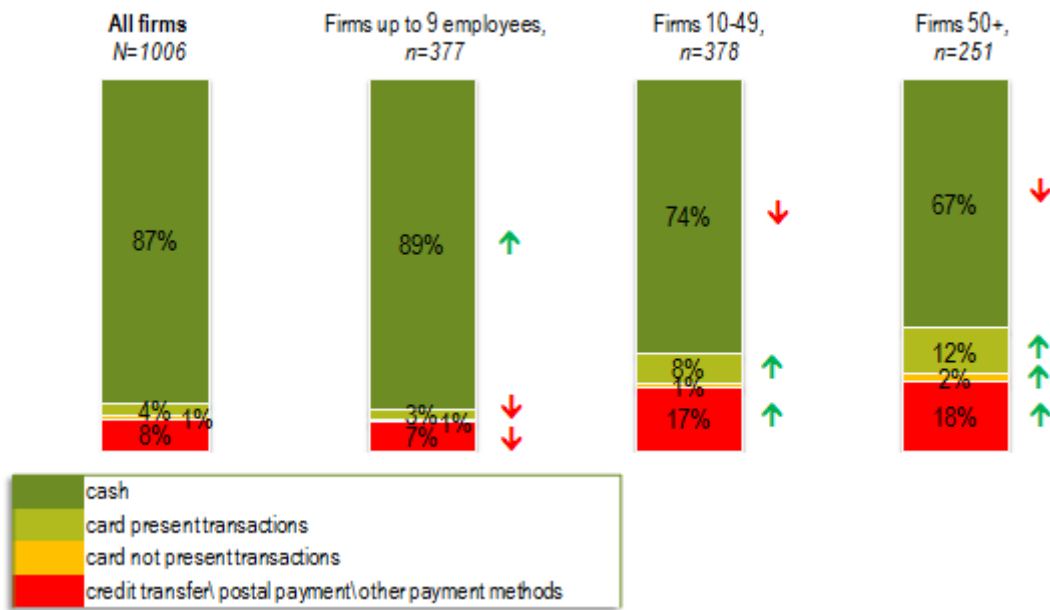
Source: Survey results, n=1006.

According to initial declarations of companies 87% of all transactions in 2011 were made in cash and only 4% with physical use of cards. The share of card transactions rises with the company's size. Companies accepting cards reported higher shares of card present transactions (in total – 71% for cash, 19% for physical use of cards). The declared share of cash in value of transactions was lower than in number of transactions.

After a critical analysis of merchants' declarations, supplemented by additional data and information provided by merchants and external sources it was estimated that in 2011 an average Pole made 326 cash payments with the total value of EUR 2 233 and 26 card payments with the total value of EUR 631. Based on merchant survey data the fraction of cash in the number of consumer-to-business point of sale transactions was 92.6% (7.4% for cards) and 78.3% in value of consumer-to-business point of sale transactions (21.7% for cards).

Table 4. Cash and card quantitative indicators (2011).

|	All firms	Firms up to 9 employees	Firms 10-49	Firms 50+
	Cash N=1003 Card N=359	*Cash n=374 Card n=67*	*Cash n=378 Card n=151*	*Cash n=251 Card n=141*
Average monthly value of **cash** payments per one point of sale	€ 5 492	€ 4 282	€ 13 216	€ 25 344
Average monthly value of **card** payments per one point of sale	€ 4 899	€ 3 649	€ 8 437	€ 9 179
Average monthly number of **cash** payments per one point of sale	798	734	1136	1945
Average monthly number of **card** payments per one point of sale	242	181	379	382
Average value of one **cash** payment	€ 6.89	€ 5.83	€ 11.65	€ 13.11
Average value of one **card** payment	€ 20.24	€ 20.15	€ 22.33	€ 24.03

Note: In 2011 the average EUR/PLN exchange rate in Poland was 4.12. The values provided in the table were converted at this exchange rate and rounded.
Source: Survey results, cash n=1003, card n=359.

As regards all companies the average monthly value of cash payments per one point of sale in 2011 declared in the survey was only little higher than the average monthly value of card payments, but because of bigger discrepancy between the number of average payments with these two instruments, the average value of card transaction was almost three times higher than that of cash transaction (EUR 20 vs 7). In the case of card payments the average value reported for large companies was exactly the same as in the Polish central bank's statistics, which means that most card transactions in Poland are made at points of sale of large companies, such as supermarket chains, warehouses or petrol stations.

When it comes to costs 74% of merchants perceived cards as more costly than cash. Only 6% claimed that cash was more expensive than cards.

Figure 4. Perception of cash and card costs (2012)
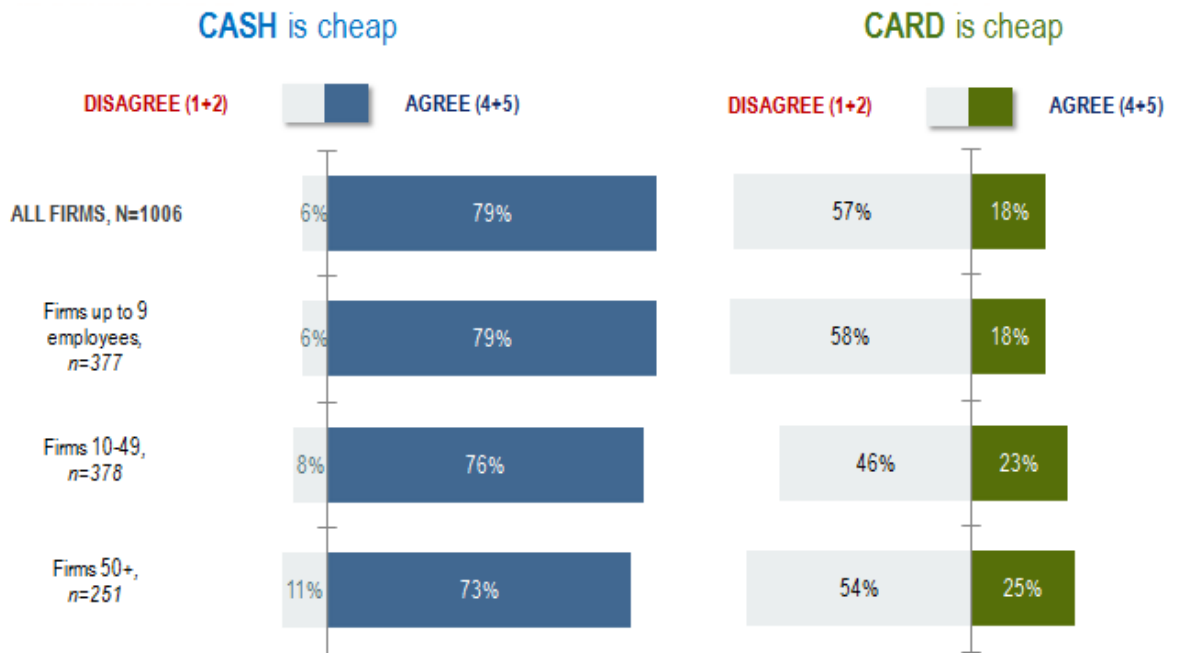
Question: Do you agree that cash/card is cheap: 1 – strongly disagree, 2 – disagree, 3 – neither disagree nor agree / do not know, 4 – agree, 5 – strongly agree.
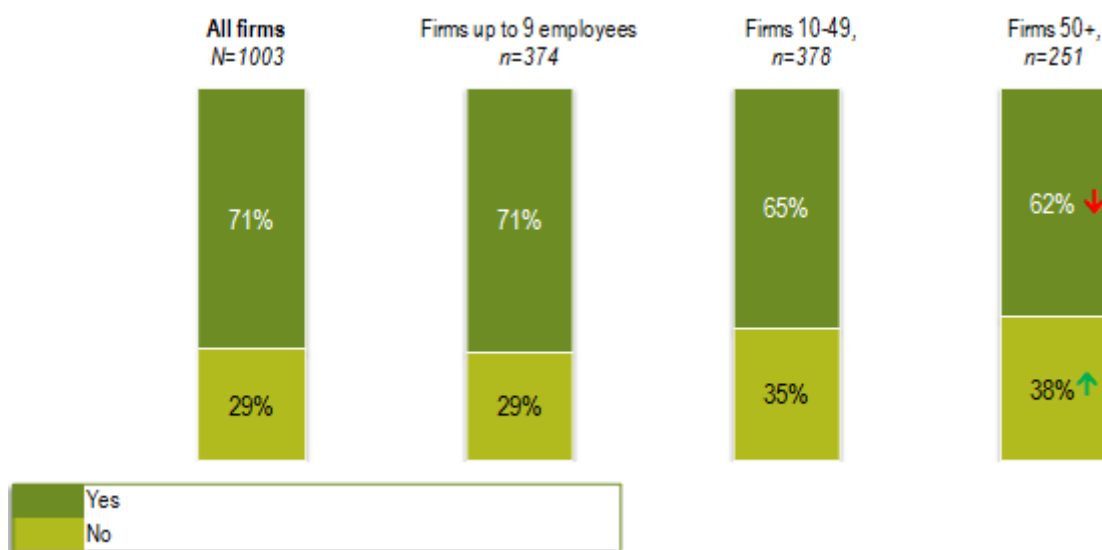Source: Survey results, n=1006.

79% of merchants responded positively to the statement that cash was cheap (with 6% of negative answers), whereas only 18% agreed that card was cheap (and as much as 57% didn't). Bigger companies tended to evaluate cash "cheapness" slightly worse and card "cheapness" slightly better than smaller companies.

The views on safety and convenience of cash and card payments were more balanced, although the Polish merchants had a visibly better attitude toward banknotes and coins. 72% of merchants rated cash as safe, 66% rated cards as safe, 85% rated cash as convenient, 71% rated cards as convenient. Interestingly enough large companies appeared to value cards more as a more secure and convenient payment method.

Almost half of all merchants preferred when clients paid in cash instead of card, only 4% was of an opposite opinion (the rest of merchants did not express a clear preference towards any of payment instruments). The popularity of cash, especially among small companies, could be explained by a number of factors.

Figure 5. Usage of cash in debt repayment to contractors and employees (2012)

71% of merchants declared that they used cash for clearing some of their obligations to business partners and employees. The share of such answers was significantly lower in large companies (by 9 percentage points).

Another answer corresponded with the above declaration. On average 22% of companies stated, that even though they had current accounts at banks, they neither used those accounts for depositing nor withdrawing cash, because they fully recirculated the whole stock of cash. Many companies asserted that they used cash either because of their own preferences or expectations of suppliers and employees. According to answers in the survey cash was sometimes the only possible option for business-to-business or wage payments. The survey did not contain any explicit questions about shadow economy, but these answers cast some light as to why cash payments were desired and popular.

75% of all firms acknowledged that they did not perceive fees for cash withdrawals and deposits as excessive. Merchants thus represent the view that the level of those fees in Poland is adequate. Quite a significant number of merchants – 63% – did not believe that accepting card payments would boost sales. On the other hand more than a half of merchants already accepting cards were convinced that this factor had a positive impact on their revenues.

Cash was considered a faster means of payment than cards. 64% of all firms agreed that on average cash transactions take less time than card transactions in a contact mode (with 10% of opposite opinions), 52% acknowledged that cash was also quicker than proximity payments (with 15% of opposite answers). However, significantly less large companies shared the opinion that contactless card payments were slower than cash (42%).

Merchants who stated in the 2012 survey that in a forthcoming year they would not start accepting cards (76% of all respondents), cited a few arguments behind their approach, with the most important ones being:

- excessive costs of cards (52% of companies),

- lack of evident benefits from accepting cards (41% of companies),
- lack of interest of clients in paying with cards (30% of companies).

The surveyed merchants declared almost no costs associated with frauds on cash (counterfeiting, theft, robbery). Even if they reported some incidents, they claimed they had not suffered financially as a result. It should be underlined, however, that merchants also declared minor losses on card frauds, which could in effect be considered negligible as well. Macro statistics from external sources confirm that Poland stands out positively in Europe regarding fraud rates on cash and cards.

