NBP Narodowy Bank Polski

Costs of payment instruments on the Polish market

Final report on the NBP research project

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Summary

Summary

The research project on the costs of payment instruments on the Polish market was carried out by Narodowy Bank Polski in the years 2015–2018. The survey covered the most important entities involved in the Polish payment market: the central bank, banks, payment infrastructure providers, retailers, cash transporting and handling companies and consumers. The broad scope of the project covered both traditional and innovative payment instruments: cash, prepaid cards, debit cards, credit/charge cards, mobile payments, credit transfers and direct debits. Under the NBP research project, data were collected for 2015 which at the same time was considered the base year for the above mentioned survey.

The aim of the study was to estimate the costs of social and private retail payments incurred by individual parties in the payment chain in connection with using the most important payment instruments.

Due to the fact that this was the first study on this issue for the Polish market, the results obtained are of key importance for understanding the functioning of the Polish economy. It was assumed that the total cost of payments need to be determined on a multidimensional basis. Social costs of payments for all entities, as well as by payment instruments, were summed up and expressed as a percentage of GDP created in Poland.

An important benchmark for the Polish project was the study on the costs of payment instruments conducted in 2009–2012 under the leadership of the European Central Bank, in which central banks from 13 EU member states participated. As in the case of the European Central Bank study, in order to estimate the costs of payments on the part of banks and payment infrastructure providers, in the Polish project, the ABC (*Activity-Based Costing*) methodology was used. The survey questionnaires were designed so as to separate internal cost items (costs of resources) from external costs (fees and commissions to other entities in the survey), which allowed to estimate social costs (representing the sum of internal costs of all participants in the payment system) and private costs (representing the sum of internal and external costs of a particular participant in the payment system).

An extremely important element of the research project was the extrapolation of the collected data on the cost of payments to particular sectors of the economy. To that end, data on cost drivers collected in the project were mainly used (number and value of transactions performed with the use of particular payment instruments). In the case of banks and payment infrastructure providers, these data were compared with comprehensive statistical data collected by Narodowy Bank Polski on the number and value of non-cash and cash transactions, i.e. withdrawals from ATMs. With regard to retailers and consumers, statistical data and databases of Statistics Poland (GUS) on the number of entities and sales revenues in selected industries, as well as data on household consumption were used in the extrapolation process. When presenting the results of the NBP survey, it is necessary to indicate separately the private costs and social costs of payments in Poland.

The total cost of private payments in Poland in 2015 can be estimated at PLN 31.2 billion. The highest private costs were incurred by the payment system participants in connection with cash (PLN 21.1 billion). This resulted from the dominating share of the number of cash transactions (11.8 billion) in the total number of payments in Poland (17.0 billion). Private costs for other payment instruments were lower. For debit cards they amounted to the total of PLN 6.1 billion while credit transfer, they reached PLN 2.4 billion. For other instruments, they were relatively less important.

The highest share in private payment costs was recorded for banks (40%) and for retailers (36%). The aforementioned sectors of the economy were therefore burdened with private payment costs to a similar extent. Just over 13% of the cost of private payments were borne by consumers. The other actors were much less important in private costs. The private costs per payment instrument were not incurred in a proportionate way by all entities participating in the survey. Costs of cash prevailed in private costs of the central bank. In the case of commercial banks, the highest private costs per transaction were incurred for mobile payments (as much as PLN 94). This is due to the fact that in 2015 these were instruments that already entailed significant costs in order to be able to offer them while the scale of transactions was still small. Significant unit private costs were also calculated for cash services – about PLN 19. Significantly lower unit costs were observed for payment cards – PLN 1.77. The least expensive payment instruments included direct debit (PLN 0.46) and credit transfer (PLN 0.48). For infrastructure entities, cash services turned out to be most expensive in terms of private unit costs (PLN 5.3), while acquiring services were about twice cheaper (PLN 2.7). In addition, the negligible unit costs of a credit transfer (PLN 0.01) are worth noticing. In the case of companies transporting and handling cash – CIT (*Cash-In-Transit*), a full estimate of only the total private costs has been performed. Taking into account the unit private costs of payments on the part of retailers, bank transfer was the cheapest method of payment (PLN 0.30). The second cheapest payment instrument per transaction in this group was cash (PLN 0.62). In terms of unit price, a debit card was about twice as expensive (PLN 1.23) as cash. On the other hand, a credit card (PLN 1.47) was slightly more expensive than a debit card. The most expensive instruments in terms of unit price were not very popular (PayPal, direct debit and cash on delivery).

The total social costs of retail payments in Poland were estimated at 1.34% of GDP, i.e. PLN 24.1 billion. Cash had the highest share of total social costs in GDP (0.98% of GDP), i.e. PLN 17.6 billion, which results mainly from a very high share of cash payments in the total number of retail payments (69.2%). The share of social costs in GDP for debit cards was five times lower and amounted to 0.21% of GDP (PLN 3.7 billion) with the share in the total number of retail payments at a level of 13%. On the other hand, social costs of bank transfers amounted to only 0.1% of GDP (PLN 1.8 billion). Costs of other instruments (credit cards, direct debit, mobile payments and other) had a minor share in the Polish GDP (in total 0.05% of GDP, i.e. PLN 1.0 billion).

It is noteworthy that the ECB has estimated for 2009 data (based on the extrapolation of data obtained for the 13 countries that participated in the survey) social costs of payments in Poland and other 7 Central European countries, grouped in one of five clusters of EU countries, at 1.01% of GDP, i.e. close to the average level of social costs estimated by the ECB

for all 27 EU Member States (1%). However, ECB analyses were related to a narrower scope of subjects – participants (they did not take into account social costs of consumers which were estimated at 0.07% of GDP in Poland), therefore, in order to compare the results of the survey on costs of payment instruments in Poland and the ECB survey, the data obtained for Poland should be reduced by consumer costs. The higher (by 0.26 percentage points and 0.27 percentage points, respectively) share of social costs of payments in GDP (excluding consumer costs) in Poland (1.27% of GDP) than the level estimated for the "Polish" cluster in the ECB study (1.01% of GDP) and the average level for all EU countries (1% of GDP) may result from the adoption of a different base year in both studies (2015 and 2009 respectively), imperfect estimates in relation to countries other than participating in the ECB's survey, different subject matter (the Polish survey also includes mobile payments) but especially from a different structure of payment instruments used, different payment and clearing infrastructure in various countries and different payment habits and preferences existing in individual countries. At the same time, however, the level of social costs in Poland turned out to be lower than in some other EU Member States participating in the survey under the auspices of the ECB (the level in three countries with the highest share of social costs in GDP ranged from 1.30% to 1.35%). The highest share of social costs of payments in Poland was borne by banks (49%), followed by retailers (34%). The share of payment infrastructure providers was also noticeable (7%). Less significant share was estimated for consumers (5.34%), the central bank (2.35%) and CIT companies (2.29%).

In accordance with the results of the study, the average unit social cost of a transaction made with a payment instrument in Poland may be estimated at PLN 1.41. The least expensive payment instrument, in terms of social costs and on a per unit basis, was a credit transfer (PLN 0.74) which is used mainly in payments to so-called mass creditors, in e-commerce or in P2P payments, at the same time being almost not used in physical points of sale where cash was mainly used. This confirms the general opinion on the effectiveness of clearing systems for transfers, which represent a popular payment instrument in Poland in the above mentioned areas of payments. At the same time, this result indicates a very significant specifics of the Polish market, since in the ECB survey the transfer was the most expensive electronic payment instrument. The second cheapest payment method in Poland on a per unit basis was cash, which dominated in the number of retail transactions covered by the survey. The unit social cost of cash payments was estimated at PLN 1.49. The social cost of debit cards was higher, estimated at PLN 1.67 per transaction, while the cost of credit cards was estimated at PLN 2.24 per transaction. Payment methods used to a limited extent in Poland were most expensive, i.e. direct debit and mobile payments, which were only gaining popularity in 2015. The high costs for innovative payment methods, such as mobile and instant payments, result from a typical innovation implementation process and economies of scale that are likely to change favourably if the solution is popularised among consumers.

It is also worth noting that the estimated social costs of cash (amounting to PLN 17.6 billion) accounted for 73.1% of the total social costs of payments in Poland, with a simultaneous share at a level of 69.2% in the total number of retail payments. This small (4 percentage points) difference in both percentages means, especially considering possible underestimation in the studies, that cash and non-cash payments represent a share in social costs quite similar to the actual share of both groups of payment instruments in the entire retail payment market, with only a minor prevalence of non-cash payments.

Summing up, it is important to stress the importance of the presented survey which provided a comprehensive estimate of the costs of retail payments for the first time in Poland. Detailed results of the study may also provide a good background for in-depth analyses in the scope of the development of individual payment instruments in Poland in the future. In particular, supplementing the scope of the existing study with an analysis of fixed and variable costs would allow the estimation of changes in the level of the overall social costs of payments, assuming a potential increase or decrease in the share of specific payment instruments in the total payment volume. At this point, it should also be noted that the survey covered 2015. Since then, the shares of individual payment instruments in the total number of transactions have changed, which would also translate into a change in the cost structure. On the one hand, the results obtained in the report should therefore be treated with some caution from the point of view of assessing the current situation on the payment market in Poland and proposing potential measures for the future while, on the other hand, they may constitute a certain benchmark for further research in this area. Repeating the study for a later base year would allow us to understand the directions of development of the payment system in the area of payment costs, including the development of payment innovations and the impact of legal regulations on this market.

In addition to security, speed, convenience, anonymity or the universality of possession and acceptance, cost is only one of the factors in the choice of payment instrument for making or accepting retail payments and this choice should be left to the discretion of consumers or retailers. At this point, it should also be stressed here that it is important to enable access to different payment methods (cash and non-cash) corresponding to the preferences of different users of payment instruments. It is also important from the point of view of broadly understood security of payments since in the case of failures, technical problems or in emergency situations (e.g. threats to the state security) such diversification of access and acceptance of payment instruments enables easier substitution of the above mentioned instruments.

Introduction

Introduction

Costs related to the issuance, use, maintenance of operation and acceptance of a payment instrument are one of its most important features. As security, speed, convenience, level of anonymity or universality of possession and acceptance, they have an impact on the payment instrument which a payer is ready to hold, which instrument will be chosen to make a particular payment and which will be accepted by the payee. Investigating the costs incurred by individual entities in the payment chain, the so-called private costs, is a complicated task but it is even more difficult to examine the total costs of a given payment instrument from the point of view of all the entities mentioned above as well as their internal costs, i.e. the so-called social costs.

For several years, Narodowy Bank Polski has analysed the costs of payment instruments incurred by individual entities in the payment chain and the research in this area that was conducted worldwide in the form of long-term projects by central banks. The survey concerning the costs of payment instruments conducted in 2009–2012 under the leadership of the European Central Bank in which central banks from 13 EU member states participated is worth special attention. The results of this large-scale project were presented in a study published by the ECB in 2012 entitled *The social and private costs of retail payment instruments. A European perspective*.[1]

In 2008–2009, Narodowy Bank Polski considered taking part in the survey under the auspices of the ECB and participated in preparatory work for this survey. However, due to the lack of possibility to obtain the necessary data from most of the entities that would be covered by the survey, the decision was made to resign from participation in this research project. In 2012, apart from the publication of the above report by the ECB, several key events in the area of analysing the costs of payment instruments took place, which led to the conclusion that it would be possible to obtain data from individual entities on the Polish payment market (the above conditions are described in detail in Chapter 1). Consequently, at the turn of 2012 and 2013, the idea emerged in NBP to conduct a similar survey in Poland.

On 21 March 2013, reports entitled "Comparison of the results of research on the costs of payment instruments carried out worldwide" and "Assumptions of research on the costs of payment instruments on the Polish market" were presented to the Payment System Council (PSC). In addition, the Council was requested to:

1. support the idea of conducting a survey of the costs of payment instruments on the Polish market, following the example of measures undertaken by other EU Member States;
2. adopt the assumptions of research on the costs of payment instruments on the Polish market.

Both items were positively considered by the Council. Therefore, Narodowy Bank Polski planned to conduct a survey on the costs of payment instruments in the Polish market on the part of the central bank, banks, payment infrastructure providers, cash transport and

[1] Schmiedel H., Kostova G.L., and Ruttenberg W., *The social and private costs of retail payment instruments: a European perspective*, "ECB Occasional Paper Series", 2012, no 137.

handling companies, merchants (retailers) and consumers. It was decided that the main research tool used to obtain data on costs incurred will be survey questionnaires to be addressed to particular groups of respondents.

The aim of the study was to estimate the social and private costs of retail payments incurred by individual parties in the payment chain in connection with using the most important payment instruments.

It should be noted that this project was the first of its kind conducted for the Polish market. It was implemented in the form of the NBP research project in the years 2015–2018, with the participation of other entities and institutions active in the area of the payment system. For the purposes of this project, substantial studies on costs of payment studies were designed and implemented, covering specific groups of actors (cf. Subparagraph 3.2). The high representativeness of all the research samples used in the project should be emphasised, which distinguishes the Polish study from the studies carried out under the direction of the ECB.[2] This meant that the project was highly labour-intensive and led to the increase in its duration.

The final report consists of six chapters and two annexes. The first chapter presents theoretical issues related to the costs of payment instruments, including the definition and breakdown of payment costs. The second chapter aims to review existing studies on the social costs of payment instruments. Attention will also be paid to the aforementioned study carried out under the leadership of the European Central Bank. The third chapter presents the assumptions of the project carried out by NBP. The fourth chapter presents the private and social costs of the participants in the payment system. On the other hand, in the fifth chapter, the private and social costs of payment instruments are presented in unit terms and by reference to the Gross Domestic Product. The last chapter discusses the outlook for the development of studies on the cost of payments. Annex 1 presents the conditions of the project carried out by NBP, while Annex 2 presents the second variant of the consumer cost survey, which was not taken into account in the final cost calculations.