Issues that companies regarded as important in their decision to start accepting card payments were: various costs of card acceptance, but also the security of payments, considerable number of clients willing to execute card payments, duration of a payment transaction, acceptance of cards by competition.

Figure 6. Rate of blending in merchant service charges (2012).
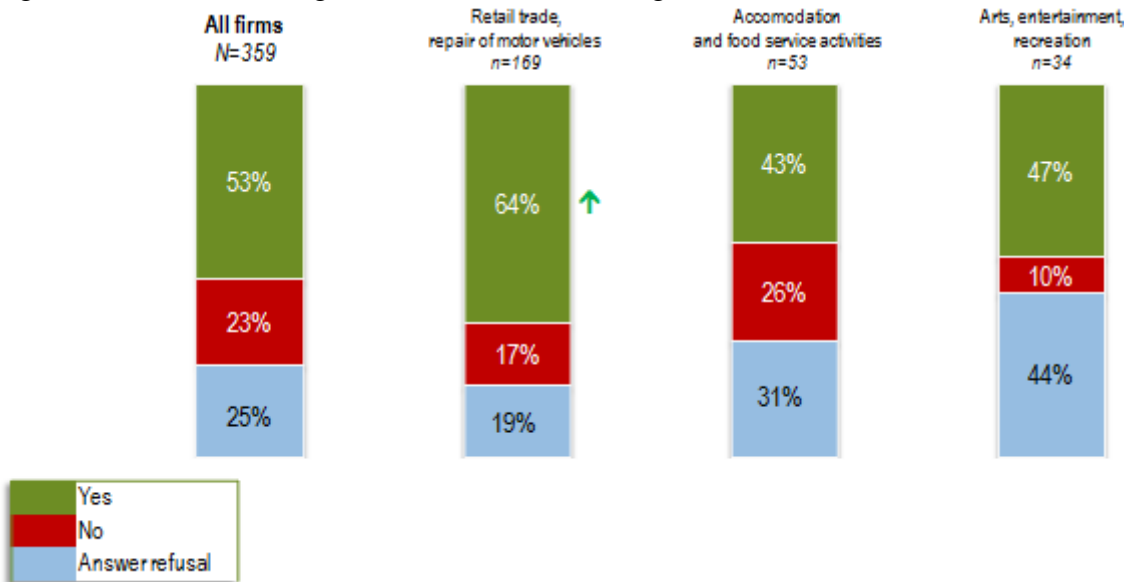
↑↓ statistically significant difference between the total and a given group of companies
Source: Survey results, n=359.

According to declarations of merchants in 2012 53% of them had contracted a blended (single) merchant service charge (MSC) rate for all card transactions. Retail trade and repair of motor vehicles sector featured an even higher rate of blending (64%).

Table 5. Average level of blended MSC (2012)

|	All firms	Firms up to 9 employees	Firms 10-49	Firms 50+
Blended MSC	1.82%	1.85%	1.76%	1.70%

Source: Survey results, n=359.

Pursuant to survey results the average blended MSC rate in 2012 was 1.82%. Larger companies reported lower rates of blended MSC rates. Some firms declaring blending (63%) claimed that the fee rate also included a flat component. With regard to all firms a flat fee

component amounted to 4.6 eurocents (small companies – 5.1 eurocents, medium companies – 3.6 eurocents, large companies – 1.9 eurocents).

Businesses were also asked about the level of an acceptable and desirable MSC. Two charts below exhibit cumulated acceptance of the MSC in given intervals. The width of intervals (except for the highest one) was set at 0.25 percentage points. The first chart below shows answers for all companies accepting cards, the second – for companies which claimed in 2012 that they did not want to start accepting cards within the next year because of the cost barrier.

Figure 7. Acceptable level of MSC – for all companies accepting cards (2012)
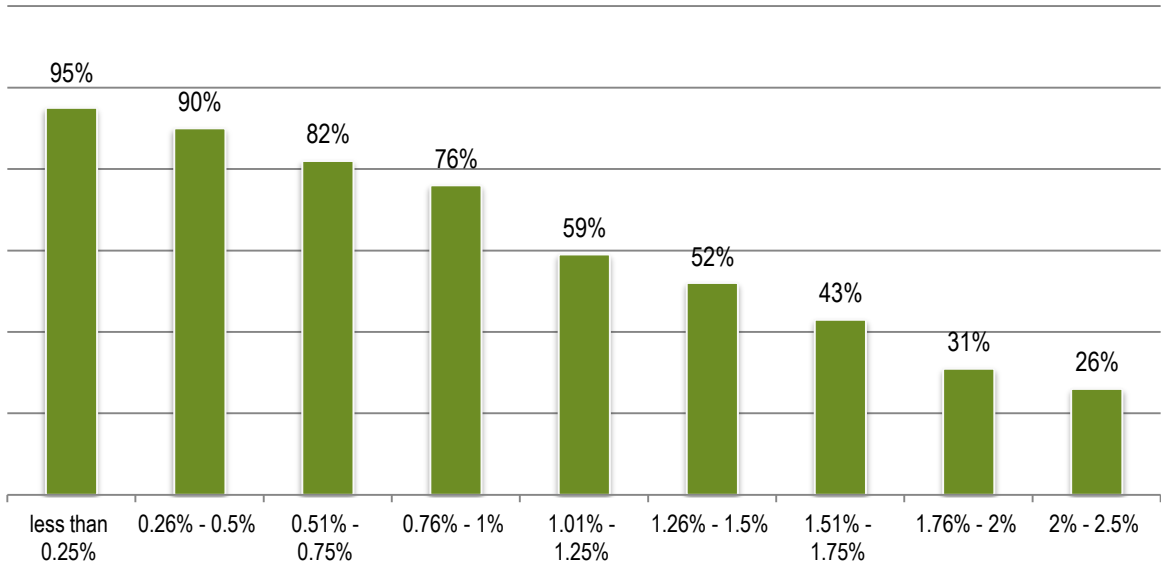
Source: Survey results, n=359.

The highest increase in the preferences of businesses occurred at the transition level from 1.01% - 1.25% to 0.76% - 1% (a leap from 59% to 76% of companies accepting a given level). Moreover, 82% of merchants already honouring cards deemed a tier of the MSC in the range of 0.51% - 0.76% appropriate and desired. An interchange fee is a component of the MSC. Therefore, in accordance with preferences of businesses its level should be respectively lower by the acquirer mark-up including scheme fees paid to payment organisations. It can be estimated that a tier of interchange fees satisfying 76% - 82% of merchants already accepting cards should have been in the range of 0.5% - 0.75% in 2012. One should note, however, that responses were given at a time when Polish IFs and MSCs ranked highest in the EU.

Figure 8. Acceptable level of MSC – for companies not willing to start accepting cards within the next year and perceiving card costs as a barrier (2012)
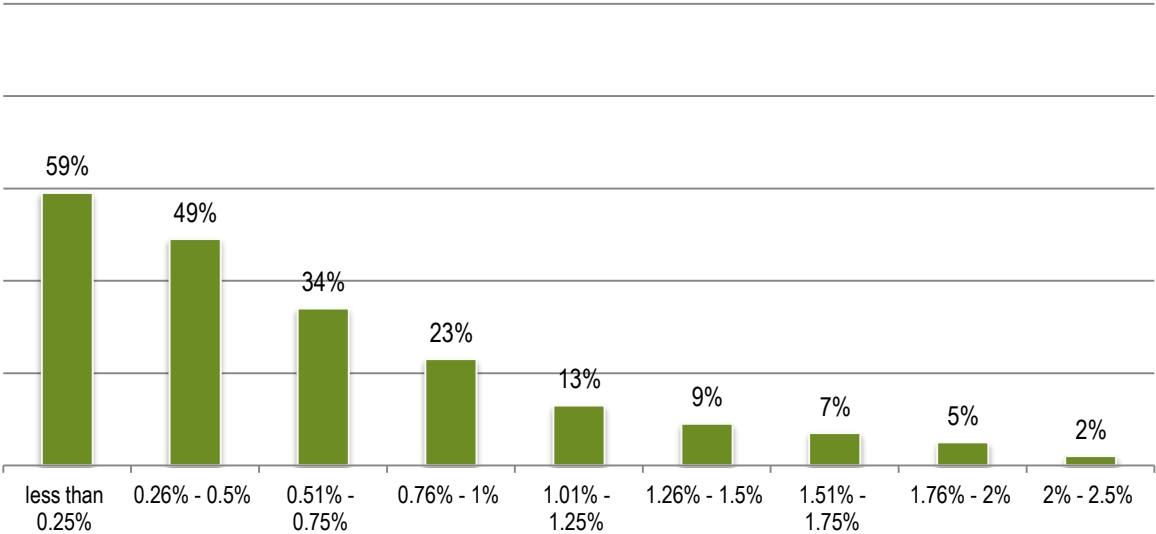
In 2012 the price elasticity to MSCs for merchants not willing to start accepting cards and indicating costs as a barrier was much higher than for those who were already at that moment allowing for payments with this instrument. The acceptance level regarding any MSC was low. Only an MSC below 0.5% would encourage half of the surveyed retailers to begin accepting card payments. As a result it could be argued that IFs sufficiently incentivising the expansion of payment terminal network in Poland should be even below 0.25%.

Tests of price elasticity undertaken in the survey proved that every decrease in interchange fees would stimulate the growth of payment card acceptance network, but *ceteris paribus* highly dynamic changes in number of terminals could only happen when reductions of MSCs (and underlying IFs) were more profound.

High costs of card acceptance and good perception of cash influenced payment habits of Polish retailers. In 2012 almost 30% of all firms accepting cards declared that they offered rebates for cash payments at least from time to time. Large merchants were less willing to do so, only 15% in that group confirmed offering rebates to clients performing cash payments. In most cases rebates were offered occasionally, not permanently, although 30% of retailers in this subgroup said they were frequently inducing clients to make cash payments by offering discounts. On the other hand, Polish firms did not surcharge clients in face-to-face transactions – positive answers to a question about this practice oscillated around the survey's margin of error (1%).

It seems that another practice of Polish merchants was more prevalent – limitations of card payments below a certain threshold value. More than one quarter of companies active in retail trade acknowledged that they prohibited clients from paying with cards when the amount of transaction was too low (in 90% of cases the limit was set at about EUR 5). Unlike rebates, this practice clearly in breach of payment organizations rules was almost always in place and supposedly must have been accepted by clients.

The internalisation level of different costs was not the same. It appeared that some cost items were disregarded by merchants.

Figure 9. Is float cost in card payments treated as an opportunity cost of lost interest? (2012)
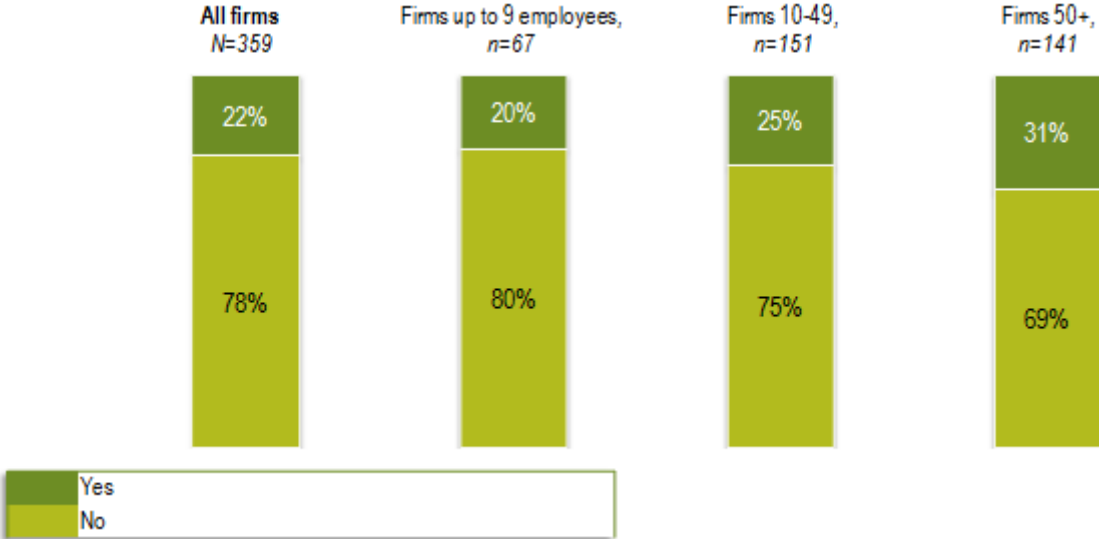
One in five companies did not consider the time between a card transaction at their point of sale and a moment of crediting their bank accounts as an opportunity cost of lost interests on money in float. The awareness rose with the size of company.

Figure 10. Is counting, sorting and packing of cash treated as cost? (2012)
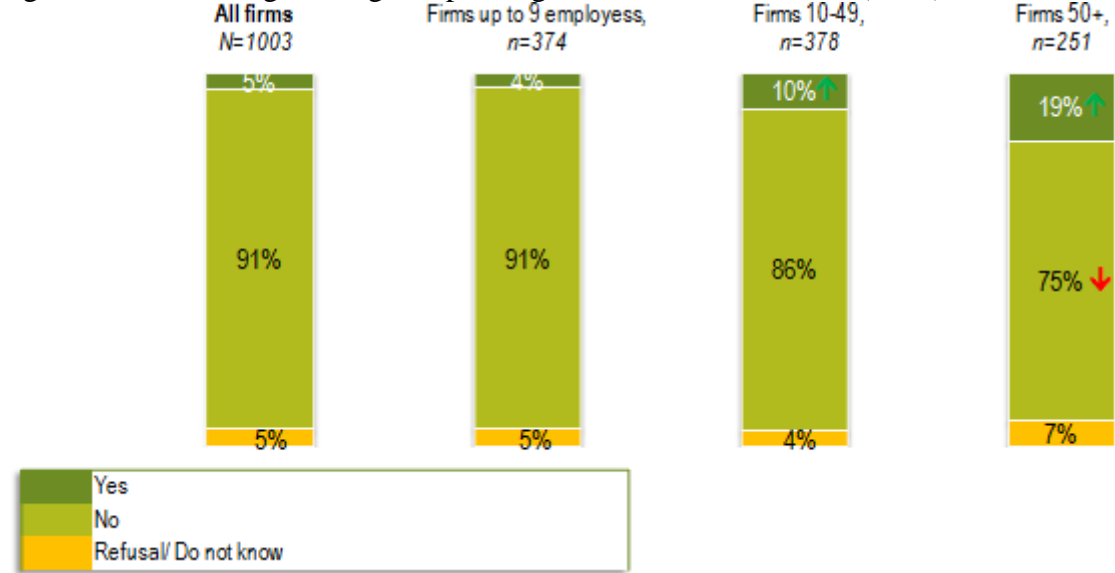
As many as 91% of retailers did not treat cash handling activities such as counting, sorting and packing of banknotes and coins as cost. Among large companies, which had more points of sale (nearly 5 on average) these activities were recognised as cost by 19% of merchants.

4. Cost items investigated

The study distinguished 9 pecuniary cost items and 4 non-pecuniary costs of each payment instrument (cash and cards). According to the survey results not all cost items turned out to be equally important. Therefore, some of them were not used in basic-scenario cost calculations but they were discussed in additional complementary analyses. Pecuniary cost items were costs associated with charges and tariffs, costs of depreciation, foregone interest (opportunity costs) and financial losses as a result of fraud, counterfeiting or theft (see "Glossary of cost definitions"). Non-pecuniary cost items were related entirely to time costs associated with labour time of staff employed (front and back office labour costs). Non-pecuniary cost items required conversion into monetary terms by multiplying labour time with average hourly gross wage rate of employees.

Respondents were asked to report for 2011. Questions referred either to one or all points of sale of a company and different time periods. However, all final calculations were made for one month and one point of sale of a representative company (compare information on sampling). The average values were calculated for series of quantitative variables after cutting off top five percentile of outliers on each side of the distribution (together 10% of the most outlying values).

Apart from distinguishing between private/social, pecuniary/non-pecuniary, external/internal costs, it was necessary to make other technical cost divisions. Therefore costs were split into fixed and variable, total and marginal (see "Glossary of cost definitions"). Assuming one year time horizon facilitated defining fixed or variable nature of costs.

In the study credit and debit cards were treated jointly, because from the perspective of merchants this division was not relevant in the cost context and because it was hardly possible. The level of the MSC and the corresponding IF could be the only cost differentiating item between credit and debit cards. Untypically, in Poland IFs for debit card-based transactions were often higher than for credit card-based transactions (especially in the case of Visa cards). It can also be argued that the duration of a payment transaction is important. However, other card distinctions appear to be more significant as regards the duration of a card transaction (such as for example the distinction between contactless/PIN-based/signature-based cards, etc.).

Table 6. Pecuniary and non-pecuniary cost items of cash.

Pecuniary items		Non-pecuniary items	
cost item	economic significance for a merchant	cost item	economic significance for a merchant
cost of cash open and closed deposits	++	cost of payment tender time (front office)	++
cost of cash open and closed withdrawals	++	cost of cash handling time (back office)**	++
total cost of cash*	+	cost of cash reconciliation time (back office)	+
cost of cash handling equipment	−	time cost of travels to a bank and back (back office)	+
cost of armoured car services (Cash-In-Transit)	+		
cost of counterfeited notes and coins	−		
cost of mistakes in giving change	−		
cost of thefts and robberies	−		
cost of insurance against cash thefts and robberies	−		

* used as a control position, ** counting, sorting, packing, counterfeit checking, preparing cash for cash deposits (open or closed), preparing denominations for cash registers, changing cash in other stores when there is lack of particular denominations of notes and coins at cash registers, possibly time of supplying needed denominations to cash registers in other ways, other time costs.
"+" indicates high significance, "−" indicates low significance

Costs of cash open and closed deposits/withdrawals appeared to be the major pecuniary cost for merchants. Cash open deposits/withdrawals differ in such manner from cash closed deposits/withdrawals that cash is not sorted and securely packaged. Cash withdrawals were generally cheaper than cash deposits for merchants due to lower fees resulting from lower internal bank labour costs. In several Polish banks cash deposits and withdrawals for firms were free of charge. 22% of companies declared that they did not bear any pecuniary costs of cash deposits and withdrawals, because they used the entire cash stock for paying contractors or employees, or kept it. The declared average share of cash deposited in a bank was 53%.

Only 2% of merchants reported bearing the costs of cash handling equipment (the fraction was higher in large companies). 4% of all merchants used external cash transport services (24% in a group of large companies). Costs of armoured car services were quite significant for merchants who incurred them, but this cost item must have been treated as alternative to time cost of travels to a bank and back. Most of firms in Poland (especially small and medium-sized ones) delivered cash to banks on their own. Therefore, a representative business was regarded as bearing this non-pecuniary cost and not the cost of CIT services.

Polish enterprises did not suffer from counterfeit banknotes and coins. 10% of merchants acknowledged mistakes in giving the change but it turned out that on average it didn't bring them neither losses nor profits. 1% of firms informed about theft and robbery incidents but only 0.2% of firms reported losses due to such incidents. In the remaining cases companies managed to avoid financial consequences because they were protected by

insurance or in a different way. 16% of all enterprises (46% of large firms) possessed an insurance policy which covered a wide range of events linked to property losses. For that reason cost of insurance against cash theft could not have been deemed important for a representative business and was negligible.

Costs associated with labour time of employees – front and back office non-pecuniary costs – were important, although not internalised by merchants. Cash handling and tender payment time consumed internal resources of companies.

Table 7. Pecuniary and non-pecuniary cost items of payment cards.

Pecuniary items		Non-pecuniary items	
cost item	economic significance for a merchant	cost item	economic significance for a merchant
cost of renting payment terminals	+	cost of payment tender time (front office)	++
cost of payment authorisations (telecommunication costs)	+	time cost of payment terminal operations*** (back office)	++
merchant service charge, MSC (including interchange fee)	++	time cost of contacts with an acquirer service and of disputes with clients**** (back office)	+
other costs**	+	cost of time when a terminal is down due to a breakdown	–
total cost of payment cards*	+		
cost of adjustment to Payment Card Industry Data Security Standards (PCI-DSS)	–		
cost of card frauds	–		
cost of disputes and chargebacks	–		
cost of float (opportunity cost)	–		

* used as a control position, ** costs of: payment terminal service, voice and fax authorisations, revoked authorisations, logo on slips, additional software, change of time of sending files for settlement, for resending files for settlement, for sending monthly statements of card transactions, etc., *** preparing, switching on and off, changing terminal paper rolls, reconciliation, verification of errors, etc., **** calls to an acquirer service due to malfunctioning of terminals (e.g. problems with authorisations), resolving disputes of clients revoking payments and willing to execute chargeback.
"+" indicates high significance, "–" indicates low significance

Also in the case of cards, front and back office time costs proved to be economically significant, but with some exceptions. Situations when a payment terminal was down in a reported year were only declared by 16% of companies.

On the other hand, some pecuniary costs of cards were very high. MSCs constituted the dominant expense for merchants. But also costs of renting terminals appeared to be significant. As regards telecommunication costs many Polish merchants (36%) were still using dial-up terminal types in 2011 and 2012, which generated a variable cost whenever a card payment authorisation took place. However, this type of terminal has gradually been

replaced by newer ones and at the same time the usage of high-speed Internet in Poland has increased.

Other costs relating for example to charges for additional payment terminal software, change of time in sending files to clearing and settlement of transactions, logotype on slips, monthly statements of card transactions were of moderate economic significance to merchants. Concerning another indirect cost of cards, only 2% of companies asserted they bore costs of adjustment to PCI-DSS security standards (more in a group of large companies).

Only 3% of merchants informed about cash fraud incidents such as for example the willingness to use or even actual usage of fake and stolen cards. 57% of companies did not declare costs of disputes and chargebacks, although some of large merchants reported considerable losses owing to chargeback. Nevertheless chargebacks appeared to be more a problem in remote transactions, hence corresponding costs could have not been attributed to costs of face-to-face card transactions.

According to survey results in 2011 companies in Poland waited on average almost 3 days for money transfer to their current bank account. However, as shown earlier, merchants were not so much perceiving costs of card float as important in their profit and loss account. In a complementary analysis this card cost item could be used for comparisons with cost of foregone interest on cash holdings. However, it should be remembered that cash in possession of merchants served transactional purposes to pay back debts to business partners and employees. Merchants held voluntarily about half of their stock of cash and did not deposit it to bank accounts. Analysing opportunity costs of cash compared to deposit money, it is worth noticing that many demand deposits are kept on accounts which are non-interest bearing.

All pecuniary and non-pecuniary cost items were evaluated in terms of their nature. For example costs of renting payment terminal were treated as fixed, merchant services charges were variable linked to value of transaction (percentage fee component) and variable linked to number of transaction (flat fee component). Costs of cash deposits and withdrawals were qualified as variable changing with value of transactions. Payment tender time of cash and card was considered to be fully variable depending on the number of transactions. Some cost items relating e.g. to back office costs of cash posed problems with regard to defining their nature – whether they were fixed, variable by number or value and required an arbitrary expert decision benchmarked to merchants' declarations and different cost studies.

6. Cost calculations of cash and card payments

Calculations of cash and card payment costs were conducted for different cases based on the survey results. Part of them is briefly presented below.

Tabela 8. Selected cash and card statistics used in cost calculations (2011).