[2] Ibid.

Chapter 1

Costs of payment instruments – theoretical issues

Costs of payment instruments – theoretical issues

In order to estimate the costs of payment instruments, they should first be properly defined, the costs borne by individual payment market participants should be identified and a method for measuring them should be developed. This part of the report reviews the research approaches adopted by central banks worldwide. The basic definitions of payment costs were derived from the survey of De Nederlandsche Bank[3] and National Bank of Belgium[4], conducted in 2002 and 2003, respectively. Their development was described based on the report on studies of Sveriges Riksbank.[5] Moreover, the following chapter identifies the costs and revenues borne by the main participants of the payment market. The breakdown of costs into fixed and variable costs depending on the number of transactions and the turnover is also presented.

It should be stressed that the information contained in this chapter is a theoretical approach and it demonstrates a certain universal approach present in the literature on the subject and may not be directly applicable in Polish conditions.

1.1. Basic definitions of the cost of payments – social and private costs

In the study conducted by De Nederlandsche Bank and the National Bank of Belgium, costs of payments were divided into[6]:

- ***external*** – costs of payments (e.g. fees, commissions) made by an entity in the payment chain to other entities in the chain;
- ***internal*** – all other costs of the payment chain actor, i.e. own costs of generating/producing the payment service (incurred by service entities) or using the service (in the case of consumers); internal costs are equal to private costs less external costs;
- ***private/total*** – the sum of internal and external costs of a given entity in the payment chain;
- ***total net*** – the sum of total costs for all entities in the payment chain less the sum of revenues earned by each entity from other entities in the payment chain due to operating payment instruments;

[3] De Nederlandsche Bank, *The cost of payments*, "DNB Quarterly Bulletin", 2004, March, pp. 57–64; Brits H. and Winder C., *Payments are no free lunch*, "DNB Occasional Studies", 2005, vol.3, no. 2.

[4] National Bank of Belgium, *Coûts, avantages et inconvénients des différents moyens de paiement*, Brussels 2005, https://www.nbb.be/doc/ts/publications/brochures/moyenpaiement.pdf; National Bank of Belgium, *Costs, advantages and drawbacks of the various means of payment*, "Economic Review", 2006, June, pp. 41–47.

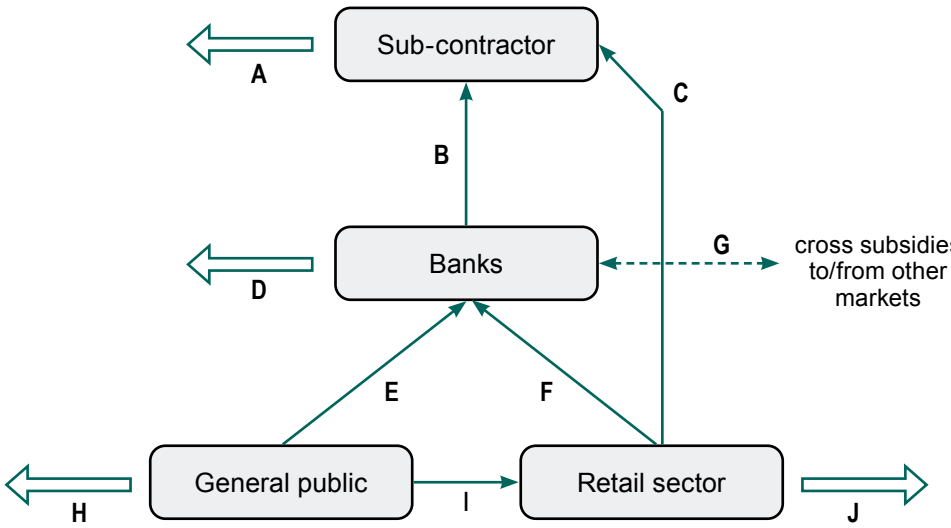
[5] Bergman M., Guibourg G. and Segendorf B., *The costs of paying – Private and social costs of cash and card*, "Sveriges Riksbank Working Paper Series", 2007, no. 212.

[6] Brits H. and Winder C., *Payments are no free lunch*…, op. cit., pp. 8–9.

– ***social, societal, resources*** – the sum of internal costs of all actors in the payment chain; social costs are equal to total net costs. Social costs are defined as the costs of resources in terms of capital and labour which are used in the production of payment services.

The above list should be supplemented by ***revenues***, i.e. values (e.g. fees, commissions) received from other entities in the payment chain. The most important players in the payment chain include banks, sub-suppliers, retailers and the society. The cost flows for the above mentioned participants are shown in figure (Diagram 1).

Diagram 1. Internal and external costs of payment system participants



Block arrows (A, D, H, J) – represent the internal costs of payment instruments borne by individual participants in the payment chain.

Regular arrows (B, C, E, F, I) – represent fees for transactions borne by individual participants in the payment chain for the benefit of others.

Dashed arrow (G) – represents cross subsidies to or from other areas of banking activity.

Source: Bergman M., Guibourg G., and Segendorf B., *The costs of paying – Private and social costs of cash and card…* op. cit., p. 6.

According to the literature on the subject, social costs can be calculated by summing up the internal cost items or net private costs of all actors in the payment chain (Table 1). The result obtained should be reduced by the costs of seigniorage, i.e. the lost interest income for resources stored in cash. The seigniorage is not linked with the actual consumption of labour resources and capital. Consequently, the social cost of cash equals A + D + H + J – S, i.e. the sum of internal costs of all participants in the payment chain, less the seigniorage.

Table 1. Components of private costs, internal costs, net private costs and social costs

	Private costs	Internal costs	Net private costs
Sub-contractors	A	A	A – B – C
Banks	B + D	(B + D) – B	(B + D) – E – F
Shops (retail sector)	C + F + J	(C + F + J) – C – F	(C + F + J) – I
General public	E + H + I	(E + H + I) – E – I	E + H + I
Total		A + D + H + J	A + D + H + J
Correction for seigniorage		– S	– S
Social costs		A + D + H + J – S	A + D + H + J – S

Source: Own study based on Bergman M., Guibourg G. and Segendorf B., *The costs of paying – Private and social costs of cash and card…*, op. cit., p. 6.

1.2. Cost components of the main actors in the payment chain

The Dutch study identified the costs of the main participants of the payment market.[7] They include: central banks, commercial banks, shops and consumers. These parties bear the costs of internal and external payments and earn certain revenues which, at the same time, represent external costs of one of the other three participants.

The central bank bears costs related to cash. The internal costs of the central bank include items related to[8]:

- production and distribution of banknotes and coins,
- departments organising and managing cash flow logistics,
- product development (banknote design and technical specifications, counterfeit detection equipment),
- checks on the authenticity and fitness of banknotes for recirculation (audits, logistics, transportation),
- storage and security (vaults).

However, the central bank does not incur external costs associated with cash or other payment instruments (mint, securities companies, cash transport and handling companies, cash sorting companies, etc. in the Dutch survey are included as part of the central bank).[9]

Commercial banks also play a very important role in the cash distribution process, as they use bank outlets and ATMs for this purpose. The specification of internal and external costs for both cash and payment cards is presented in Table 2.

[7] Brits H and C. Winder, *Payments are no free lunch…*, op. cit.
[8] Ibid., pp. 14–16.
[9] Górka J., *Koszty społeczne i prywatne instrumentów płatniczych*, [Social and private costs of payment instruments] „Materiały i Studia NBP", 2009, no. 231.

Table 2. Internal and external expenses of commercial banks related to cash and payment cards

Commercial banks	
Internal costs	**External costs**
a) for cash ▪ night deposit boxes used by shops ; ▪ cash centres; ▪ administration counting, checking authentication, sorting and packaging banknotes; ▪ staff accepting cash and entering data concerning cash in the accounting system, **b) for electronic payment instruments** ▪ maintaining the infrastructure enabling processing of electronic payments; ▪ production and distribution of payment cards; ▪ product development, including product safety; ▪ administrative activities (including control audits, customer information departments)	– transfers to shops and consumers (e.g. on account of interest on current deposits)

Source: Own study based on Brits H. and Winder C., *Payments are no free lunch…* op. cit., p. 11.

Table 3. Internal and external costs of payments borne by retail and service outlets

Retail and service outlets	
Internal costs	**External costs**
– costs of purchase/lease of a payment terminal – costs of purchasing cash registers – duration of payment with a given payment instrument, measured by the rate of the employee's wage – time spent on counting notes and coins, their packaging and transporting to the bank's branch	– merchant's fees paid to the acquirer

Source: Own study based on Brits H. and Winder C., Payments are no free lunch… op. cit., p. 11.

The list of costs related to payments incurred by shops, broken down into internal and external costs, is presented in Table 3.

From consumers' point of view, internal costs are equivalent to the time of making payment using a given payment instrument, as expressed in money. The time of reaching the ATM, the consumer's time spent while standing in a line at the ATM or cash register and the time spent on topping up the electronic purse shall be added. Estimation of consumer costs was performed in the Swedish survey.[10] This project focused on consumers' private and social costs for cash and payment cards. The main cost was the annual fee for using the card (Swedish consumers very rarely paid for withdrawing money from an ATM). It was referred to the number of ATM withdrawals and card transactions (by debit and credit cards). In addition, the following costs were estimated: (1) costs of maintaining liquidity calculated as a percentage of cash resources held for transaction purposes (calculated as half of the average cash withdrawal from an ATM), (2) so called *shoe leather costs* related

[10] Bergman M., Guibourg G., and Segendorf B., *The costs of paying – Private and social costs of cash and card…*, op. cit.

to cash withdrawal in the nearest ATM, and (3) time needed to perform a transaction at the shop's cash desk. The analysts also pointed to the risk of carrying cash.

In the reports, the costs were also divided into the so-called "*front office*" and "*back office*". In the case of merchants, the costs of the *front office* are the costs of labour involved in processing payments. On the other hand, the *back office* costs include: preparing, emptying and balancing cash registers, cash management, preparing the daily takings for deposit, supplying cash-on-hand (change) and cash register rolls and the related administrative burden. Additionally, merchants bear the following costs: purchase and maintenance of payment terminals, telecommunications including debit card processing, irregularities related to cash (including errors in giving change). In addition, cash transport and insurance costs were taken into account.

In the case of banks, the *front office* costs refer to activities related to direct customer contact, in particular branch network costs such as bank cash desk services (cash withdrawals and deposits, delivery of debit cards). Branch expenses are included only to the extent they relate to products associated with retail payments. The *front office* costs also included costs related to devices for recharging electronic purses and ATMs (investment depreciation, maintenance, including physical and IT security upgrades) and the costs of maintaining ATMs. On the other hand, *back office* costs are costs related to cash handling (cash centres, etc.), production and distribution of cards (both for ATM withdrawals and POS payments), maintenance of the interbank computer network, including measures to ensure compliance with the required security conditions, etc. In addition, at the centralised level, there are costs allocated to the retail payment system, such as costs of control and management departments related to, for example, logistics issues, costs of providing information to customers in the form of bank statements and telecommunication costs. These costs have been included only to the extent they relate to retail payments.

1.3. Breakdown into fixed and variable costs

The study of the Bank of the Netherlands and the National Bank of Belgium distinguished between fixed costs, i.e. costs which, unlike variable costs, are not directly related to individual transactions or sales amounts, and variable costs, i.e. costs which can be directly related to a transaction, some of which depend only on whether a transaction has been executed while others are related to the amount of the transaction.[11] Variable costs may be broken down into costs dependent on the number of transactions and turnover-dependent costs. This distinction may help in selecting the most cost-effective payment instruments for a given size of transaction. For electronic instruments, most of the costs are permanent and relate to the IT infrastructure needed to make payments. In their case, variable costs are usually dependent on the number of transactions (from the perspective of processing costs, there is no difference between a transfer of PLN 100 or PLN 1,000). For cash, processing and distribution costs incurred by the central bank and commercial banks are mainly related to the value of the flow of banknotes and coins. The share of fixed costs plays a lower role than in the case of electronic instruments.

[11] It is noted that, in the long run, all costs can be considered as variable. Therefore, a time horizon ranging from 3 to 5 years was assumed in the survey.

1.4. Including an analysis of payment benefits

In addition to the previously mentioned terms related to payments (expenses and revenues), a category of benefits should also be distinguished. The cost can be social or private, the revenue is always private, while the benefit can be both private and social. In American[12] and Australian[13] research, revenue was treated as a private benefit. The social benefit is created as a result of an external effect. It exists not only for an individual, but it applies to the whole group. Social benefits are most often mentioned in the case of consumers. A typical example is the extent of the acceptance network of a given payment instrument (positive externalities, network effects). Other benefits for consumers include, e.g. the security and anonymity of payments, ease of use of the payment instrument, speed of settlement, reliability of the issuer. A question arises as to which of these benefits can be classified as social. However, they are certainly private and non-monetary in nature. Social benefits are not directly recognised in the monetary account of costs of payment instruments.[14, 15]

The elements of the theoretical approach presented here show the diversified possibilities for examining the costs of payments. When interpreting the results, it should be borne in mind that each country has a different payment system, including a different cash circulation model, national payment arrangements and a different structure of use of payment instruments, i.e. different payment habits. Selected results of studies conducted in this field in different countries are presented in chapter two of this report.