	All firms	Small firms	Medium firms	Large firms
Average monthly value of **cash** payments per one point of sale	€ 5 492	€ 4 282	€ 13 216	€ 25 344
Average monthly value of **card** payments per one point of sale	€ 4 899	€ 3 649	€ 8 437	€ 9 179
Average monthly number of **cash** payments per one point of sale	798	734	1136	1945
Average monthly number of **card** payments per one point of sale	242	181	379	382
Average value of one **cash** payment	€ 6.89	€ 5.83	€ 11.65	€ 13.11
Average value of one **card** payment	€ 20.24	€ 20.15	€ 22.33	€ 24.03
Number of **cash** deposits a month	6.73	6.41	9.11	12.23
Number of **cash** withdrawals a month	4.05	4.03	4.16	4.70
Average number of employees transporting **cash** to a bank	1.01	1.00	1.26	1.35
Average percentage of **cash** deposited at a bank	53%	52%	61%	64%
Percentage of firms declaring the use of an external money transport service	4%	3%	10%	24%
Average time of single travel to a bank and back (in minutes)	23.56	23.78	21.37	23.19
Average hourly gross wage rate of a cashier	€ 2.56	€ 2.50	€ 3.00	€ 3.08
Average hourly gross wage rate of a manager	€ 3.96	€ 3.83	€ 4.82	€ 5.14

Source: Survey results, cash n=1003, card n=359.

Different cash and card statistics served as a basis for cost calculations. It can be easily noticed that the results for all companies are mostly similar to those of small companies. This is due to research assumptions including weighting. In 90% of cases a representative business was a small company employing up to 9 people. The bigger the company, the higher the values of different statistics.

The presented statistics influenced the cost calculations. In the case of cash, pecuniary costs must have been low on average, because of a couple of factors. The declared mean share of cash deposited in bank was 53%. 22% of firms said they did not deposit or withdraw money at all. Only 4% of companies declared they paid a CIT company for transporting their cash. Therefore, initial declarations made by firms in the introductory part of the questionnaire reflected the reality well. Subsequent cost calculations taking into account additional data and information from the survey did not diverge much.

Table 9. Pecuniary costs of cash according to introductory declarations of companies (2011)

	All firms	Small firms	Medium firms	Large firms
Declared average monthly cost of cash per one point of sale	€ 5.79	€ 4.89	€ 14.68	€ 24.84
Average cost per one cash transaction	€ 0.007	€ 0.007	€ 0.013	€ 0.013
Average cost per one euro of cash sales	0.11%	0.11%	0.11%	0. 10%

The average pecuniary cost of one cash transaction amounted to about 1 eurocent and 0.1% of cash turnover. The cost per number of cash transactions was a bit higher in large than in small companies whereas in cash sales it was a little lower. The reported cost of cash can be entirely associated with fees charged by banks on cash deposits and withdrawals.

Table 10. Cost calculations of internal and external cash transport (2011)

		All firms	Small firms	Medium firms	Large firms
Cost of monthly external CIT cash transport per one point of sale		€ 65.40	€ 63.35	€ 80.50	€ 102.76
Cost of monthly internal cash transport per one point of sale		€ 18.93	€ 18.11	€ 29.03	€ 44.25
Cost of external CIT cash transport	per one cash transaction	€ 0.082	€ 0.086	€ 0.071	€ 0.053
	per one euro in cash sales	1.19%	1.48%	0.61%	0.41%
Cost of internal cash transport	per one cash transaction	€ 0.006	€ 0.006	€ 0.006	€ 0.006
	per one euro in cash sales	0.34%	0.42%	0.22%	0.17%

Costs of both internal and external cash transport turned out to be higher than costs of cash deposits and withdrawals. The cost of own money transport appeared to be about 60% lower than that of an external one judging by its share in the value of sales (0.34% versus 1.19%). In large companies the cost per both turnover and number of transactions was relatively lower than in small companies. Calculations were heavily driven by the number of trips with cash to a bank and back. Especially in the case of external cash transport this factor impacted the level of costs. The calculations did not cover all aspects (such as for example the risk factor or the cost of car depreciation) which could have potentially been taken into account and could have increased the competitiveness of external money transport services. However, cost calculations explain very well why (especially small) businesses preferred to transport cash by themselves.

Similarly to cash also pecuniary costs of cards were calculated.

Table 11. Calculations of pecuniary card costs – the most representative case (2011).

	All firms	Small firms	Medium firms	Large firms
Average monthly value of card payments per one point of sale (a)	€ 4 899	€ 3 649	€ 8 437	€ 9 179
Average monthly number of card payments per one point of sale (b)	242	181	379	382
Merchant Service Charge – flat fee component (α)	€ 0.05	€ 0.05	€ 0.04	€ 0.02
Merchant Service Charge – percentage fee component (β)	1.82%	1.85%	1.76%	1.70%
Cost of renting payments terminals	€ 16.17	€ 16.42	€ 15.75	€ 18.05
Cost of payment authorisations	€ 7.36	€ 7.39	€ 6.21	€ 5.39
Other card costs	€ 13.85	€ 12.86	€ 18.13	€ 7.55
Cost of Merchant Service Charge*	€ 91.34	€ 69.13	€ 151.34	€ 157.29
Sum of card costs	€ 128.73	€ 105.81	€ 191.43	€ 188.28
Total average card cost per one transaction	€ 0.53	€ 0.58	€ 0.50	€ 0.49
Total average card cost per one euro in card sales	2.63%	2.90%	2.27%	2.05%
Share of MSC in total card costs	71%	65%	79%	84%
MSC after inclusion of a flat fee component	1.86%	1.89%	1.79%	1.71%

* Calculated on the assumption that a flat fee component, regardless of a company size, occurred in 20% of transactions: $0.2 \times \alpha \times b + \beta \times a$.

In this case all major pecuniary costs of card payments were included. The average total cost per one transaction amounted to EUR 0.53 which accounted for 2.63% in card sales. Costs fell proportionally to the size of companies. On the other hand, the share of the MSC for all businesses was 71% but for larger companies it was higher (84% with regard to firms employing more than 50 people).

It is worth bearing in mind, that in this case businesses represent an average for the whole market (in terms of studied PKD sections of merchants actively selling products and services to consumers). Costs may differ depending on the branch of activity or business size. Some items may not be present at all, while others may be more or less pronounced with a different share in total costs for business.

Beside pecuniary costs of cash and cards, there are also non-pecuniary costs – front and back office costs. Front office costs fully ensue from time of purchase transactions at the cash register. Hence a faster payment instrument is more efficient for merchants, because it accelerates sales and generates lower costs. Payment tender time costs are in 100% variable linked to number of transactions. Back office costs stem from numerous activities necessary to facilitate cash and card transactions. They are more diverse in nature than front office costs.

Comparing costs of front office tender time, cash still ranked better than cards. According to empirical chronometric research conducted in Poland in grocery convenience stores on the basis of 3700 transactions (Polasik and Górka *et al.* 2013), statistically a standard (not proximity) card transaction lasted about 50% longer than cash transaction (29 seconds for cash vs 43 seconds for a card). The European Central Bank studies confirmed this difference in payments tender time, although its adopted average durations of cash and card transactions were shorter – 22 seconds for cash, 29 seconds for debit card and 31 seconds for

credit card (Schmiedel *et al.* 2012: 34). A measurement of payment time made by the British Retail Consortium produced similar results to the Polish research − 32 seconds for cash, 41 seconds for card (BRC 2012: 4).

The below payment tender times are quantified and presented according to the Polish study but later the European Central Bank's estimations are also applied to further cost calculations.

Table 12. Front office payment tender time costs of cash and card (2011)

	All firms	**Small firms**	**Medium firms**	**Large firms**
Tender time of one cash payment in seconds	29	29	29	29
Tender time of one card payment in seconds	43	43	43	43
Total time of cash payments a month per one point of sale in hours	64.27	59.14	91.50	156.64
Total time of card payments a month per one point of sale in hours	28.90	21.63	45.29	45.63
Average hourly gross wage rate of a cashier	€ 2.56	€ 2.50	€ 3.00	€ 3.08
Tender time of cash payments per one point of sale a month*	€ 164	€ 148	€ 275	€ 482
Tender time of card payments per one point of sale a month *	€ 74	€ 54	€ 136	€ 141
Average tender time cost per one cash payment	€ 0.21	€ 0.20	€ 0.24	€ 0.25
Average tender time cost per one card payment	€ 0.31	€ 0.30	€ 0.36	€ 0.37
Average tender time cost per euro of cash sales	2.99%	3.44%	2.08%	1.90%
Average tender time cost per euro of card sales	1.51%	1.48%	1.61%	1.53%

* cost computed by multiplying the average hourly gross wage of a cashier by the monthly tender time of cash/card payments.

Selling merchandise requires accepting a method of payment. It is a *sine qua non* condition of trade. Payments are an inherent component of sales. However, processing of payment transactions generates high labour costs. According to calculations made under the aforementioned assumptions in 2011 in Poland payments in cash lasted as many as 64 hours and cost EUR 164 per one point of sale a month. Payments with cards, mainly because of lower number of transactions, were shorter − 29 hours and cost EUR 74 but their unit costs were higher compared to cash (EUR 0.31 vs EUR 0.21). Unit costs of cash and card payments, increasing with the size of companies, emerge as a consequence of rising average hourly gross wage of cashiers. On the other hand, due to higher values of card transactions average tender time costs per one euro in sales were much lower for cards than for cash (1.15% vs 2.99%).

Table 13. Comparison of back office handling costs of cash and cards (2011)

	All firms	Small firms	Medium firms	Large firms
Average monthly cash handling time* together with cash transport time per one point of sale in hours	13.4	12.6	19.5	24.5
Average monthly card handling time per one point of sale in hours**	5.8	5.5	7.3	9.2
Difference between cash and card handling costs a month in hours	7.5	7.1	12.2	15.3
Average cash handling time cost per one cash transaction	€ 0.061	€ 0.061	€ 0.077	€ 0.061
Average card handling time cost per one card transaction	€ 0.072	€ 0.089	€ 0.069	€ 0.089
Average cash handling time cost per euro of cash sales	0.88%	1.05%	0.66%	0.47%
Average card handling time cost per euro of card sales	0.36%	0.44%	0.31%	0.37%

* counting, sorting, packing, counterfeit checking, preparing cash for cash deposits (open or closed), cash reconciliation, preparing denominations for cash registers, changing cash in other stores when there is lack of particular denominations of notes and coins at cash registers, possibly time of supplying needed denominations to cash registers in other ways, other time costs

** preparing, switching on and off, changing terminal paper rolls, other terminal related service activities, reconciliation of payments and verification of errors, calls to an acquirer service due to malfunctioning of terminals (e.g. problems with authorisations), resolving disputes of clients revoking payments and willing to execute chargeback

A comparison of back office costs pertaining to cash and cards revealed higher consumption of resource costs resulting from banknotes and coins handling. The difference applicable to all firms was 7.5 hours in favour of cards, rising with the size of a company. Time of cash handling also included time of internal money transport (all firms – 4.2 hours, small firms – 4.1 hours, medium firms – 4.7 hours, large firms – 6.5 hours). However, owing to a higher number of cash than card transactions after computing costs on a per transaction basis cash came out as cheaper than cards (6 vs 7 eurocents). Owing to higher value of card than cash transactions, the relation was advantageous for cards in terms of turnover (0.36% vs 0.88%).

Staff costs were quantified in monetary terms with hourly gross wage rates of salesmen and managers depending on who executed particular activities. An effort was put not to double count the same time.

It should be underlined that in the case of back office activities the compared cost items are different in nature. Back office costs of cash are both fixed and variable, but changing with a transaction value (rather than number). The bigger the value of sales, the more time needed to handle cash. Back office costs of cards are both fixed and variable, but changing with the number of transactions (rather than value). The value of card transaction, unlike the number, does not affect the time of card handling. Due to the role of electronic

infrastructure more back office costs of cards are fixed. It was therefore assumed, after benchmarking to opinions of merchants and to other cost studies (Brits and Winder 2005: 43, Bergman *et al*. 2007: 15-16, Pleijster i Ruis 2011: 20) that 50% of card back office costs was fixed in nature and 50% variable – linked to number of transactions, whereas 30% of cash back office costs was fixed in nature and 70% variable – linked to value of transactions. The cost of cash transport was treated as fixed (later in one of scenarios involving the tourist test application this assumption was relaxed).

Subsequently using the algorithm $\alpha + \beta \times x$ (where α – variable cost per one additional cash/card transaction in euro, β – variable cost per euro of additional cash/card turnover, x – value of cash/card transaction) the marginal non-pecuniary (internal) functions of cash and card from the merchant's perspective could have been set in order to define threshold values.

Figure 11. Non-pecuniary (internal) marginal functions of merchants' cash and card costs – case I (2011)
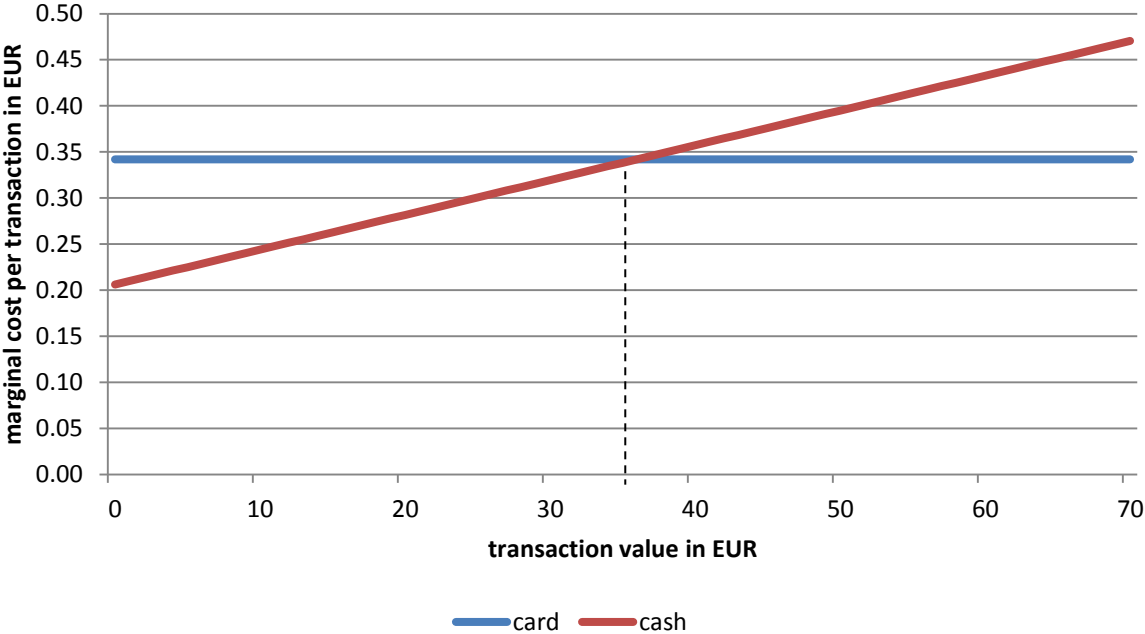
Note: Duration of cash payment 29 s., duration of card payment 43 s. (Polish estimations)

Figure 12. Non-pecuniary (internal) marginal functions of merchants' cash and cards costs – case II (2011)
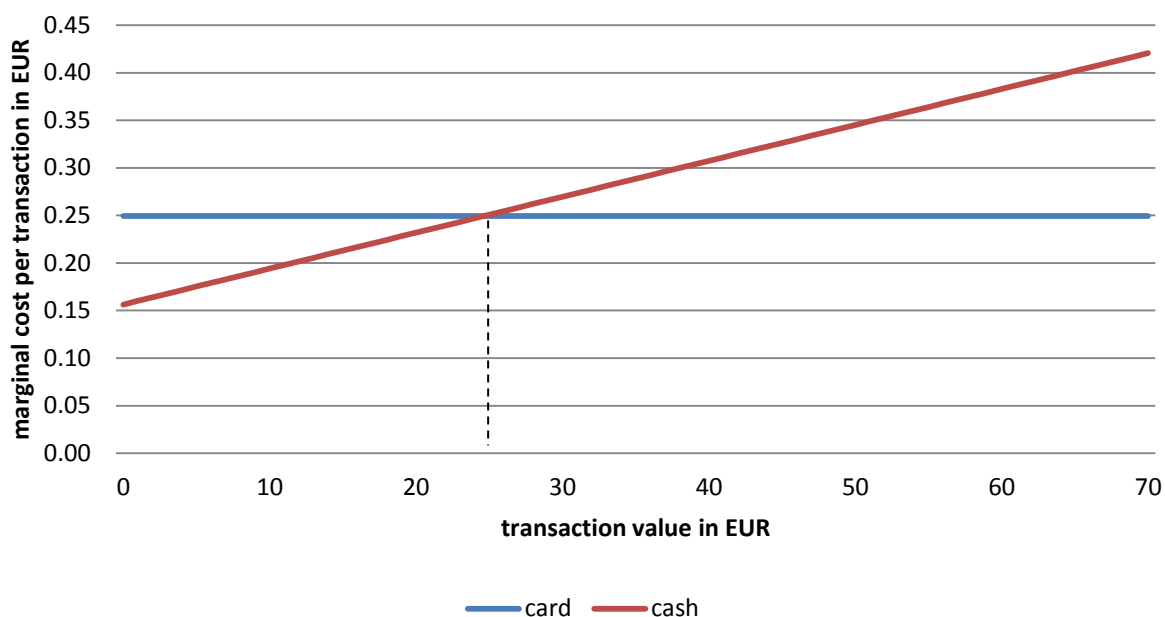
Note: Duration of cash payment 22 s., duration of card payment 30 s. (ECB estimations).

The two cases presented above differ between each other only in terms of one input variable – average duration of cash/card payment transaction.

In the first case EUR 36 is a threshold transaction amount at which cash becomes more expensive than card concerning marginal (variable) internal costs of merchants. In the second case the break-even amount is lower (EUR 25). Irrespective of the amount, the marginal cost of card was the same (34 eurocents in the first case, 25 eurocents in the second case). On the other hand, marginal cost of cash increased, because of the positive β parameter of the function (variable costs linked to value of transaction).

Front office costs accounted for a significant share of non-pecuniary costs of merchants. In the first case estimations of tender time costs were based on data from grocery stores (Polish digital chronographic measurements). Extrapolating results to all branches of economic activity justified adopting the European Central Bank's estimations, which were also used in the tourist test application.

Non-pecuniary internal merchants' costs constitute a fraction of social costs. Pursuant to the above calculations of card costs one could argue that in order to keep convergence between social and external private costs the charged fees, including the merchant service charge, should be set as flat rather than percentage rates. This would be beneficial for retailers as regards transactions of higher value, and quite on the contrary as regards transactions of lower value.

Before the application of the merchant indifference test one can draw brief conclusions regarding levels of cash and card costs in Poland.

After computing pecuniary costs of cash in several scenarios, it turned out that:
- on average cost of cash deposits and withdrawals varied between EUR 0.007 and 0.015 per one cash transaction with an average value of EUR 6.89 (0.1%

to 0.21% of cash sales' value – with the lower limit being most representative for merchant population in Poland),

- costs of own money transport were cheaper than the use of an external service provider.

After computing pecuniary costs of cards in several scenarios, it turned out that:

- the average share of the MSC in all pecuniary costs of a merchant accounted for about 71% and an average blended MSC percentage level was about 1.82% of the payment transaction value,
- average total costs per card transaction with the value of EUR 20.24 ranged between 0.43 and EUR 0.53, corresponding to 2.15% - 2.63% of the card transaction value (with the upper limit being most representative for merchant population in Poland).

With respect to costs of front office tender time, cash still ranked better than cards.

In the case of back office costs of cash and cards, more labour time was used for handling cash than for handling card transactions. However, due to the high number of transactions cash was subject to stronger economies of scale.

Table 14. Summary of merchants' costs of cash and cards in 2011

		cash	**card**
	Average transaction value	€ 6.89	€ 20.24
a	Average total non-pecuniary (internal) cost per transaction	€ 0.22	€ 0.29
b	Average total non-pecuniary (internal) cost per euro of turnover	3.16%	1.41%
c	Average total pecuniary (external) cost per transaction	€ 0.01	€ 0.53
d	Average total pecuniary (external) cost per euro of turnover	0.10%	2.63%
a+c	Average total cost per transaction	€ 0.22	€ 0.82
b+d	Average total cost per euro of turnover	3.26%	4.04%
	Share of non-pecuniary (internal, social) cost in total merchant's cost	96.94%	34.92%

Merchant survey revealed that in 2011 the average transaction value of card transaction at physical points of sale was almost 3 times higher than the average value of cash transaction (EUR 20 vs 7). Therefore, even though the average total non-pecuniary (internal) cost per transaction for cash was lower than for cards, in percent of turnover the opposite was true – card was cheaper. However, because of high discrepancy in pecuniary (external) costs of cash vs cards, the average total (pecuniary + non-pecuniary) costs turned out to be lower for cash – when measured on a transaction basis and when measured in percent of turnover. Finally, the difference of the share of internal costs to total costs is remarkable: 95% for cash and 35% for cards. This finding can be explained by the fact that fees paid by merchants for card payments were much higher and dominated the costs of cards.

7. The concept of merchant indifference test

The merchant indifference test (MIT), also referred to as the tourist test or avoided-cost test, explores the question whether a merchant would refuse a card payment, if he were certain that a non-repeat customer who is about to pay at the cash register had enough cash in his pocket. The test is passed if accepting a card does not increase the merchant's operating costs, i.e. if its impact on the merchant's profit and loss account is neutral and renders a merchant indifferent to card or cash payments (Rochet and Tirole 2007: 2). In analytical terms MIT can be expressed by means of the following formula (Leinonen 2011: 22):

$$B^m - C^m - MIF^{m0b} = 0 \qquad\qquad (7.1)$$

where:
B – benefit,
C – cost,
^{m} (superscript) – means merchant,
MIF^{m0b} – MIF resulting in a merchant zero-level benefit

According to Rochet and Tirole (2007, 2011) card payment costs for the seller(a total of C^m and MIF^{m0b}) should not exceed the costs of an alternative payment method (e.g. cash which is the closest substitute and a competitive payment instrument to cards in face-to-face transactions). Merchant's benefit from accepting cards is derived from not bearing costs incurred with regard to an alternative payment instrument. Merchant indifference test thus leads to the estimation of a cost tier at which card and cash costs (or possibly costs of alternative payment methods) level out.

The term "tourist test" and its explanation refer to a research approach. There is in fact no research experiment, nor is there a tourist, a non-repeat customer to be taken into account. The tourist test is aimed at eliminating the negative effects of "business stealing" – in other words "must-take cards", i.e. a phenomenon where merchants face a prisoner's dilemma. Once they start accepting cards, they are reluctant to stop doing so, even if corresponding fees are high or increasing, because this would deteriorate their position vis-à-vis their competition. Merchants would be freed of the limitations posed by the prisoner's dilemma, if there came a tourist who is a non-repeat customer with sufficient amount of cash in his pocket. Most often in economic practice it is not tourists, but regular customers who shop at the point of sale. Therefore to define the optimum interchange fee level based on the MIT methodology, merchants' operating costs of cash and cards are compared. The benefit of using a card is understood as avoiding the cost of cash. However, costs cover benefits, e.g. speed of card transactions vs. cash transactions. The faster instrument is considered better. In the Polish study cash costs were lower than card costs due to shorter payment time. Other benefits were also captured, e.g. less time engaged in handling card vs. cash, which is the benefit of a card resulting from lower back office costs compared to cash. Possible benefits attributed to 9 pecuniary and 4 non-pecuniary cash and card items were considered. Some appeared to be negligible, therefore there were no grounds to include them in the MIT compliant final calculations based on the representative merchant. This remark applies, among others, to the benefit of payment methods security, measured as cash and cards frauds rate which retailers reported to be low (as confirmed by other data valid for the whole population of businesses in Poland).