[12] Garcia-Swartz D.D., Hahn R.H., and Layne-Farrar A., *The move toward a cashless society: A closer look at payment instrument economics*, "Review of Network Economics", 2006, Vol.5, no. 2, pp. 175–198.

[13] Simes R., Lancy A., and Harper I., *Costs and benefits of alternative payments instruments in Australia*, "Melbourne Business School Working Paper", 2006, no. 8.

[14] Schmiedel H., Kostova G.L., and Ruttenberg W., *The social and private costs of retail payment instruments: a European perspective*…, op. cit., pp. 15–19.

[15] J. Górka J., *Synteza badań kosztów gotówki i bezgotówkowych instrumentów płatniczych* [Synthesis of surveys on costs of cash and non-cash payment instruments], "Problemy Zarządzania", 2012, vol.10, no. 4, pp. 223–241.

Chapter 2

Review of selected studies on the costs of payment instruments carried out worldwide

Review of selected studies on the costs of payment instruments carried out worldwide

2.1. Norwegian research

The analysis of the research achievements in the scope of costs of payments should start with a 2003 survey carried out under the leadership of the Bank of Norway.[16] The private costs of payment instruments incurred by banks were then examined. That survey collected data from 7 banks (out of 28 to which questionnaires were sent) for 2001. The ABC method[17] was used for this purpose. In general, the ABC method is based on the determination and settlement of both direct and indirect costs resulting from undertaking measures necessary to produce and sell services. Direct costs are defined as costs that arise from the direct and exclusive use of resources enabling to create products and offer payment services. In other words, they are costs directly related to measures undertaken on behalf of individual payment instruments and can be allocated in a simple way (e.g. fees, commissions or salaries of employees directly involved in a specific activity related to a given payment instrument). Indirect costs are costs that arise as a result of non-exclusive use of resources enabling production of products and offering of payment services. These are so-called local overheads[18] and costs related to the support functions[19] that are necessary for activities undertaken for the benefit of individual payment instruments. Indirect costs should be allocated using so-called allocation keys. In the Norwegian study, costs of payment services were estimated on the basis of the settlement of activity-based costs using quantitative cost carriers (*cost drivers*).[20] This method will also be mentioned hereinafter in the report when the survey on payment costs under the guidance of the European Central Bank is analysed.

The survey has shown that the unit cost incurred in connection with offering payment services was decreasing over time. On the other hand, income of banks from offering the services was increasing. This was mainly associated with abandoning paper-based payment instruments in favour of electronic instruments (more profitable for banks).

[16] Gresvik O. and Øwre G., *Costs and income in the Norwegian payment system 2001. An application of the Activity Based Costing framework*, "Norges Bank Working Paper", 2003, no. 8.; The Bank of Norway had previously carried out research in 1988 and 1994.

[17] Previous surveys used the method of *Contribution Margin Analysis*.

[18] These are costs which are direct at a level of the organisational unit responsible for providing a given service or product but which cannot be directly assigned to them in an economically viable way, e.g. the function of unit director, secretariat or other supporting functions (e.g. conceptual work) incurred within the organisational unit.

[19] Support functions comprise all functions that relate to: accounting, information and communication technology, secretarial services, decision-making bodies, communication, ceremonies and meetings, linguistic and legal services, planning as well as control and organisation, internal audit, internal affairs, institutional, legal, fiscal and administrative affairs, human resources management, social affairs and internal services.

[20] Górka J., *Konkurencyjność form pieniądza i instrumentów płatniczych* [Competitiveness of forms of money and payment instruments], CeDeWu, Warsaw 2009, p. 132.

In 2009, the earlier project was extended by supplementing it by a cost analysis of the central bank, retail and service outlets, sub-suppliers and consumers.[21] The costs of payment instruments in POS and outside POS were examined. The total social costs of payments were estimated at 0.49% of GDP (of which 0.15% of GDP were costs of cash).

In 2013, another study was carried out[22] taking into account the most commonly used payment instruments in Norway, i.e. payment cards, cash and giro transfers.[23] Based on the Norwegian survey, social costs in 2013 were estimated at 0.48% of GDP, including the social costs of cash, cards and transfers which amounted, respectively to: 0.10%, 0.21% and 0.18% of GDP. Compared to the previous survey, unit costs for cash and payment cards decreased, while for giro transfers they increased, which may have been due to the fact that traders took into account the time-intensity of making their own payments. The share of costs of payment instruments in Norway's GDP, compared to other countries, is relatively low. The unit costs of cash amount to EUR 0.82, of debit cards to EUR 0.37 and of credit cards to EUR 1.61. Banks and acquirers incurred 40% of social costs, households and traders – 21% each, sub-suppliers – 17% and the central bank – 1%.

2.2. Dutch and Belgian studies on social and private payment costs

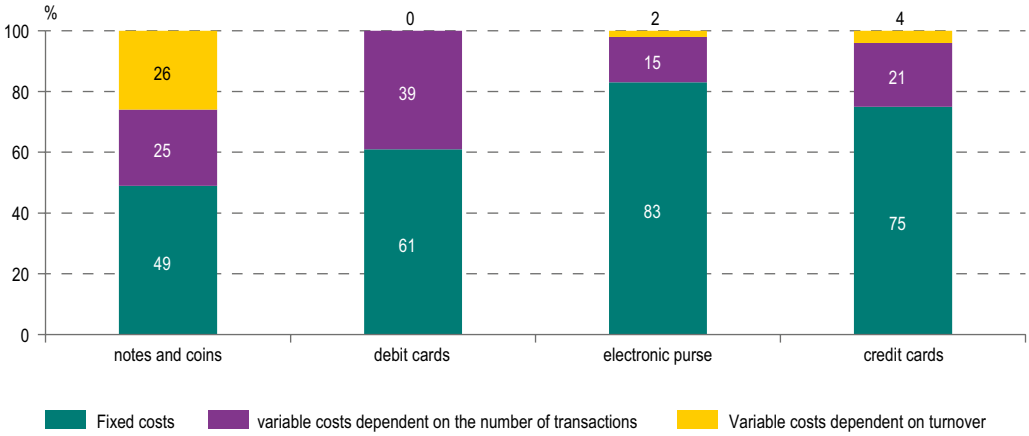
The surveys of the National Bank of Belgium[24] and De Nederlandsche Bank[25] are also worth mentioning. The Belgian studies were largely based on the methodology proposed by De Nederlandsche Bank. The objective of both studies was to: (1) identify and estimate the social costs of payments made at points of sale and (2) measure the savings that can be achieved by replacing expensive payment instruments with cheaper ones. The analysis covered cash payments, payments by electronic purse, debit card and credit card.[26] In the first of the aforementioned countries, data for 2003 were collected and in the second one – data for 2002. Under the survey, three questionnaires were prepared in order to calculate the costs of (1) the financial sector, (2) retailers and (3) consumers (obtaining information on the frequency of cash payments).

Total costs in the surveys under discussion were divided into fixed and variable costs, depending on the number of transactions and the turnover. Chart 1 presents the cost structure for individual payment instruments in the framework of data collected by the National Bank of Belgium.

The highest share of fixed costs (as much as 83%) could have been observed for payments with electronic purses, slightly lower for credit cards (75%) and debit cards (61%). The lowest share of fixed costs was recorded for cash payments (49%), for which variable costs dependent

[21] Gresvik O. and Haare H., *Costs in the Norwegian payment system*, "Norges Bank Staff Memo", 2009, no. 4.
[22] Norges Bank, *Costs in the Norwegian payment system*, "Norges Bank Papers", 2014, no. 5.
[23] In the study, cross-border payments, P2P, payments between banks, payments made by cheque, fuel cards and e-money or cost of recipients of payments incurred for issuing bills and accepting payments were not taken into consideration.
[24] National Bank of Belgium, *Coûts, avantages et inconvénients des différents moyens de paiement*…, op. cit.; National Bank of Belgium, *Costs, advantages and drawbacks of the various means of payment*…, op. cit.
[25] De Nederlandsche Bank, *The cost of payments*…, op. cit., pp. 57–64; Brits H. and Winder C., *Payments are no free lunch*…, op. cit.
[26] Cheques, Shopping Cards, Diners Club Credit Cards and American Express Cards were not included in the survey.

Chart 1. Share of variable and fixed costs in social costs of payment instruments in Belgium in 2003



Source: Own study based on the study by the National Bank of Belgium, *Costs, advantages and drawbacks of the various means of payment…* op. cit., p. 43.

on turnover (26%) and the number of transactions (25%) were almost equally distributed. In the case of electronic instruments, costs dependent on the number of transactions prevailed. No turnover – dependent costs were observed for debit cards, while the share for electronic purses and credit cards was very small (2% and 4% respectively).

In Belgium, the average total cost per transaction for cash, debit cards and electronic purse was very similar (EUR 0.53, EUR 0.55 and EUR 0.54, respectively). A significantly higher value was recorded for credit cards – EUR 2.62. The results for the Netherlands turned out to be more varied – the cheapest in this respect was cash (EUR 0.30), a debit card (EUR 0.49) and an electronic purse (EUR 0.93) turned out slightly more expensive while a credit card (EUR 3.59) was most expensive. In terms of turnover per euro, the cheapest instrument was a debit card, while the most expensive was an electronic purse. Such a high score for the latter payment instrument resulted mainly from the fact that it was used for a relatively small number of low-value transactions. On the other hand, costs for cash and credit cards were similar and almost equal in both countries. While analysing only variable costs, an electronic purse turned out to be the cheapest instrument in the Netherlands. A credit card was always more expensive than a debit card. The report concluded that taking into account only the cost criterion, it should not be a preferred payment instrument regardless of the size of the transaction.

Based on the survey of the Bank of the Netherlands, total social costs were estimated at EUR 2.9 billion, i.e. 0.65% of GDP. The average cost per payment transaction was 35 euro cents. In Belgium, social costs of payments to the financial sector, cash issuers (the National Bank of Belgium, the Belgian Royal Mint) and the retail sector were estimated at EUR 2.034 billion, or 0.74% of GDP (including 0.58% for cash, 0.11% for debit cards, 0.04% for credit cards, 0.02% for electronic purses). It was calculated that 50.5% of the cost of payments had been borne by the retail sector, 47.1% by the financial sector and 2.3% by the institutions issuing cash. In the Dutch survey it was calculated that for a transaction at a level of EUR 11.63, costs of cash and debit card payments were equal (below this amount cash was cheaper, above this amount – a debit card was cheaper). According to the Belgian estimate, this amount reached EUR 10.24.

It is worth stressing that the Netherlands is an example of a country where debit card payments have become less expensive than cash payments. This was confirmed by another survey performed by the Bank of the Netherlands in 2012.[27] The cost of the average cash payment at that time amounted to EUR 0.44 whereas the cost of the average debit card payment was EUR 0.30. In 2002–2012, the number of debit card payments more than doubled to 2.5 billion while the use of cash decreased to 3.8 billion transactions (from 7.1 billion in 2012). As a result of the changing payment behaviour of the Dutch people and the development of non-cash transactions, the total cost of cash and debit card payments for the society dropped by 10% (from over EUR 2.6 billion in 2002 to less than EUR 2.4 billion in 2012). In relation to GDP, the social costs of total payments decreased from 0.57% to 0.40% of GDP. The author of the report expected the trend of increased use of payment cards and decreased use of cash to continue. The report of the Bank of the Netherlands claimed that from the cost perspective such a change would be beneficial for the general public.[28]

2.3. Swedish survey taking into account consumer costs

The Bank of Sweden conducted another study of the cost of payment instruments at points of sale. In 2004, costs of private payment instruments (cash, debit cards and credit cards) were examined from the point of view of banks.[29] This analysis was subsequently extended in 2007.[30] With the use of previously collected data from 2002, the social costs of cash and payment cards for all actors in the payment chain were estimated.

It is worth emphasising that the project had a very wide range of subjects. The study covered: the central bank and cash sorting plants, commercial banks and post offices, the general public (payers, including mainly consumers), shops (retail sector), clearing system operators (*switches*) and transport companies. In the Swedish survey, a group of so-called sub-suppliers was also distinguished. This study differs from the previous ones since it includes consumer social costs (not calculated in the Dutch or Belgian study). Payment habits were also the subject of interest.

The study report presents the results broken down into costs (private and social) of cash and costs (private and social) of payment cards and compares both payment instruments in terms of social costs. Another interesting point is the comparison of consumers' private costs with the real choice between cash and a payment card. The method developed by the Bank of the Netherlands was used to calculate the cost of the additional transaction for a particular payment instrument. Costs are also divided into fixed and variable. As a result of research efforts undertaken, it was calculated that the total social cost for cash, debit and credit cards amounted to 0.4% of Sweden's GDP for 2002. Taking into account the social costs per transaction, cash turned out to be most expensive (EUR 0.52) whereas credit cards were only slightly cheaper (EUR 0.50). Debit cards had the lowest social costs per transaction, amounting to 34 euro cents. Costs were calculated for average transaction values amounting

[27] Jonker N., *Social costs of POS payments in the Netherlands 2002–2012: Efficiency gains from increased debit card usage*, "DNB Occasional Studies", 2013, vol.11, no. 2.
[28] Ibid.
[29] Guibourg G. and Segendorf B., *Do Prices Reflect Costs? A study of the price- and cost structure of retail payment services in the Swedish banking sector 2002*, "Sveriges Riksbank Working Paper", 2004, no. 172.
[30] Bergman M, Guibourg G., and Segendorf B., *The costs of paying – Private and social costs of cash and card…*, op. cit.

to approx. EUR 18 for cash and approx. EUR 68 for card payments. The aforementioned electronic instruments, for payments above EUR 8 (debit cards) and EUR 18 (credit cards), proved to be cheaper than cash in terms of social costs.