There is a range of difficulties associated with the use of a tourist test on the basis of empirical data, one of them being the approach to fixed and variable costs. Total costs of a payment instrument for a merchant include fixed and variable components.

$$TC_n = F_n + \alpha N_n + \beta V_n \tag{7.2}$$

where:

TC_n – total cost of a given payment instrument n (e.g. cash/card),

F_n – fixed cost of a payment instrument n,

α – variable cost per one additional transaction with n,

N_n – number of transactions with n,

β – variable cost per unit of additional sales with n,

V_n – value of transactions with n

Calculations that are conformant with the tourist test should focus on the comparison of variable (and marginal) costs of card and cash payments. Treating fixed costs as irrelevant to the MIT calculations is directly related to the test structure itself. Merchants incur fixed costs (both those applicable to cards, as well as to cash) regardless of whether consumer chooses to pay in cash or with card. They cannot opt to avoid fixed costs of cash which is a legal tender. If they already accept payment cards they cannot evade the associated fixed costs such as e.g. monthly fixed fees for terminal renting.

Therefore, their willingness to accept a card or cash payment is correlated with the level of variable costs.

In practice the division between fixed and variable costs (linked to the number and value of transactions) is ambiguous. It is difficult to calculate non-pecuniary costs of cash and payment cards (which are of time nature and associated with work of employees). However, quantifying those costs with a single wage rate means that cards are treated at par with cash. It may be debated whether internal costs should be handled in the same way as external ones (i.e. charges paid to other entities), since the internalisation level of both cost categories is different, but it seems to be the right assumption as regards MIT. Nevertheless, when calculating the cost of payment instruments one needs to remember about the difficulty posed by lacking cost transparency, the assumptions made, methods of quantifying non-pecuniary cost items, etc. Macro calculations of payment method costs are always an attempt at estimating the true cost values which are not uniform across all retailers but are made for an average representative retailer.

In order to compute MIT compliant MIF it is necessary to deduct the variable costs of cards from variable costs of cash. It is assumed that variable costs change in a linear fashion hence average variable costs are equal to marginal costs.

$$MIT\ MIF = VC_{cash} - VC_{card} = MC_{cash} - MC_{card} \tag{7.3}$$

By rewriting the formula we get:

$$MIT\ MIF_{two-part} = \alpha_{cash} - \alpha_{card} + (\beta_{cash} - \beta_{card})x \tag{7.4}$$

where:

α_{cash} and α_{card} – average variable cost per one additional cash/card transaction,

β_{cash} and β_{card} – average variable cost per one additional euro of cash/card sales,

x – value of transaction

MIT compliant calculations take account of the internal (non-pecuniary) private merchant costs, as well as external (pecuniary) private merchant costs. MIT MIF has a two-part form consisting of an α parameter linked to number of transactions and β parameter linked to value of transactions.

Since the MIT MIF is to be the outcome of calculations, interchange fees must not be treated as an input parameter. An acquiring margin can be the only β_{card} pecuniary cost item (comprising an acquirer's own mark-up and scheme fees paid by acquirers to payment organisations). No other internal (non-pecuniary) costs of cards are variable by value. Front and back office labour costs of cards are entirely variable by number of transactions or fixed. On the other hand, costs of cash can be either variable linked to number of transactions or to value of transactions. Withdrawal/deposit fees are variable by value, front office tender time costs – variable by number and back office internal (non-pecuniary) costs – fixed, variable by both number and value of transactions depending on the assumptions.

MIT MIF as a two-part function can be computed for every transaction value. However, there are specific transaction amounts which deserve special attention, namely the average transaction value of a cash and card payment and possibly a mean of these two ATVs. Other studies focused on (debit and credit) card ATVs (Jonker and Ploois 2013, EC 2014), however considering the decreasing trend in card ATV and the substitution between cash and cards it is justified to also take a closer look at cash ATV and other transaction amounts.

In 2012 the European Commission decided to make a study on merchants' costs of cash and card payments to better analyse the level of adequate MIFs in the context of competition cases against card associations. In the case against MasterCard (2007) cross-border MIFs were considered to restrict competition and were banned by the European Commission's decision. MasterCard failed to prove their positive effect on the payments market. The General Court upheld the Commission's decision on 24 May 2012. However, the European Commission did not rule out that under some conditions MIFs could create efficiencies.

Capping interchange fees on the tourist test compliant level may promote cost efficient payment instruments, because merchants will not incur excessive costs feeling forced to accept expensive card payments (a must-take cards situation). Retailers embed interchange fees (and MSCs) in the prices of their merchandise, thus burdening all consumers, regardless of their chosen payment method. Consequently, customers who pay cash cross-subsidise those who pay with cards (Börestam and Schmiedel 2011: 25, 34). On the other hand, customers paying with cards which have lower internal interchange fees cross-subsidise those who pay with more expensive, prestigious credit cards, often tied with a rebate program (debit card payments are seldom rewarded). Capping the interchange fee should broaden the payment card acceptance network, which would be a large benefit to consumers. Consequently, consumer benefits pertaining to rebate loyalty programmes could be reduced, as banks would be able to decrease their attractiveness or even cancel them. Any such disadvantages, however, should be outweighed by the benefits offered by a more widespread card acceptance (Börestam i Schmiedel 2011: 34).

It is pointed out that interchange fees may be a tool for exercising market pressure by banks and card associations, artificially increasing payment card costs, which in turn causes anti-trust authorities to step in (Verdier 2009). The said phenomenon is all the more

detrimental to the market, if an increase in interchange fees is not followed by an increased safety of payment card schemes and greater innovation. Another issue often raised in the literature and discussions on interchange fees is competition between retailers. If a seller decides to accept cards to increase the attractiveness of his outlet for customers, he will not consider ceasing it at a later time when faced with continuously raised MSCs, as he will be afraid to lose customers to competition (a must-take cards situation, Vickers 2005, Rochet and Tirole 2007, 2011). The interchange fee, set outside market competition mechanisms and not communicated to payers – consumers, may therefore seriously deform both the payment market, as well as the price signals that determine consumers' choice of a more cost-efficient form of payment.

Consumers are not aware of card costs to merchants because usually they are not steered to cost efficient payment instruments by rebates and surcharges. Therefore, the MIF tier compatible with the tourist test generates benefits to merchants and consumers who can internalise cost savings of merchants through lower retail prices. In the competitive market retailers are expected to pass the benefits of reduced interchange fees through lower MSCs on to consumers. Thus MIFs that are above MIT compliant levels appear not to create efficiencies that would offset possible anti-competitive effects, since it is doubtful that a fair share of excessive MIFs is passed through to the demand side of the payments market (EC decision against Visa 2010: 15-16).

Calculations compliant with the merchant indifference methodology, as the name itself suggests, comprise exclusively the cost items of merchants, but no other payment stakeholders, e.g. commercial banks and card associations. They are not calculations based on social costs of all entities in the payment chain (see "Glossary of cost definitions"). The application of MIT takes account of the internal (non-pecuniary) merchant costs, as well as some external (pecuniary) merchant costs. It is desirable to deduct items of variable nature (depending on the number and value of transactions). In the following point tourist test was applied under the Polish conditions, taking into account merchant discount rate in the *ad valorem* formula as external (pecuniary) merchant cost, less average market interchange fee in Poland. The MIT MIF is the main outcome variable, the level of which (optimal under the Polish conditions) is deduced. An optimal level is one that levels the corresponding card and cash costs of a given transaction value on the merchant side and at the same time uses the mechanism of internalisation of merchant cost savings by the consumer (by means of merchandise prices and cardholder charges), benefitting the latter. A MIT-compliant interchange fee should also boost the development of payment card acceptance network

8. The application of merchant indifference test

A prerequisite to apply the tourist test was to define marginal private merchants' costs of cash and card payments. Survey data served as a basis for calculations. The share of the interchange fee in the merchant service charge was approx. 85% in 2010 according to studies of the National Bank of Poland (Maciejewski 2012: 66). This value was also used for 2011, because with all likelihood it must have been comparable, since the structure of interchange fees and other market conditions had hardly changed. The acquiring margin along with other scheme fees which acquirers paid to payment organisations was estimated to be at the level of

0.0027 (0.0182 x 85%) or 0.27% by taking the average blended MSC rate (1.82%) declared by companies in the survey. No other pecuniary costs of cards were included. A variable cash withdrawal/deposit cost of 0.2% was adopted (market rate), which is twice as much as the average according to retailers' responses in the survey.

Three scenarios of MIT application were considered, in which the dividing line between fixed and variable back office costs was set differently.

In the first basic scenario (scenario 1), after benchmarking to merchants' opinions and to foreign cost studies it was assumed that 50% of back office card cost was fixed in nature and 50% variable – linked to number of transactions, whereas 30% of back office cash cost was fixed in nature and 70% variable – linked to value of transactions. 100% of front office costs (time of cash and card payments) were treated as variable by number of transactions.

Thus we arrive at marginal cost functions of cards and cash for merchants.

$$y_{card} = 0.25 + 0.0027x,$$
$$y_{cash} = 0.15 + 0.0058x$$

After asking a normative question when applying the tourist test: "what is the level of (multilateral) interchange fee at which card and cash costs will be equal", the two-part MIT MIF function (the first component dependent on the number of transactions, the second one dependent on the value of transactions) was defined:

$$\text{MIT MIF}_{two\text{-}part} = -0.09 + 0.0031x$$

Figure 14. Functions of merchants' marginal cash and card costs and the two-part MIT MIF function (scenario 1)
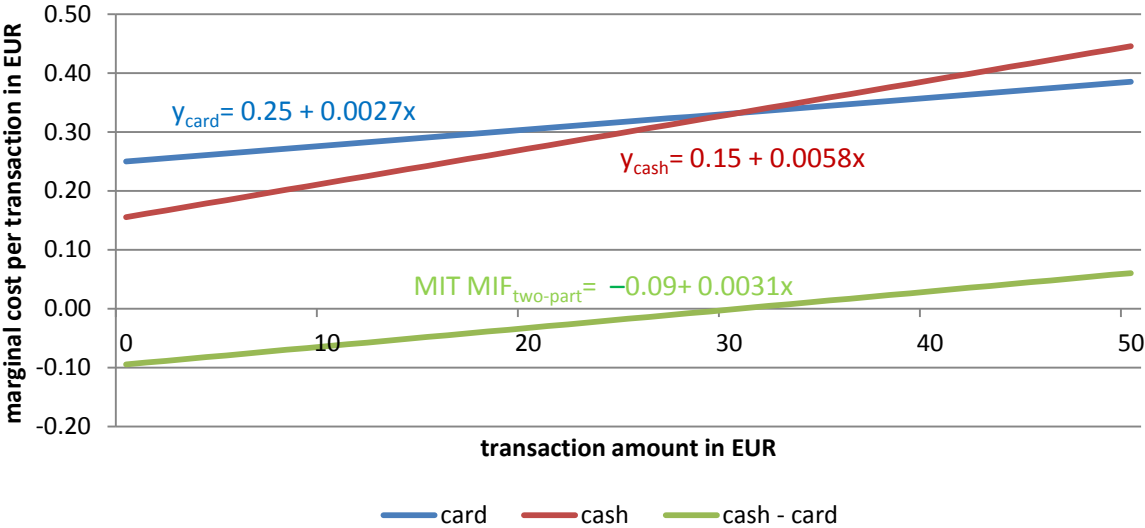
Note: Values were rounded.