2.4. Pan-European survey on the cost of payments under the leadership of the European Central Bank

Examination of the costs of payments was also of interest to the European Central Bank. The aim was to obtain reliable estimates of the social and private costs of payment instruments and to enable comparability of results due to the Pan-European nature of the survey. The four-year project[31], in which the data for 2009 were collected, was conducted under the leadership of the ECB and involved 13 countries represented by the following central banks: (1) Danmarks Nationalbank (Denmark), (2) Eesti Pank (Estonia), (3) Central Bank of Ireland (Ireland), (4) Bank of Greece (Greece), (5) Banco de Espana (Spain), (6) Banca d'Italia (Italy), (7) Latvijas Banka (Latvia), (8) Magyar Namzeti Bank (Hungary), (9) De Nederlandsche Bank (Netherlands), (10) Banco de Portugal (Portugal), (11) Banca Nationala a Romaniei (Romania), (12) Suomen Pankki (Finland) and (13) Sveriges Riksbank (Sweden). These countries represented about 40% share of the EU payment market in terms of the number of payments (46% in cash payments and 30% in non-cash payments). The ECB extrapolated the results to all 27 EU countries and divided all EU Member States into 5 clusters in terms of similarities from the point of view of the subject of the study.

The countries that participated in the project differed significantly in terms of the structure of use of payment instruments. On average, cash was the most widely used payment instrument, accounting for 69% of the transactions for the examined sample (65% for the EU-27). The use of cheques was marginal or zero in the majority of the countries surveyed. Some payment instruments, despite their noticeable role in a given country, were not very important on a European scale and were therefore not included in the project.

2.4.1. Basic elements of the ECB's survey methodology

In the ECB survey, social and private costs were defined in a similar way as in the survey of De Nederlandsche Bank and the National Bank of Belgium (cf. Subchapter 2.2). Costs were divided into internal and external. Private costs meant costs borne by each payment market participant individually. They represented the sum of internal and external costs. The social costs were equal to the sum of all internal costs incurred by the participants in the payment chain in order to carry out transactions at points of sale. Benefits related to payment instruments were not included in the survey. Data were collected by the central banks of countries which participated in the project and the base year was 2009. All cost items were reported in national currencies.

The scope of the European survey was broad and comprised:

[31] Preparation for the survey started in 2008, the data were collected for 2009 and the report was published at the end of 2012.

- issuing authorities – central banks and governments[32];
- banks and interbank infrastructure providers (automated clearing houses, ATM networks, etc.);
- cash-in-transit companies;
- retailers.

The study covered the following payment instruments: (1) cash, (2) cheques, (3) debit and credit cards[33], (4) direct debit and credit transfer up to EUR 50,000. The rule was that payment instruments with at least 5% share in the number of non-cash transactions were taken into account.

In the analysis of bank costs, the ABC method was used which is based on the allocation of direct and indirect costs between individual payment instruments. In the case of the questionnaire for retailers, a simplified approach was applied.

In order to determine the total number and value of cash payments, a review of the methods for their estimation and measurement was performed. The ECB report distinguishes and describes in detail the following 7 methods for measuring the extent of using cash at the national level:

1. a consumer survey,
2. the "cash withdrawal data" approach,
3. a retailer survey,
4. the "cash register statistics" method,
5. the "merchant deposit statistics" method,
6. the "consumption residual" method[34],
7. the "circulation residual" method.[35]

[32] The ECB survey did not take into account the costs related to euro banknotes, which reduced the estimate of costs borne by central banks in relation to cash, Schmiedel H., Kostova G. L., and Ruttenberg W., *The social and private costs of retail payment instruments: a European perspective*…, op. cit., p. 21 and p. 31.

[33] With regard to credit cards, only costs associated with the payment process were taken into account in the survey. On the other hand, costs relating to e.g. granting of a loan are excluded.

[34] The "consumption residual" method is a method of determining the value of cash transactions executed at points of sale calculated as a difference between the value of household consumption and the value of non-cash transactions, Schmiedel H., Kostova G. L., and Ruttenberg W., *The social and private costs of retail payment instruments: a European perspective*…, op. cit., pp. 46–47.

[35] The "circulation residual" method is a method of determining the value of cash transactions executed at retail and service outlets through an attempt to isolate the share of cash resources that are maintained in order to carry out transactions (at the same time, it is necessary to make an estimation of ready resources that serve other purposes – e.g. which are collected for the future or used for P2P settlements), ibid.

Table 4. Methods used to estimate the number and value of cash transactions in countries which participated in the ECB project

Country	Consumer survey	Cash withdrawal data	Retailer survey	Merchant deposit statistics	Consumption residual	Other method
Denmark	„X"					
Estonia					„X"	X
Finland		X				„X"
Greece					„X"	
Hungary	„X"				„X"	
Ireland					„X"	
Italy		„X"			„X"	
Latvia	X		„X"		X	
Netherlands	„X"	X	X	X	„X	
Portugal		„X"	„X"	„X"		
Romania	„X"		„X"			
Spain			„X"		„X"	
Sweden	„X"	„X"		X	X	

X denotes the method(s) used by each country's central bank for the estimation of the volumes and values of cash payments. Some central banks used various estimation methods to confirm the robustness of estimates and then selected the most appropriate estimations based on expert opinions. "X" marks the method(s) used for the final cash estimation of the volumes and values of cash payments. None of the central banks used the "Cash-register statistics" or the "Circulation residual" methods; therefore, they are excluded from the table.

Source: Schmiedel H., Kostova G.L. and Ruttenberg W., *The social and private costs of retail payment instruments: a European perspective…* op. cit., p. 47.

2.4.2. Survey on the costs of payments incurred by banks using the ABC method

The ABC method was selected to calculate the costs related to offering of payment instruments in the European Central Bank survey. Its choice was driven by the high share of indirect costs in the costs incurred by participants in the payment chain as well as the differences in the use of resources exploited to enable offering of payment services. The ABC method allows for the breaking down activities performed by market participants into activities directly and indirectly related to individual payment instruments. Relevant measures with respect to each payment instrument and market participant were identified in the survey questionnaires. On the basis of these activities, the direct and allocated indirect costs observed were summed up.

2.4.3. Survey on the costs of payment instruments for retailers and companies

The European Central Bank's project focused exclusively on economic sectors where businesses have a direct relationship with the consumer. The survey was addressed to retailers and companies operating in the area of "non-financial services", while the industrial sector and other *Business-to-Business* (B2B) activities were excluded. The survey covered mainly representatives of the following industries: retail trade, transport, telecommunications, accommodation, food, real estate activities and other services. Moreover, public utility services (e.g. payments for electricity, fuel, etc.), which are most often provided by several larger companies, have been taken into account.

The survey addressed to retailers and entrepreneurs was based on a predefined division of the retail sector. Three categories of purchases related to typical payment patterns were distinguished: (1) remote purchases, (2) over-the-counter (OTC) purchases, (3) other purchases.[36]

The final decision concerning the research sample and the entity that collected the data (central bank, specialised research company or other entity) in terms of retailers and businesses was taken by the central banks participating in the project, taking into account the specific characteristics of the country concerned.

2.4.4. Aggregate results of the survey on costs of payments survey for 13 countries

As a result of estimates for all payment instruments it was found that the overall cost level was composed of two thirds of direct costs and one third of indirect costs. Chart 2 presents a breakdown of costs into direct and indirect costs for individual market participants and payment instruments.

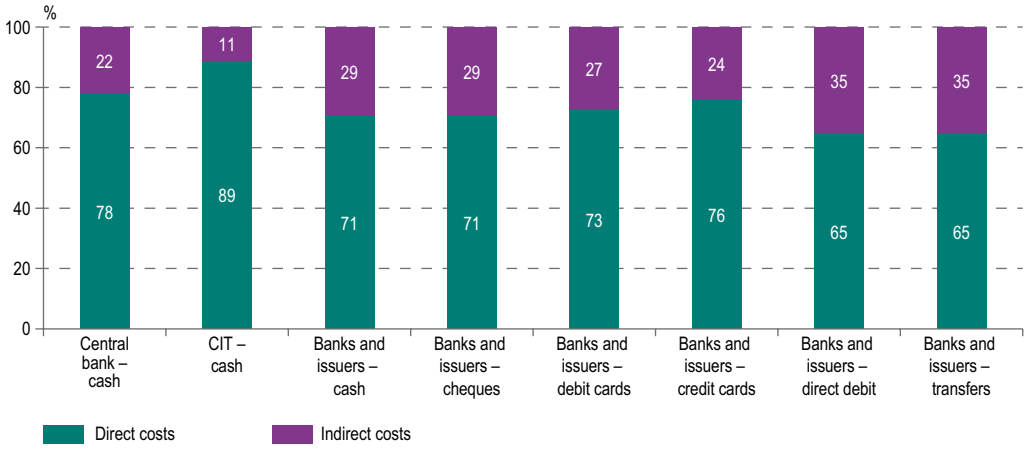
The report also presents the main components of private costs for particular payment instruments from the point of view of the entities offering them. For central banks, cash was primarily associated with costs related to the issuance of coins and banknotes (more than two thirds of the costs). Another important item included costs of insurance, processing and transport of cash (27%). On the other hand, three most important cost components for cash on the part of banks, payment infrastructure providers and companies transporting and handling cash were related to: cash withdrawals (47%), deposits (21%) and cash collection and transport (11%).

In the case of payment cards, 14 measures were identified as necessary to estimate the costs associated with these payment instruments. Costs were distributed roughly equally between these activities. The three most important ones for debit cards from banks' point of view included: purchase management[37] (18%), payments (14%) and transaction processing (10%). For credit cards, they included: acquisition of new customers and credit risk analysis (18%), management and monitoring of activities (12%) and customer service (12%). In the case of

[36] Purchases with a relatively high value where payment is often made after the goods or services have been delivered. The supply side includes entities offering professional services (dentists, architects, etc.), jewellers or service providers. These entities accept cheques and bank transfers (credit transfer and direct debit) which may not be accepted in the case of the other two categories.

[37] These were the costs of managing purchases made with the use of a payment terminal, e.g. related to IT or communication, interbank fees, commissions.

Chart 2. Share of direct and indirect private costs broken down by payment instrument and market participant



Source: Schmiedel H., Kostova G.L. and Ruttenberg W., *The social and private costs of retail payment instruments: a European perspective…* op. cit., p. 31.

cheques – depositing cheques (34%), for direct debit – customer service (25%) whereas for credit transfer – its processing (37%).

The private costs of the merchants were divided into the following costs: *front office*, *back office*, terminal, telecommunications, deposits, storage and transport. Costs of *front office* were calculated through multiplying the time needed for executing the transaction by the average wage rate of an employee. Regardless of the payment instrument under consideration, *back office* costs had the highest share. However, the differences between individual instruments were considerable. For cash and debit cards, the share of *back office* costs was 40%, while for credit cards – 72%. Another item included the *front office* costs which, for example for debit cards, reached 39% and for cash – 32%.

The most important results obtained as a result of the studies undertaken carried out under the leadership of the ECB are as follows:

1. the social costs of retail payment instruments amounted to EUR 45 billion, i.e. 0.96% of GDP for 13 countries participating in the project. As a result of extrapolation of calculations to all EU Member States, it was estimated that the result would not change significantly – the social costs of retail payment instruments would also amount to approx. 1% of GDP, i.e. EUR 130 billion.
2. half of the social costs of payments were borne by banks and payment infrastructure providers while 46% were covered by retailers. The remaining part was incurred by central banks (3%) and cash transporting and handling companies (1%).
3. retailers incurred higher private costs (0.59% of GDP) than banks and payment infrastructure providers (0.49% of GDP) since their external costs in favour of the remaining participants of the payment chain were higher.
4. banks incurred slightly higher costs for cash than for payment cards.
5. retailers incurred the highest costs in connection with accepting and using cash. More than 60% of social costs of retailers were related to cash payments.

6. due to the substantial use of cash, the social costs of cash amounted to almost a half of the social costs. Among the countries surveyed, 69% of transactions were made in cash. On average, social costs of cash amounted to 0.49% of GDP, which means that compared to cards (0.23% of GDP), transfers (0.17% of GDP), cheques (0.08% of GDP) and direct debit (0.06% of GDP), it was a significant share.
7. on average, the lowest social cost per transaction was recorded for cash payments (EUR 0.42), followed by debit card payments (EUR 0.70). The figure for direct debit was EUR 1.27, for credit transfer – EUR 1.92 and for credit cards – EUR 2.39. The most expensive in this respect were cheques – EUR 3.55.
8. in some countries, cash did not reach the lowest unit social cost. In more than one third of countries, a debit card was the cheapest payment instrument in this sense (e.g. in Denmark, Finland, the Netherlands and Sweden).
9. the market of retail payments demonstrated a relatively high share of indirect costs, in particular for non-cash instruments.
10. estimates from Denmark and Hungary have shown that by adding household and consumer costs to the social costs of retail payments, an average of 0.2% of GDP should be added.
11. it should be kept in mind that both the countries that participated in the project and the remaining EU members had a different market for retail payments. Some payment markets were more similar to each other, others completely different in terms of social costs, market development or payment habits. The ECB divided the European market in the context of retail payments into five clusters:
    a) cluster 1: Denmark, Sweden and Finland – for which the estimated social costs amounted to 0.80% of GDP;
    b) cluster 2: Austria, Germany, the Netherlands and Luxembourg – for which the estimated social costs amounted to 0.92% of GDP;
    c) cluster 3: Belgium, Estonia, Spain, Portugal, Slovenia and the United Kingdom – for which the estimated social costs amounted to 1.11% of GDP;
    d) cluster 4: Cyprus, France, Greece, Ireland, Italy, Malta and France – for which the estimated social cost was 1.20% of GDP;
    e) cluster 5: Bulgaria, the Czech Republic, Hungary, Latvia, Lithuania, Poland, Romania, and Slovakia – for which the estimated social costs amounted to 1.01% of GDP.

It is worth noting that, according to the ECB, the lowest social costs of payments in the EU are recorded for Denmark, Sweden and Finland (0.80% of GDP), i.e. the European leaders in terms of the number of non-cash transactions by payment cards.

2.4.5. Hungarian central bank survey conducted under the ECB project

Several countries participating in the ECB project published national reports enabling a more accurate insight into the results achieved and also presenting elements that went beyond the methodology proposed by the ECB.[38]

A survey carried out by the Hungarian central bank, Magyar Nemzeti Bank, in the framework of the ECB project[39], provided important conclusions for the development of non-cash transactions. The social costs of payment instruments in Hungary calculated on the basis of collected data, amounted to HUF 388 billion or 1.49% of GDP.[40] Such a high result could be due to the extended scope and subject matter of the survey compared to the ECB core methodology, as well as the high share of cash payments in Hungary. In addition to calculations for the real scenario (in which social unit costs were the lowest for cash), a simulation of savings possible to achieve as a result of the adoption of the payment structure characteristic of Northern European countries, where the use of cash is lower while other paper instruments were largely replaced by electronic settlements, was carried out. The social costs of payments in the case of this scenario were estimated at HUF 285 billion or 1.09% of GDP. As a result of the increase in the use of non-cash instruments, their social unit cost decreased significantly, which resulted in savings estimated at approximately HUF 103.31 billion, i.e. 0.4% of Hungarian GDP.

[38] The countries that published the national reports are as follows: Denmark (Danmarks Nationalbank, *Costs of payments in Denmark*, Copenhagen 2011. http://www.nationalbanken.dk/en/publications/Documents/2012/04/betaling_engelsk_samlet_web.pdf), Hungary (Turján A. et al., *Nothing is free: A survey of the social cost of the main payment instruments in Hungary*, "MNB Occasional Papers", 2011, no. 93., http://mek.oszk.hu/12000/12096/12096.pdf), Sweden (Segendorf B. and Jansson T., *The cost of consumer payments in Sweden*, "Sveriges Riksbank Working Paper Series", 2012, no. 262. http://www.riksbank.se/Documents/Rapporter/Working_papers/2012/rap_wp262_120619.pdf), The Netherlands (Jonker N., *Social costs of POS payments in the Netherlands 2002–2012: Efficiency gains from increased debit card usage*…, op. cit. http://www.dnb.nl/binaries/OS2_tcm46–288179.pdf), Latvia (Latvijas Banka, *The Bank of Latvia review of social costs of retail payment instruments in Latvia*, Riga 2013. http://www.bank.lv/images/stories/pielikumi/publikacijas/citaspublikacijas/MaxLidzekli_EN.pdf), Italy (Banca d'Italia, *The social costs of payment instruments in Italy. Survey of firms, banks, and payment service providers*, Rome 2012. https://www.bancaditalia.it/pubblicazioni/tematiche-istituzionali/2012-costo-sociale/social_costs_payment_instruments_Italy.pdf), Ireland (O'Toole R., *The Usage, Cost and Pricing of Retail Payments in Ireland*, "Central Bank of Ireland Quarterly Bulletin", 2013Q2, pp. 74–84. https://centralbank.ie/docs/default-source/publications/quarterly-bulletins/qb-archive/2013/qb2–2013.pdf?sfvrsn=6#page=76), Portugal (Banco de Portugal, *Os custos sociais dos instrumentos de pagamento de retalho em Portugal*, Lisbon 2013. https://www.bportugal.pt/sites/default/files/anexos/pdf-boletim/estudo%20-%20julho%202013.pdf), Finland (Nyandoto E., *Vähittäismaksamisen kustannukset pankeille*, "Bank of Finland Online", 2011, no. 7. http://www.suomenpankki.fi/fi/julkaisut/selvitykset_ja_raportit/bof_online/Documents/BoF_Online_07_2011.pdf).

[39] Turján A. et al., *Nothing is free: A survey of the social cost of the main payment instruments in Hungary*…, op. cit.

[40] Cash transactions – 0.80% of GDP, card payments – 0.19% of GDP, credit transfers – 0.29% of GDP, direct debits – 0.03%, B2B direct debits – 0.00003%, incoming postal money orders – 0.15%, outgoing postal money orders – 0.03%.

Chapter 3

Methodology of the NBP research project on the costs of payment instruments on the Polish market

Methodology of the NBP research project on the costs of payment instruments on the Polish market

3.1. Objective of the research project

The objective of the research project was to estimate the social and private costs of retail payments incurred by individual parties in the payment chain in connection with use of the most important payment instruments. The performance of such a survey, for the first time for the Polish market, required determining of costs broken down into internal and external and their estimation by payment instruments. Social costs of payments for all entities as well as payment instruments, were expressed in absolute terms (in PLN billion) and as a percentage of GDP generated in Poland.[41]

It is worth stressing that the implementation of the survey had a considerable cognitive potential in the scope of obtaining the data of significant economic and governance importance. As the estimates of the European Central Bank under the pan-European project, described in Chapter 2.4 show, the social cost of payments amounts to approx. 1% of GDP (for a sample of 13 EU countries), with the highest national level of these costs in total amounting to 1.35%.[42] In general, the greatest burden of social costs of payments was covered by European banks. On the other hand, costs related to cash flow accounted for half of all costs of retail payments (49%). Nevertheless, the average social costs of cash showed the lowest rate per transaction (EUR 0.42) and were significantly lower than the second cheapest payment method, i.e. the debit card (EUR 0.81). On the other hand, a credit card (EUR 2.79) and a bank transfer (EUR 2.22) turned out to be the most expensive electronic payment methods. In Poland, it was estimated a few years ago that about 1% of GDP is accounted for by cash costs alone.[43] From the research point of view, it was therefore interesting to verify these estimates and compare the costs of payment instruments in Poland with the corresponding costs in other European countries.

Moreover, results of the surveys concerning the implementation of technological innovation in the payment services market[44] indicate a common problem of high up-front outlays and

[41] The Gross Domestic Product of Poland in 2015 amounted to PLN 1,800,228 million. GUS data — *Statistical Yearbook of the Republic of Poland 2018*, Statistics Poland, Warsaw 2018.

[42] Schmiedel H., Kostova G.L., and Ruttenberg W., *The social and private costs of retail payment instruments: a European perspective…*, op. cit., p. 47.

[43] Programme "From paper to digital Poland" – the most important information and current status of work, https://www.gov.pl/documents/31305/0/prezentacja_programu_od_papierowej_do_cyfrowej_polski_2.pdf/0f3d57c6–03b6–97ad-e8a6–14d26af30fbf, p. 23.

[44] Bolt W., Jonker N., and Plooij M., *European retail payments systems: Cost, pricing, innovation and regulation*, [in:] *The Palgrave Handbook of European Banking*, ed. Beck T. and Casu B., Palgrave Macmillan UK, London 2016, p. 173.

postponed return on investment. Combined with the initially small number of transactions for new payment solutions and the consequent unfavourable economies of scale.[45]

3.2. Material and subjective scope and the base year of the survey

Initially, it was planned to conduct a survey comprising data for 2014, but subsequently it was decided to change the base year to 2015. This postponement (from 2014 to 2015) was associated with major changes on the Polish payment market. These changes included in particular a significant reduction in interchange fee rates and accompanying innovation processes such as the development of mobile payments and instant transfers which re-modelled the provision of payment services covered by the research. It was recognised that data for 2015 should be more stable and allow for a broader coverage of innovation instruments than data for 2014.

The study covered the following personal and material scope:

1. **subjective scope of the research project** – the project covered various types of entities, both on the supply and demand side of the payment chain:
   a) the central bank;
   b) banks;
   c) payment infrastructure providers (including, but not limited to, clearing houses, acquirers, national payment institutions);
   d) retailers;
   e) CIT firms,[46]
   f) consumers.
2. **subject matter of the research project** – the subject matter was very broad and covered both traditional and innovative payment instruments:
   a) cash;
   b) prepaid cards;
   c) debit cards;
   d) credit/charge cards;
   e) mobile payments, e.g. Blik and PeoPay;
   f) credit transfers;
   g) direct debit.

The survey covered only domestic payments, i.e. payments made in the territory of the Republic of Poland with payment instruments issued in Poland. In the case of the survey of banks and payment infrastructure providers, it would be difficult to precisely separate the costs of transactions of individual customers, therefore costs of all payments below PLN 200 thousand (corresponding to EUR 50 thousand in the ECB survey) were estimated. Enterprises from the retail trade and services sector were selected for the survey. This means that the survey covered retail payments, including part of B2B transactions.

[45] Beijnen C. and Bolt W., *Size matters: Economies of scale in European payments processing*, "Journal of Banking & Finance", 2009, Vol.33, no. 2, pp. 203–210.

[46] Due to the very low return rate of surveys by CIT firms, the costs of these entities were estimated on the basis of data obtained from banks.

3.3. Questionnaire surveys and cost classification

In the framework of the research project, four survey questionnaires were developed, addressed to:

1. banks,
2. payment infrastructure providers,
3. enterprises,
4. CIT firms.

The survey questionnaires were developed on the basis of the assumptions of the aforementioned 2012 European Central Bank survey. It resulted from the relevance and comprehensiveness of the above mentioned study. That project took into account research experience in the area of payment costs of several countries and it was a starting point for the development of a certain general methodological framework for the Polish project. In addition, the questionnaires addressed to banks and payment infrastructure providers and the comprehensive instructions for completing them were prepared on the basis of materials of the Norwegian central bank.[47] However, during the analysis and adjustment to the Polish payment market conditions, extensive methodological, conceptual and technical changes were introduced.

It is worth emphasising that the questionnaires for banks and payment infrastructure providers are complex tools intended for measuring the costs of payment instruments, enabling the study of various types of institutions (in particular, this refers to a very diversified group of "payment infrastructure providers"). They allowed a separate comparison of costs for payment methods used for physical use (cash, payment cards, mobile payments) and in the electronic environment (transfer, direct debit, pay-by-link payments, payment cards of card-not-present type or mobile payments).

The survey questionnaire addressed to enterprises also allows to estimate costs of servicing payment instruments on the part of various types of businesses accepting a comprehensive list of payment methods. The estimation was possible thanks to the use of a number of filtering questions which enable to adjust the list of questions asked during the interview to the specific nature of the activity carried out by a particular respondent. Owing to such solution, the questionnaire comprises the costs for payment methods used in three types of retail transactions: (1) purchases at physical retail and service outlets (cash, payment cards, mobile payments); (2) payments to mass creditors (cash, credit transfer, direct debit); and (3) purchases in the e-commerce environment (specific use of cash on delivery, credit transfer, payment cards and other payment instruments, taking into account the role of online payment operators).

All questionnaires also included questions concerning the number and value of transactions performed by individual payment instruments. For banks and payment infrastructure providers for whom the questionnaires prepared were the most complex, questions were also included on the number of payment devices, properly defined depending on the payment instrument (e.g. number of payment cards, number of ATMs, number of payment terminals, number of bank accounts).

[47] Gresvik O. and Haare H., *Costs in the Norwegian payment system: questionnaires*, "Norges Bank Staff Memo", 2009, no. 5.

The survey questionnaires were designed with the aim to separate the items of internal costs (cost of resources) and external costs (fees and commissions to other surveyed entities[48]). This approach finally made it possible to estimate the social and private costs per payment instrument and per group of respondents. It is also worth adding that in order to increase the accuracy of estimates and to obtain a possibility of verifying the correctness of the analysis of external costs, in the case of the questionnaire addressed to banks and payment infrastructure providers, questions concerning the level of revenues were included. This enabled checking the consistency of the data obtained, on the external cost side, from other groups of respondents and to increase the accuracy of the results across the whole payment system.

The questionnaires (including the instructions for filling them in) were designed in cooperation with the Members of the Working Group and other external experts. They were consulted and agreed several times in working subgroups. They were also submitted for the opinion of the aforementioned external expert on methodology. This expert expressed a positive opinion with regard to the survey questionnaires: (1) banks, (2) payment infrastructure providers, (3) enterprises. In particular, he recommended the use of the submitted questionnaires in the project studying costs of payments and confirmed that the assumptions of the research project could be implemented on the basis of the above mentioned questionnaires.

Consumers' costs associated with making payments consist of monetary and time costs. Monetary costs include fees paid by consumers and are mainly related to monthly fees for maintaining savings and settlement accounts, holding payment cards and executing payment transactions. Time costs for consumers were converted into monetary costs using the average annual net disposable income per person in households, excluding social transfers, including age-related benefits and survivors' pensions.

Summing up, it should be noted that in the process of designing survey questionnaires for groups of respondents covered by the subject matter of the research project, two main objectives were adopted:

- completeness – in the case of the majority of surveyed groups of entities, covering both direct costs and total indirect costs as well as cost drivers,
- consistency – compatibility of survey questionnaires addressed to the most important groups of entities on the payment market. It makes it possible, on the one hand, to compare the item of external costs borne by a particular group of respondents with the revenue of another group in favour of which those external costs were incurred. On the other hand, it aims to reduce duplication of cost items.