The point of intersection between y_{cash} and y_{card} fell on value x equal to around EUR 30. This means that for each amount below EUR 30 the MIT compliant interchange fee would be negative, while for each amount above EUR 30 the interchange fee would be positive (see the function MIT MIF$_{two\text{-}part}$ = −0.09 + 0.0031x).
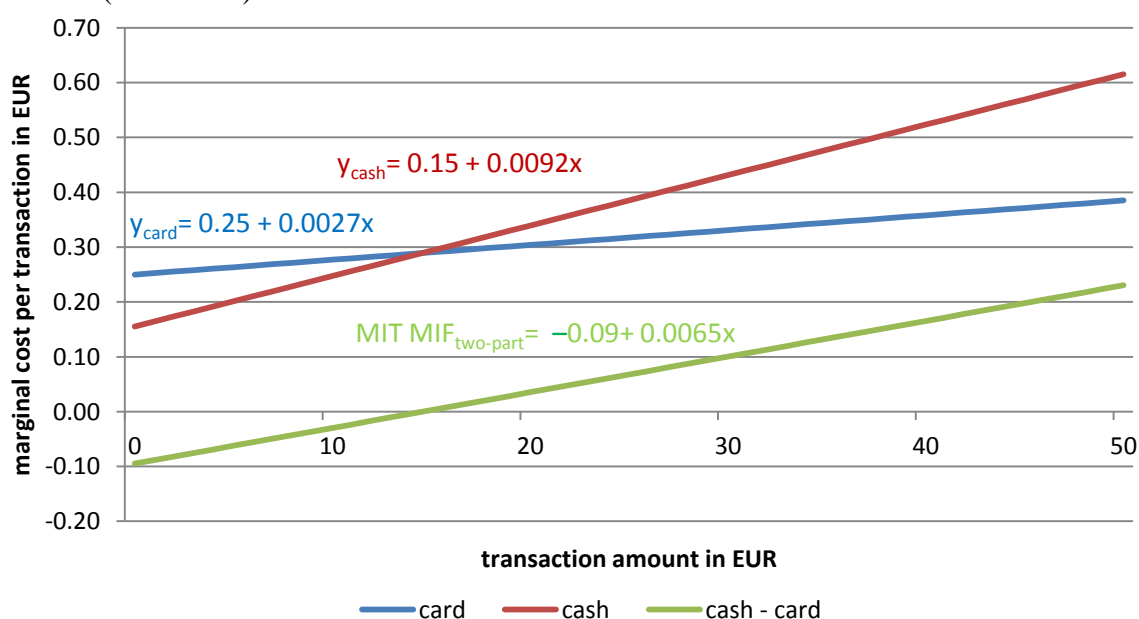
By taking specific average transaction values as arguments of the MIT MIF$_{two\text{-}part}$ function we get:

1. ATV card (20.24 EUR) => MIT MIF$_{\text{two-part}}$ = −0.16%
2. ATV cash (6.89 EUR) => MIT MIF$_{\text{two-part}}$ = −1.07%
3. Mean of cash and card ATVs (13.57 EUR) => MIT MIF$_{\text{two-part}}$ = −0.39%

With lower transaction values the MIT conformant interchange fee level would be more negative. The higher the transaction value and the closer to EUR 30, at which marginal function costs of cash and cards estimated for the purpose of MIT application become equal, the less negative the interchange fee level. Consequently, in line with MIT, the use of the interchange fee would only be justified at levels above EUR 30. With each average payment amount (card, cash, the mean of the two) it is only a negative interchange fee that would make the merchant economically indifferent to the payment instrument chosen by the consumer (cash or card).

In the second scenario (scenario 2) 100% of internal costs of cash transport, which were recognised as fixed earlier on, were included in the (value dependent) variable cost of cash (β parameter).

Figure 15. Functions of merchants' marginal cash and card costs and the two-part MIT MIF function (scenario 2)

y_{cash}= 0.15 + 0.0092x

y_{card}= 0.25 + 0.0027x

MIT MIF$_{\text{two-part}}$= −0.09+ 0.0065x

Note: Values were rounded.

Positive interchange levels would be justified only when MIT MIF would exceed around EUR 14.
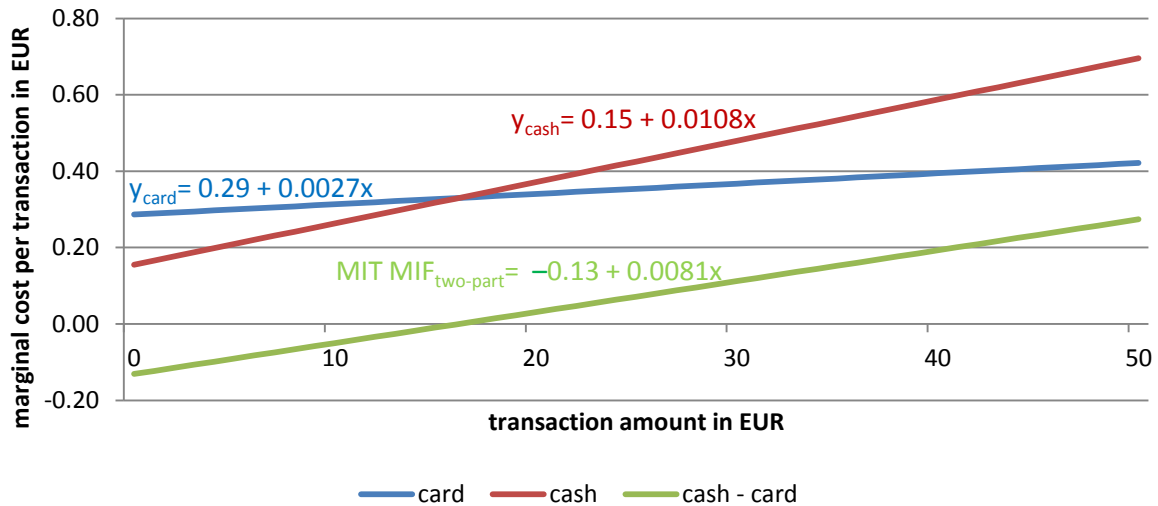
In scenario 2 solving the MIT MIF$_{\text{two-part}}$ function with characteristic values produces following results:

1. ATV card (20.24 EUR) => MIT MIF$_{\text{two-part}}$ = 0.18%
2. ATV cash (6.89 EUR) => MIT MIF$_{\text{two-part}}$ = −0.73%
3. Mean of cash and card ATVs (13.57 EUR) => MIT MIF$_{\text{two-part}}$ = −0.05%

With average transaction value for cards the interchange fee of 0.18% would level out the merchants' costs of card and cash payments.

In the third scenario (scenario 3) not only 100% of cash transport costs were included in MIT calculations, but also 100% of back office cash and card handling costs (100% back office costs of cards – variable depending on the number of transactions, 100% back office costs of cash – variable depending on the value of transactions).

Figure 16. Functions of merchants' marginal cash and card costs and the two-part MIT MIF function (scenario 3)

Note: Values were rounded.

In scenario 3 break even between card and cash functions amounts to EUR 16. Compared to previous scenarios the α parameter as well as the β parameter responsible for the slope of the MIT MIF$_{two part}$ function undergo changes, which impacts the calculations.

If we compute outputs of the MIT MIF$_{two part}$ function for different ATVs, we get:

      1. ATV card (20.24 EUR) => MIT MIF$_{two-part}$ = 0.16%
      2. ATV cash (6.89 EUR) => MIT MIF$_{two-part}$ = −1.09%
      3. Mean of cash and card ATVs (13.57 EUR) => MIT MIF$_{two-part}$ = −0.16%

Table 15. Summary of MIT application results (Polish study 2012)

	Scenario 1	**Scenario 2**	**Scenario 3**
Cost functions $(\alpha + \beta \times x)$ cost of one additional trx with value of x	$y_{cash} = 0.15 + 0.0058x$ $y_{card} = 0.25 + 0.0027x$ MIT MIF$_{two-part}$ = $= -0.09 + 0.0031x$	$y_{cash} = 0.15 + 0.0092x$ $y_{card} = 0.25 + 0.0027x$ MIT MIF$_{two-part}$ = $= -0.09 + 0.0065x$	$y_{cash} = 0.15 + 0.0108x$ $y_{card} = 0.29 + 0.0027x$ MIT MIF$_{two-part}$ = $= -0.13 + 0.0081x$
Transaction amount where cash costs equal card costs	€ 30	€ 14	€ 16
MIT MIF for ATV card	−0.16%	0.18%	0.16%
MIT MIF for ATV cash	−1.07%	−0.73%	−1.09%
MIT MIF for mean of card and cash ATVs	−0.39%	−0.05%	−0.16%

Note: y – marginal cost, x – transaction amount. Values were rounded.

The outcomes of MIT applied on the basis of the cost data from the Polish merchants' survey in three scenarios proved that interchange levels rendering businesses indifferent to the choice of payment instrument by consumers in any case do not exceed 0.2% even with regard to the average card transaction size.

The test result is an estimate and should be treated as indicative. Calculations are sensitive to α and β changes, as well as to the average card and cash transaction value. α and β were estimated taking into account market conditions in Poland, where cash generated greater effects of scale due to a much higher number and value of payments. Increasing the number and value of card payments, while at the same decreasing the number and value of cash payments would improve (reduce) α of the marginal cost function of cards, and deteriorate (increase) β for cash. Moreover, cash generated benefits pertaining to shorter transaction time, which had quite a significant impact on MIT compliant calculations (and before that on the calculations according to internal non-pecuniary costs borne by merchants). Another cost element which determined relatively low cash costs from merchant's perspective was the level of variable pecuniary costs of cash, i.e. the commission charged by banks with respect to cash deposits and withdrawals. However, this cost item was assumed twice as high as the level declared by merchants in the survey in order to offset high acquiring margin of cards (pecuniary/external cost item linked to the value of transactions) based on estimations of the National Bank of Poland, thus making the calculations more robust to likely reductions of the mark-up owing to the increasing competition between acquirers.

As the cost survey revealed and additional cost calculations confirmed, merchants turned out to be the main group that shouldered the direct burden of financing card turnover in Poland, including payment of an economic rent to banks and card associations, which seemed unjustified under the MIT, also through lack of a credible proof from the perspective of supply-side costs attributable to card turnover.

Cash turnover is subject to powerful effects of scale in Poland, which makes it cheap in terms of unit costs borne by merchants. The situation is different in countries where card turnover is more developed (greater number and value of card transactions, different average card and cash transaction values). In those countries the application of MIT will produce different threshold values that level out the costs of cash and payment cards (see MIT application results of Jonker and Plooij 2013 or Layne-Farrar 2013). The analysis, however, leads to a universal conclusion that there is a need for more transparent business models and new payment systems which will be able to demonstrate to merchants and consumers their cost advantage over the existing systems, and which will exercise a natural pressure to change the functioning principles of the present systems and the size of hidden internal charges.

Modifying MIT with potential benefits provided by card payments to retailers, one could make an attempt at a microeconomic approach which in a way does better in reflecting the competitive edge of retailers who accept cards as opposed to those who don't. The convenience offered by cards may (but doesn't have to) induce consumers to more spending, thus providing for higher sales in the group of merchants who accept cards. The game, however, seems to be a zero-sum game on the level of the whole economy, unless card payments result in the reduction of the savings rate, which perhaps would not be desirable in Poland. Furthermore, the analysis could include a credit variable which is mainly tied with a credit card payment, although it also characterises cash e.g. by means of consumer credits in

cash or debit card by means of overdraft. The multiplier effect of debt financing can stimulate economic growth, boosting consumer spending. Debt financing has both its positive and negative sides. The transformation of the Polish society according to the US model (where an average American citizen has five credit cards in their wallet) would not necessary produce positive results. For several years now Polish banks have been involved in the process of cleaning their credit card portfolios, among others due to the poor quality of credit card debt characterised by low repayment rate. The problem of bad debts kept growing, causing severe losses in the banking sector.