3.4. Research sample selection and data collection methods

Elements of the survey methodology were differentiated depending on the group of respondents:

1. **central bank** – cost estimation based on the NBP internal accounting systems, use of the NBP function valuation method (the function "cash and issue activity" and "payment

[48] Fees and commissions paid by banks to payment card organisations were treated as internal costs in line with the methodology adopted by central banks to include costs of only those actors in the payment chain participating in the study, since payment organisations were not covered by the research scope.

system"); the choice of this method was subject to internal multi-stage consultations at NBP (within the Payment Systems Department, Controlling Department and Cash and Issue Department); this method comprises both direct and indirect costs for selected areas of NBP's activity; the survey, based on the methodology adopted by the ECB, did not take into account the central bank seigniorage; however, in view of the theoretical model presented in Chapter 1 and the importance of this economic category in Poland, below it is indicated how the estimated internal costs of cash would be affected by including the seigniorage;

2. **banks, payment infrastructure providers** – population survey; two separate questionnaires, addressed to banks and payment infrastructure providers, were sent to respondents by NBP;
3. **retailers** – the survey was conducted on the basis of a questionnaire prepared by NBP; the survey was conducted using the method of direct CAPI *(Computer Aided Personal Interview*) by a research agency selected in a tender procedure performed by NBP. NBP, in cooperation with external experts, designed the entire study in a comprehensive manner, taking into account a detailed description of the selection of the research sample. The survey covered groups of entities selling products and services to retail customers as part of their core business as:
   a) physical retail and service outlets – 1,002 entities,
   b) e-commerce – 150 entities, including at least 50% conducting only online sales,
   c) mass creditors – 150 entities.

The survey of enterprises was carried out in three stages:

- **first stage** – telephone recruitment of a respondent and delivery of a cover letter prepared by NBP. Moreover, the respondent was informed when the interview would take place, for which it was necessary for him/her to prepare the issues included in the survey questionnaire.
- **second stage** – conducting the CAPI survey. In addition, the respondent was warned that in the following days he could receive a phone call during which he would be asked to supply the missing information if such a lack of information occurred.
- **third stage** – telephone contact with respondents who did not answer all the questions and filling in the missing data.

4. **consumers** – estimation of costs of payment instruments borne by consumers on the Polish market was performed in two variants. In the first variant, the starting point was the approach used by the European Central Bank to estimate the number and value of consumers' cash payments under the so-called "consumption residual" method. It was based on using the data published by Statistics Poland concerning the value of household consumption in Poland in 2015, the statistical data of NBP and partially the results of the survey of enterprises. The second variant relied on the results of the conducted by NBP in 2016 among consumers and partially on the results of a diary survey conducted by NBP in 2011. In order to achieve the consistency of data in the research project, including in particular harmonising the estimated value of cash and non-cash payments with the GUS data concerning consumption, estimates obtained for the first variant of consumer cost calculations were used for final cost calculations across the whole economy (cf. Chapter 5). The second variant for estimating consumer costs was therefore only comparative (cf. Annex no. 2).

3.5. Data extrapolation methods

An extremely important element of the research project was the extrapolation of the collected data on the cost of payments to particular sectors of the economy. To that end, data on cost drivers collected in the project were mainly used (number and value of transactions performed with the use of particular payment instruments).

In the case of banks and payment infrastructure providers, these data were compared with complex statistical data collected by Narodowy Bank Polski on the number and value of transactions (non-cash and cash): by payment cards, direct debits and credit transfers as well as selected cash transactions.

In relation to retailers, the extrapolation was based on the database of Statistics Poland on the number of entities and sales revenues in selected industries. Based on the results of the survey on a representative sample, the values of individual cost elements for individual retail trade and service sectors were estimated using the above mentioned economic statistics.[49] Data obtained from enterprises, after estimation for selected sectors, were compared and reconciled with data on revenues from the surveyed banks and payment infrastructure providers, in particular acquirers (e.g. the level of MSC fees, lease costs of payment terminals).

3.6. Estimates of the number and value of cash payments in Poland

For the needs of the research project concerning costs of payments (for 2015 data), the cash consumption estimates obtained both from the survey on retailers and from the two variants on consumers were compiled. The first of the above mentioned studies provided information on the shares of individual payment instruments in the number and value of transactions in relation to the surveyed enterprises. In case of consumers, the "consumption residual" method (cf. Subchapter 4.5) and the consumer survey method (cf. Annex 2) were used.

Therefore, NBP performed several estimates of the total number of cash transactions, like other central banks (cf. Table 4). For the purpose of the final determination of the retail cash transaction costs (cf. Chapter 5), the method of the questionnaire survey among the retailers was chosen as the most accurate and reliable estimate. The number of transactions generated by this method (11,755 billion; cf. Subchapter 4.4.1.2) comprises not only *consumer-to-business* (C2B) cash payments but also *business-to-business* (B2B) cash payments.

3.7. Representativeness of the survey

An important element of the survey resulting from the methodology, which is of key importance for the quality of the research and recognition of its results as reflecting the examined reality, is the selection of the research sample and its representativeness. The larger the sample, the smaller error should be found in the survey results, which would thus better describe the area surveyed. As the cost survey on payment instruments actually

[49] Detailed information on the methodology of data extrapolation in the survey of retailers is presented in Chapter 4.4.1.

covers several surveys concerning different parties of the payment chain, it is important for the quality of the survey that each of these parties is representative.

Information on the number of respondents surveyed in individual countries (ECB survey and Polish market survey), their market share and the entity that conducted the survey addressed to retailers is included in Table 5.

Table 5. Representativeness of the sample for individual surveyed entities in countries which participated in the ECB project and for Poland

Country	Central bank (CB)	Banks (B) and infrastructure providers (I)		CIT firms[1]		Retailers (R)	
	Market share (%)	Sample size	Market share(%)[2]	Sample size	Market share (%)	Sample size	Entity conducting the survey
Denmark	100	9	≥70	2	100	231	central bank
Estonia	100	4	33	1	99	17	central bank
Finland	100	8	93–98	2	100	40	central bank
Greece	no data#	4	37–78	1	8	6	central bank
Hungary	100	10–14[3]	61–97	3	100	349[8]	external research firm
Ireland	no data	6	98–99	no data	no data	51	various sources
Italy	no data	10	63	B+I	not applicable*	376	various sources
Latvia	100	5[4]	80	B+I	not applicable	29	central bank
Netherlands	no data	3	90	B+I	not applicable	1,008	external research firm
Portugal	no data	8	80	B+I	not applicable	206	central bank
Romania	100	31	90	B+I	not applicable	1,038	external research firm
Spain	no data	12	60[6]	B+I	not applicable	183	central bank
Sweden	100	5	80–95	4	100	11	central bank
Poland	100	20[5]	64–65[7]	B+P	not applicable	1,302[9]	external research firm

Legend: [1] If the CIT firms' questionnaire was not separate due to the competitive situation in some countries, data for CIT firms are included in the data on banks and infrastructure (B+I). In the Polish survey, the costs of CIT firms were calculated on the basis of data obtained from banks and enterprises (B+P). [2] Data based on the percentage of the total number of retail payments. [3] Not all banks offer all payment instruments. [4] Only banks, data concerning three main infrastructures in the country were also included in the report. [5] 20 entities comprise 10 banks and 10 payment infrastructure providers. [6] Data based on total assets. [7] Share measured by the number of transactions in the sample for credit transfers, direct debits and payment cards in the total number of transactions by means of the aforementioned payment instruments. [8] The survey was performed in two rounds. [9] Sample size used in the underlying survey. In addition, data from another study were used as complementary data to obtain information on cost drivers. The sample size for the complementary survey was 1,631 entities. # No data or data available but not reported. * Not applicable – data were obtained from other sources due to lack of data acquired directly from CIT firms.

Source: Schmiedel H., Kostova G.L. and Ruttenberg W., *The social and private costs of retail payment instruments: a European perspective…* op. cit., p. 20.

The above information indicates that the representativeness of the sample in the Polish survey does not deviate from the average in the countries conducting the survey under the auspices of the ECB and seems to be the highest for enterprises among the listed countries.

3.8. Assessment of the accuracy of estimates

In order to estimate the costs of payments on the Polish market, a number of different data sources were used, relating to the costs incurred by entities belonging to the individual surveyed sectors. At the same time, each source may contain an estimation error.

In the case of the central bank, the cost data came from the NBP accounting and reporting systems. It was the population survey, and so the scale of possible errors is very limited.

The banking sector survey covered 10 entities that participated in the project under the agreement with NBP and in cooperation with the Polish Bank Association. In the base year of the survey, these banks had assets representing 51.54% of total assets of the banking sector in Poland. They were the issuers of 61.51% of the total number of cards on the Polish market, which accounted for 65.84% of the number of card transactions. On the other hand, the survey concerning infrastructure entities also covered 10 entities, which in the case of the acquiring services handled over 50% of the total number of non-cash transactions performed by cards in Poland, and in the case of credit transfers, the survey participants processed as much as 99.9% of the number of all transfer transactions, while for cash services they handled 65% of the number of transactions. Therefore, the banking sector survey was the population survey and allowed to acquire data on costs related to the vast majority of payment transactions performed on the Polish market in the base year of the survey.

In the case of survey of the banking sector and payment infrastructure providers, two basic types of estimation errors could have occurred. First, an extrapolation of the results was performed in relation to transactions executed by entities which had not participated in the survey, assuming that these transactions were on average charged with the same costs as transactions of entities participating in the survey. Secondly, banks and payment infrastructure providers independently allocated costs on the basis of detailed instructions provided by NBP for filling in survey questionnaires. However, different institutions apply different cost calculation systems for their internal needs. Consequently, despite the fact that NBP performed multi-stage data agreements with representatives of the participants in order to increase the level of accuracy and consistency of filling in the questionnaires, it is possible that there were some differences in the way certain types of costs were classified and allocated by the respondents, especially in the case of indirect costs. It should be noted, however, that since the data on costs for banks and payment infrastructure providers were obtained based on data from accounting systems and other reporting data, their quality should be higher and the margin of error in estimates should be lower than in the case of surveys based on respondents' declarations.

Surveys of costs borne by enterprises were based on statistical sectoral data (among others, from GUS) and on questionnaire survey results. The latter are burdened with a random sampling error. In the case of a sample of respondents n=1302 in the NBP survey, the maximum random estimation error is 2.7%. However, the responses of respondents concerning certain cost components (e.g. cash registers, owning a payment terminal, handling transfers, etc.)

were provided only by respondents who incurred a given cost. This may involve a greater random error due to a smaller research subsample (for example, for a subsample of 500 respondents, the maximum random estimation error is 4.4%). Furthermore, it should be taken into account that the survey was based on statements submitted by entrepreneurs instead of data from their accounting systems. This means that part of declarations could differ from the actual costs incurred in a given year. An additional factor influencing the scale of potential estimation errors were the deficiencies and refusals in the respondents' answers. In such cases, the estimation error was higher than the standard random sampling error.

At the same time, it should be noted that the extrapolation process may also have been affected by an error resulting from the accuracy of the data on the number and value of transactions used for extrapolation. In the case of payment cards, these data were very precise, due to the fact that NBP keeps statistics concerning this area of the payment market. However, in the case of cash and bank transfers[50], the data were estimated, e.g. as part of estimates excluding B2B transactions or transactions with a value above PLN 200,000.

The costs of CIT companies were examined in a simplified manner, as a sum of external costs of other entities. It was therefore necessary to adopt certain assumptions (cf. Subchapter 4.3). This means that the estimates of cash costs on the part of these entities should be treated with caution.

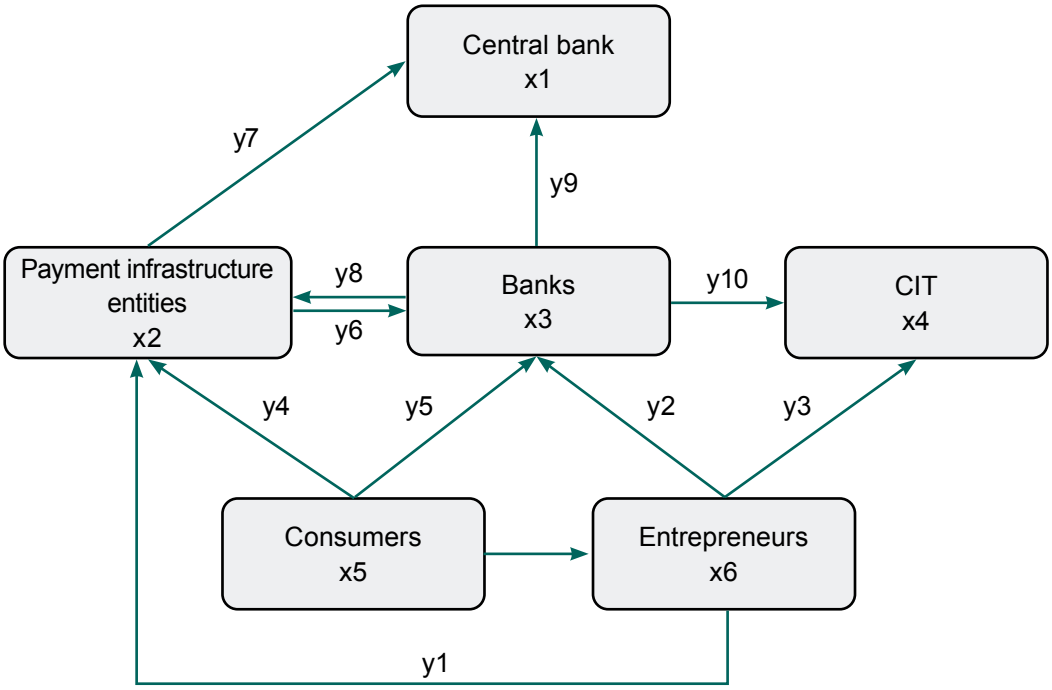
It should be noted that the calculations for consumers are only approximate as they were not based on a consistent methodology and a comprehensive underlying study, as was the case for banking sector and enterprise surveys. The methodology for estimating consumer costs involved partial estimates based on available results from other sources. This applies both to cost drivers (e.g. number and value of transactions) and to cost elements (components). In the scope of cost drivers, the consumers' data were agreed with the company survey and for these parameters there may be similar errors to those indicated for the enterprise survey. This applies in particular to the estimation of the number of cash transactions for which no NBP statistics are available. Estimates for consumers, in particular in terms of commissions and payment times, have only an indicative value and should be seen as complementary in relation to the basic part of the survey.

3.9. Summary of the methodology

The methodology applied in the study on costs of payment instruments in Poland, described in detail in this chapter, is presented in a illustrative way in **Diagram 2** which presents the parties of the payment chain and the flows of costs between them.

[50] Like in the case of payment cards, NBP keeps statistics on this area of the payment market. However, due to the assumption of the survey, the number of transactions performed by bank transfers was estimated.

Diagram 2. Cost flows in the Polish Payment Market Survey



Symbols: x – internal costs; y – external costs.

As shown in the diagram above, the private costs of payment instruments on the Polish market included the sum of internal costs of all six parties of the payment chain covered by the study (x1 + x2 + x3 + x4 + x5 + x6) and their external costs (y1 + y2 + y3 + y4 + y5 + y6 + y7 + y8 + y9 +y 10). On the other hand, social costs make the sum of all internal costs (x1 + x2 + x3 + x4 + x5 + x6).

Chapter 4

Private and social costs of payment system participants in Poland

Private and social costs of payment system participants in Poland

4.1. Costs of the central bank

4.1.1. Methodology of valuation of NBP functions[51]

The calculation of costs of Narodowy Bank Polski was based on a functioning cost estimation methodology. NBP uses a simplified cost account of basic functions performed by NBP. This account is performed for the following nine basic functions:

1. cash and issue activity,
2. determining and pursuing monetary and exchange rate policy,
3. foreign exchange activity,
4. services to the State Treasury,
5. management of Foreign Exchange Reserves,
6. statistics,
7. activities for the stability of the financial system,
8. payment system,
9. international cooperation.

The calculation covers annual operating costs of NBP (salaries with overheads, administrative costs[52], costs of issuing banknotes and coins) and depreciation costs of individual departments and regional branches (Cost Centres – MPK). On the other hand, the Cost Centres are divided into:

- MPK performing basic functions,
- MPK performing supporting functions, i.e. providing internal services[53],
- Mixed MPK, i.e. performing both basic and supporting functions.

The process of allocating the costs incurred by NBP for basic functions is carried out in the following two stages:

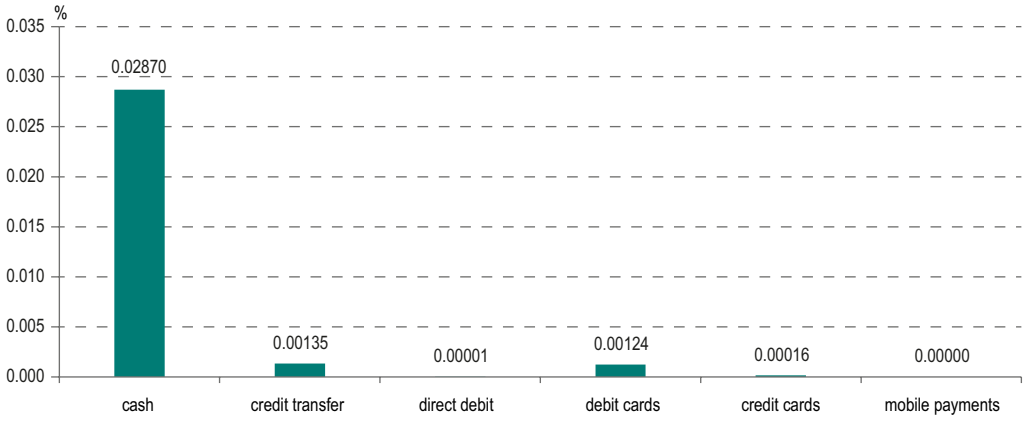
- stage 1 – during the financial year, the NBP operating costs and depreciation costs are allocated to individual MPKs in order to determine the so-called "full costs". The full costs are divided into:
  - costs that can be directly assigned to a given MPK at the stage of accounting records,
  - common costs settled on the basis of an agreed "allocation key".
- stage 2 – at the end of the reporting year, the pools of "full costs" of individual MPKs are allocated using a driver, i.e. working time.

[51] This subchapter has been developed based on the description provided by the Controlling Department of NBP.
[52] Consumption of materials, employee benefits, business trips, external services, taxes and fees, write-down for the Company Social Benefits Fund, other administrative expenses.
[53] Among others, administrative, IT, HR, legal, security and safety.

The allocation takes into account the performance of internal services (within the framework of performance of supporting functions) and through the application of the method of simultaneous allocation, the costs of these services are mutually settled between MPKs and transferred to the basic functions. As a result, all costs of the NBP operations and depreciation are subject to settlement to the basic functions.

In the framework of the survey on costs of payment instruments, the costs of the "cash and issue activity"[54] were fully allocated to cash while the cost of the "payment system" function was allocated to the surveyed non-cash payment instruments based on the number of transactions. The private costs of the central bank as a share of GDP are presented in Chart 3. Costs of cash amounted to 0.029% of GDP while costs of non-cash instruments were marginal in relation to GDP.

Chart 3. Private costs of payment instruments borne by NBP in relation to GDP



The above calculations do not take into account the central bank seigniorage, which would significantly reduce the total internal costs of cash. One of the methods that can be used to estimate the scale of the seigniorage in Poland in a simple way is the calculation of the hypothetical costs that NBP would have to bear on an annual basis due to the change in the structure of its liabilities as a result of elimination of cash. A decline in cash in circulation would translate into an analogous increase in the surplus liquidity of the banking sector, which NBP would be forced to absorb by means of open market operations, i.e. the issue of money market bills. In such a case, the costs of the central bank due to the increased issue of money market bills would be approximately equal to the product of the value of cash in circulation and the profitability of these debt securities (corresponding to the NBP reference rate). The seigniorage calculated using this method would amount to approximately PLN 2.38 billion for 2015. The seigniorage for 2015 calculated in accordance with this method

[54] To calculate the costs of the cash and issue function, the costs of collector banknotes and coins were excluded.

would have a value several times higher than the cash costs incurred by NBP (after taking seigniorage into account they would amount to minus 0.1036% of GDP).

4.2. Costs of banks and payment infrastructure providers

4.2.1. Methodology of examining the costs of banks and payment infrastructure providers

Due to the fact that the research methodology for banks and payment infrastructure providers was very similar, it will be discussed jointly.[55] The data collected in the survey questionnaires referred to the annual period of activity of the institution concerned. It was established that the costs of domestic payments below PLN 200 thousand (corresponding to EUR 50 thousand in the ECB survey) would be estimated. However, due to the fact that in many cases it was not possible to determine cost with assigned parameters without establishing total costs (e.g. system-wide costs), costs for all types of transactions (including high value transactions) were reported. The cost allocation associated with low value domestic transactions was based on information on cost drivers (number and value of transactions). Within the framework of the survey, the ABC method was used, comprising the calculation of direct and indirect costs.

The overall activity of a bank was divided into 6, areas while the payment infrastructure providers were divided into 5 areas:

1. **credit transfer and direct debit** (including services based on bank accounts of the parties to the transaction),
2. **payment cards** (on the issuer's side) – only for banks,
3. **mobile payments** – in the case of a bank – on the issuer's side, excluding the applications included in other areas (i.e. excluding transfers in mobile banking classified in the "credit transfer and direct debit" area and excluding mobile withdrawals in ATMs categorised to the "cash services" area), e.g. BLIK and PeoPay; in the case of a payment infrastructure provider – on the side of entities involved in offering and processing transactions, excluding the following areas: acquiring services for mobile transactions, mobile withdrawals in ATMs,
4. **acquiring** services (handling of payment cards, mobile and other payments on the side of the acquirer/processor),
5. **cash services**,
6. **other products** (capital and investment management, etc.).

The list of payment products provided by the aforementioned institutions in the areas of "credit transfers and direct debits", "payment cards" and "acquiring services" was based on the terminology used in clearing systems or the type of product as specified by the payment organisations. Mobile payment under this survey was limited to payment transactions performed with the use of an application installed on the customer's mobile device (smartphone, tablet), using the specific system dedicated to mobile payments. Cash withdrawals and transactions based directly on another payment service were therefore

[55] The survey involved 10 banks which represented 51.54% of the banking sector in terms of assets, 61.51% in terms of the number of cards and 65.84% in terms of the number of card transactions and 10 infrastructure providers which handled just over 50% of the number of transactions in the case of acquiring services; high representativeness was recorded for credit transfers (99.9% of the number of transactions), similarly to cash services (65% of the number of transactions); see Subchapter 4.2.2 and 4.2.3.

excluded from the scope of that concept. In technical terms, payments made using single numeric codes, QR codes and NFC payments were supposed to be treated as mobile transactions if they were integrated with a mobile payment service (e.g. HCE payment in a banking application). It should be noted that mobile payments did not include proximity stickers for mobile phones and NFC payments in the SIM-centric model, which in this survey were treated as card payments whereas the data related to them were to be provided by respondents in the area of "payment cards".

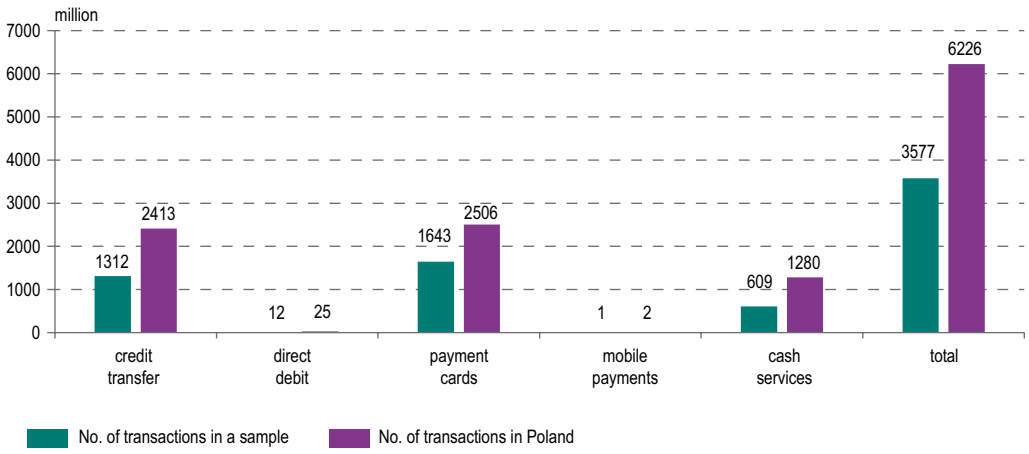
After obtaining data on costs, cost drivers, labour intensity of performing the activity (measured by the number of employees involved), broken down by areas of activity, the breakdown of costs was performed. Direct costs were allocated by the particular institution on a discretionary basis or on the basis of information on cost drivers. Indirect costs were allocated automatically on the basis of labour intensity of performing the activity and cost drivers.

As a result of calculations in this survey, estimates were obtained for:
- unit/total costs for the product,
- unit/total costs for areas of the institutions,
- costs shared between the acquirer and the issuer.

4.2.3. Results of the banks' survey

Chart 4 shows the total number of retail transactions and the number of such transactions in the sample. In 2015, bank customers executed the total of over 6 billion transactions. Most transactions were carried out using payment cards (over 2.5 billion) and credit transfers (2.4 billion) while cash services accounted for about half of all transactions (1.2 billion). Transactions in the sample accounted for almost 60% of all retail transactions on the Polish market (66% for payment cards, 54% for credit transfers and 48% for cash services[56]).

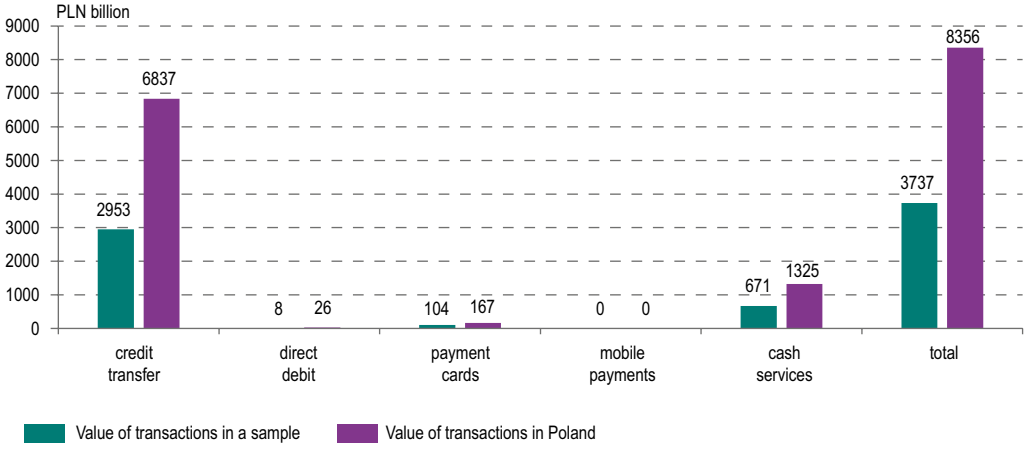
Chart 4. Number of retail transactions broken down by payment instrument/service



[56] Cash services include payments in bank cash desks and cash deposit machines as well as withdrawals in cash desks, within the *cash back* service and in ATMs.