Results of the MIT application in the Polish study conducted in 2012 and relating to data from years 2011-2012 are convergent with preliminary results of the European Commission's study which was made public in February 2014 but relied on data collected in years 2012-2013.

The European Commission (Directorate General for Competition) considered two scenarios for indentifying cost levels and cost nature. Scenario 1 reflected the MIT MIF level referring to a cost change triggered by one additional transaction based on exact data from a large merchants' survey, whereas scenario 2 assumed a 10% decrease in the number of cash transactions over 3-4 years, replaced by card transactions.

Table 16. Summary of MIT application results (European Commission's study 2014)

	Scenario 1		Scenario 2		Acquiring margin	ATV
Calculation for **debit cards**	α *	β *	α *	β *	(%)	Card (EUR)
	(EUR)	(%)	(EUR)	(%)		
Cash	€ 0.08	0.13%	€ 0.09	0.20%	0.06%	€ 42
Debit card	€ 0.09	0.01%	€ 0.1	0.01%		
MIT MIF for ATV debit card	0.02%		0.11%			
Calculation for **credit cards**	α *	β *	α *	β *	(%)	Card (EUR)
	(EUR)	(%)	(EUR)	(%)		
Cash	€ 0.08	0.17%	€ 0.08	0.24%	0.06%	€ 51
Credit card	€ 0.09	0.01%	€ 0.1	0.01%		
MIT MIF for ATV credit card	0.07%		0.15%			

* without acquiring margin

Source: European Commission (DG Competition), *Survey on Merchants' Costs of Processing Cash and Card Payments*, *Preliminary Results*, Brussels, 19 February 2014.

MIT MIF levels computed by the European Commission for average debit and credit transaction values appeared to be very low, even close to zero, which corresponded well with the outcomes of the MIT application to the Polish data. Both studies were similar in many aspects, e.g. targeted types of transactions (only face-to-face payments), cost items covered, method of MIT application. However, they also contained some differences. The scope of the Polish study was restricted to merchant population in Poland, while the scope of the EC's study − to 10 European member states. The Polish study covered more sectors of the

economic activity – not only retail trade, hotels and restaurants but also such locations as theatres, cinemas, fitness clubs, medical clinics, public transport, taxis, different services (hairdressers, florists, designers, etc.), bookshops, fitness clubs (altogether 7 sections of the European Classification of Economic Activities). A representative merchant in the Polish study was rather a small business (see the criteria used for the sample weighting in section 3 "Survey methodology") while in the study of the EC it was a large one (with annual turnover above EUR 20 m). The sample selection influenced average transaction sizes which in the EC's study surpassed those from the Polish one.

The MIT MIF computed in both studies fit in well with the Proposal for a Regulation of the European Parliament and of the Council on interchange fees for card based payment transactions issued in July 2013 introducing caps of max. 0.2% for debit cards and maximum 0.3% for credit cards per transaction (with a possible additional cap suggested by the EP of 7 eurocents per transaction with a debit card for transactions above EUR 35). Besides, the results of MIT application are quite in line with commitments of Visa (2010 and 2014) and MasterCard (2009). Based on the outcomes of MIT MIF calculations one could even argue that limits in the international card associations' undertakings and in the IF Regulation are set too high.

The regulatory pressure in the EU countries (Italy, Hungary, Romania, Spain, United Kingdom) on interchange fees has lately been intensified starting with the Polish Law of 30 August 2013 on Payment Services introducing a uniform cap of 0.5% of the payment value for all cards – both business and consumer cards, which effectively came into force on 1 July 2014. The Law was unanimously passed by the Polish Parliament ending discussions and quasi self-regulatory attempts to decrease the level of interchange fees in Poland, which for many years ranked among the highest in Europe. The Law will be binding in Poland until the Pan-European IF Regulation starts to apply to all four-party card-based transactions.

Table 17. Interchange fee dynamics – changes of average MIF tiers in card-based payment transactions in Poland (2011-2014)

Card types and payment categories	2011 and 2012 (before reductions)*	1 November 2012	1 January 2013	1 March 2013	1 July 2014
Visa debit	1.60%	public admin. 0.2 PLN	1.25%		max. 0.5%
Visa Credit	1.45%	public admin. 0.3 PLN	1.30%		max. 0.5%
Visa Business	1.60%		1.60%		max. 0.5%
Visa micropayments	1.60%		0.90-1.00%		max. 0.5%
MasterCard Debit	1.64%		~1.11-1.32%	public admin. 0.18 PLN	max. 0.5%
MasterCard Credit	~1.5%		~1.32%	public admin. 0.25 PLN	max. 0.5%
MasterCard business	1.70%	1.90%			max. 0.5%
MasterCard Micropayments	~0.80%				max. 0.5%

* Weighted average MIF of all card types and payments categories in 2011 and 2012: ~ 1.55-1.60%.

Source: own estimates based on market data

After a failure of the compromise worked out in 2012 by the Interchange Fee Task Force operating under the auspices of the National Bank of Poland issuing banks and payment organisations in fear of regulatory interchange fee reductions decided to lower MIF tiers from 1 January 2013, but those cuts were not regarded sufficient and did not stop the legislative procedure.

The results of the Polish cost study and the MIT application, like that of the European Commission, did not serve as the official basis for setting an IF cap but were quoted as a benchmark by the Polish Ministry of Finance and other institutions. They were made public more than half a year before the decision of the Polish Parliament and more than a year before the publication of preliminary results of the EC's survey. The Polish study was quoted as the first comprehensive analysis of merchants' cash and card costs in Poland, based on theory and empirical research. It was also the first attempt to assess the optimal level of interchange fees in Poland in a scientific way. Therefore, the results of the cost study served as an important argument in discussions about the justified level of IFs and additional precautions that should be taken in order to increase market transparency and foster competition. The ongoing discussions about interchange fees cover not only the optimal MIF level but also other issues such as: co-badging, cross-border acquiring, blending, honour-all-cards rule, no-surcharge rule and access of non-bank payment institutions to payment accounts and payment systems, which are equally essential for the healthy development of the balanced payments market.

9. Conclusions

The cost survey confirmed a high disproportion between pecuniary costs of cash and cards for merchants. External costs of cards, driven by high merchant service charges including excessive interchange fees, appeared to be the major factor slowing down the expansion of terminal network in Poland and the development of non-cash circulation.

Based on the outcomes of merchants' cost calculations and the tourist test application a conclusion can be drawn that tiers of interchange fees in Poland should be low – up to 0.2% of transaction value and even brought down to zero depending on the transaction value in question. The survey results and subsequent cost calculations clearly show that merchants in Poland are not economically indifferent to the interchange fee level prevailing on the market. Moreover, it was evident from the survey that the level of internalisation of pecuniary and non-pecuniary costs is different. Front office and back office labour costs were not treated in the same way as fees by merchants. Fees paid (pecuniary external costs) were considered more important.

The Polish study was conducted and published more than one year prior to the publication of preliminary results of the European Commission's study on merchants' costs of processing cash and card payments. The studies share many common features but also differ in various aspects. Nevertheless it is notable that the results concerning the tourist test compliant level of interchange fees are fairly similar. The application of the MIT in Poland on the basis of primary data from the merchants' survey was probably the first such an attempt in the economic literature.

The results of the MIT application are sensitive to changes of parameters (α and β), as well as to changes of the average card and cash transaction values. Cost calculations of cash

and cards relied on data from the survey of Polish merchants. In addition, various assumptions had to be made. Therefore, the results need to be interpreted as indicative and illustrative but not as definite numbers. Costs were computed in different scenarios. Some cost items (e.g. cost of cash and card fraud) turned out to be negligible in Poland, but it must be remembered that in cases of particular companies those cost items may play a bigger role. In Poland, cash generated far greater economies of scale than cards – due to much higher number and value of transactions.

The MIT is a purely demand-oriented approach and does not focus on the supply side. In its unmodified form it involves cost calculation, whereby benefit is understood as avoiding alternative costs of payment with another instrument. Nevertheless, some benefits are also embedded in costs (e.g. payment duration, back office operations, an instrument that is faster or requires less handling time offers bigger benefits, which were quantified in pecuniary terms).

Acceptance of various payment instruments (multi-homing) increases customer satisfaction, as consumers are free to choose their preferred payment method at a given point of sale. It benefits merchants, provided that it does not involve excessive costs.

In the case of payment instruments market, which is a two-sided network market, the application of a skewed pricing strategy does bring the expected results, provided it is not detached from the limits of merchants' price elasticity. The main benefit to card-paying consumers is the possibility of using the card in the broadest possible network of retail outlets. Rebate programs tied with cards and moneyback service are important to consumers, but they need to be interpreted as an extra benefit added to the card's payment function which is the main benefit. Moneyback and rebate programs raise controversies, as they are subsidised by users of cheaper payment instruments.

Price elasticity of retailers in Poland with regard to the size of MSC indicated that a highly dynamic development of payment card acceptance network would only happen with low interchange fee below 0.25% (*ceteris paribus*). Network development would have also been notably faster than it was at that time with higher interchange fees, but probably it wouldn't have been just as dynamic as with rates falling below 0.25%. On the other hand, merchants who accepted card payments already in 2012 largely seemed to approve of the interchange fee ranging from ca. 0.5% to 0.75% of the transaction value. This level would be satisfactory to 76% - 82% of the population of businesses which were selling goods and services in Poland in the retail segment and accepted card payments at the time of the survey (which is when, however, the interchange fees were the highest in the European Union).

A matter for further research is the pass-through pace of interchange fee regulatory decreases in Poland. Their positive effects can only materialise when acquirers lower MSCs thus incentivising new merchants to install payment terminals and reduce cost burdens for those merchants who already accept payment cards. The more frictions on the Polish market and the bigger the inclination of acquirers to keep profits from higher mark-ups in the short term, the later it is to be expected that the card acceptance network will experience a dynamic expansion and consumers will benefit from passing on lower interchange fees to retail prices by merchants.

Drawing on the theory of two-sided markets always leads to the deformation of price signals and internal subsidy mechanisms. It inevitably gives rise to the risk of elevated

internal fees which are not subject to the market supply and demand game (both banks and card associations are in favour of high interchange fees). Only transparent transaction fees that embrace cost-based pricing can fully eliminate the negative anti-competition effects. High entry barriers on the payments market and highly profitable business models of four-party card schemes, with lacking cost transparency on the payer (consumer) side hamper competition and innovation, especially when such practices as blending, honour-all-cards rule and no-surcharge rule are in place. Cashless payments can potentially be cheaper than cash. However, it requires much lower margins and less costs.

Glossary of cost definitions

total cost – a sum of fixed and variable costs

fixed cost – cost that does not vary over specific time

variable cost – cost that varies over specific time, e.g. variable cost by transaction value, variable cost by number of transactions

unit cost – cost per single payment transaction, cost per one euro turnover (it is possible to calculate total unit cost, variable unit cost, fixed unit cost)

marginal cost – additional cost that arises due to change in the number of transactions by a unit or change in the value of transactions by one euro

marginal cost calculated as α + β × x (where α = variable cost per one additional cash/card transaction in euro, β = variable cost per one euro of additional cash/card turnover, s = (average) value of a cash/card transaction) – additional cost which arises at the moment of transaction with the value of x euro

pecuniary cost – cost that arises due to payments to third parties in the payment chain, or cost related to a material loss (e.g. theft, fraud), alternative cost (e.g. forgone interest) or depreciation cost; pecuniary cost can be of cash or accrual nature

non-pecuniary cost – time cost associated with labour time of staff employed

internal cost – cost incurred due to consumption of company resources, usually time cost, or possibly depreciation or opportunity cost

external cost – cost associated with charges/fees paid to third parties (cash type cost)

private cost – any external or internal cost incurred by the company

social (resource) costs – sum of internal costs of all parties in the payment chain – the central bank, commercial banks, consumers and merchants, a fraction of social costs is incurred by every party (internal resource cost of that party); in this article calculated only for merchants

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