In 2015, banks' customers executed transactions for over PLN 8 trillion, including transfers for almost PLN 7 trillion (Chart 5). Transactions by other payment instruments had a significantly lower value (cash services – PLN 1.3 trillion, payment cards – PLN 167 billion and direct debit – PLN 26 billion). In terms of the value of retail transactions (up to PLN 200,000), the research sample covered 45% of the Polish market (62% for payment cards, 51% for cash services, 43% for credit transfers and 31% for direct debits). In terms of the number of retail transactions, it is worth noting that 2015 was a certain qualitative breakthrough for the Polish market, as for the first time in history the number of card payments was higher than the number of transfers ordered. Thus, the Polish market gradually started to become similar to Western European markets in terms of the structure of use of payment instruments.[57]

Chart 5. Value of retail transactions broken down by payment instrument/service



The highest costs in 2015 were incurred by Polish banks in connection with the provision of cash services (PLN 9.5 billion). These entities incurred over four times lower costs for offering payment cards (PLN 1.9 billion). The next instrument in terms of costs was the credit transfer, in case of which the cost of making it available to customers by the banking sector amounted to PLN 1.2 billion. The costs incurred for mobile payments (PLN 0.2 billion) and direct debit (PLN 0.02 billion) were much lower. The results of the survey on the breakdown of private costs into payment instruments are presented in Chart 6.

Nearly three-fourths of private payment costs incurred by the banking sector were related to cash, 15% – to payment cards and over 9% – to credit transfers. This breakdown is presented in Chart 7. It should be noted that the share of costs associated with the introduction of payment innovations shall be considered as high (about 1/10 of the cost for cards), in relation to the negligible number and value of transactions executed (cf. Chart 4 and Chart 5).

[57] ECB Statistical Data Warehouse, https://sdw.ecb.europa.eu/.

Chart 6. Private costs of banks broken down by payment instrument/service

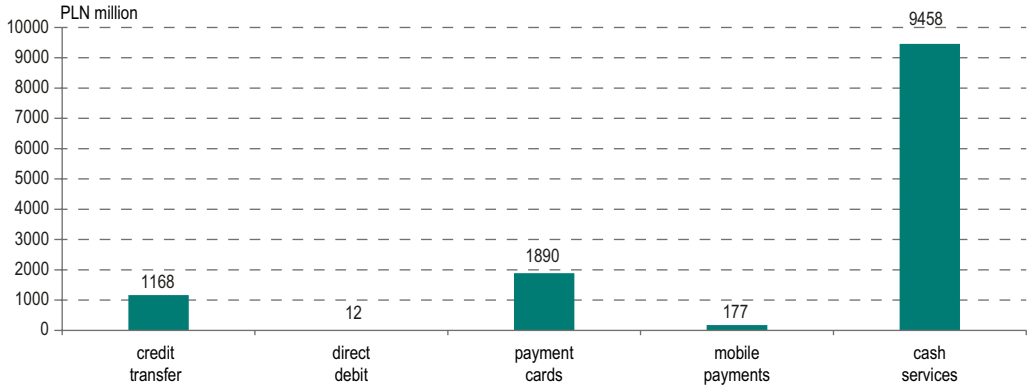
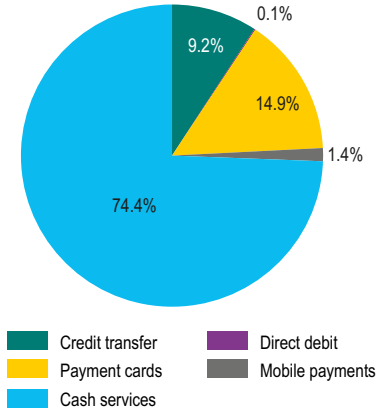


Chart 7. Breakdown of banks' private costs into payment instrument/services



Banks in Poland incurred the highest internal costs for the provision of cash services – PLN 8.7 billion (Chart 8), which accounted for just over 70% of all internal costs (Chart 9). These entities also incurred significant internal costs related to offering payment cards (PLN 1.9 billion, i.e. 16% of internal costs) and transfers (slightly more than PLN 1 billion – 9% of internal costs). These costs on the part of banks are components of the social costs of payments in Poland.

Noticeable external costs were incurred only for cash (PLN 710 million, slightly over 85% of external costs; cf. Chart 10) and credit transfer (PLN 119 million, which accounted for 14% of external costs). However, this results from the assumptions made in the study (e.g. inclusion of costs borne by banks for the payment card organisations as internal costs due to the fact that these organisations were not covered by the research scope) and such a structure should be treated with caution.

Chart 8. Internal and external costs of banks broken down by payment instrument/service

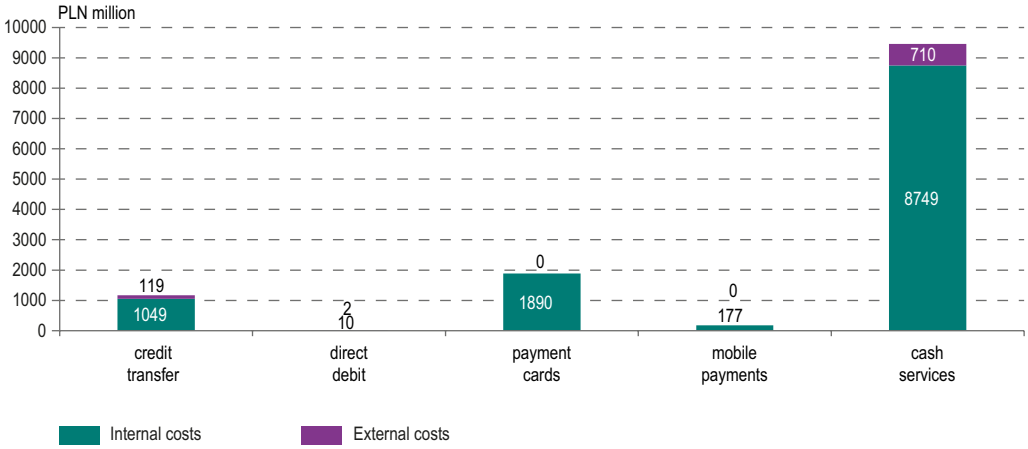
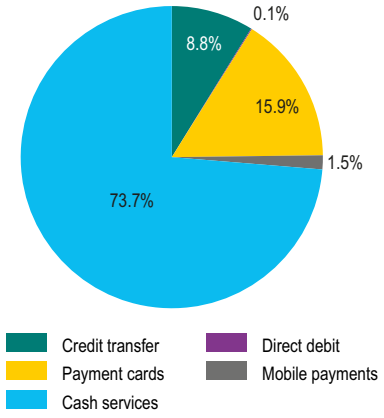


Chart 9. Breakdown of banks' internal costs into payment instruments/services



Internal costs of payment instruments on the side of banks (Chart 11) amounted to 0.660% of GDP. Of this value, more than half was incurred for the provision of cash services. For payment cards it was 0.105% of GDP while for credit transfers it was 0.058% of GDP. Therefore, the overall level of internal costs of Polish banks is rather high compared to the results for most of the countries covered by the ECB survey (cf. Subchapter 2.4).

The highest share of external costs (Chart 12), taking into account the particular payment instrument, was recorded for direct debit (18%) and for credit transfer (10.2%). However, the total external costs are generally low in relation to the total private costs of banks (6.5%). In relative terms, they are also much lower than the percentage share of external costs in the case of enterprises (26.2% – cf. 4.4.3) and especially consumers (68.7% – cf. 4.5.1).

Chart 10. Breakdown of banks' external costs into payment instruments/services

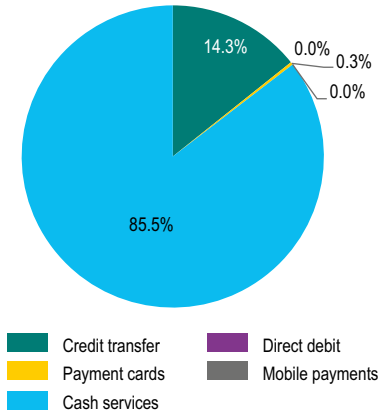
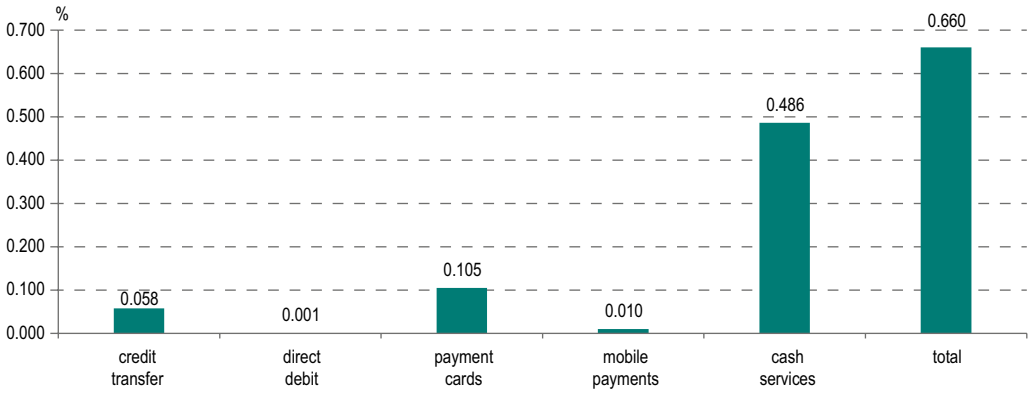


Chart 11. Share of internal costs of banks in GDP broken down by payment instrument/services



The second breakdown of costs (where data were collected[58]) is the breakdown into direct and indirect costs. Indirect costs were predominant in the case of cash services, direct debit and credit transfer. This is probably associated with higher labour intensity of the above mentioned services (labour costs were included to indirect costs and settled according to the involvement of employees assigned by respondents to a given area of services). On the other hand, a significant share of direct costs in the case of payment cards may be related to a greater involvement of IT solutions and systems which are somewhat easier to attribute as directly related to the specific service. It is shown in Chart 13.

[58] The data were only recalculated into internal and external costs.

Chart 12. Breakdown of banks' private costs into internal and external costs for individual payment instruments/services

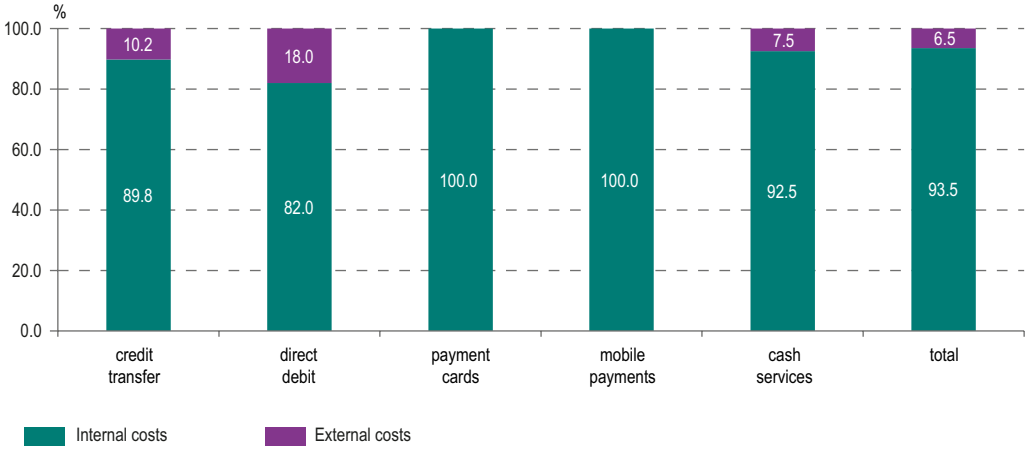
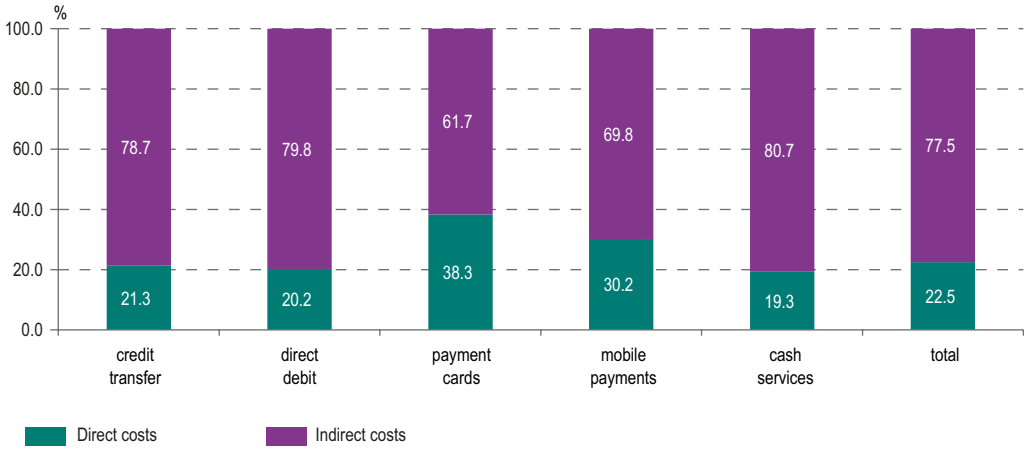


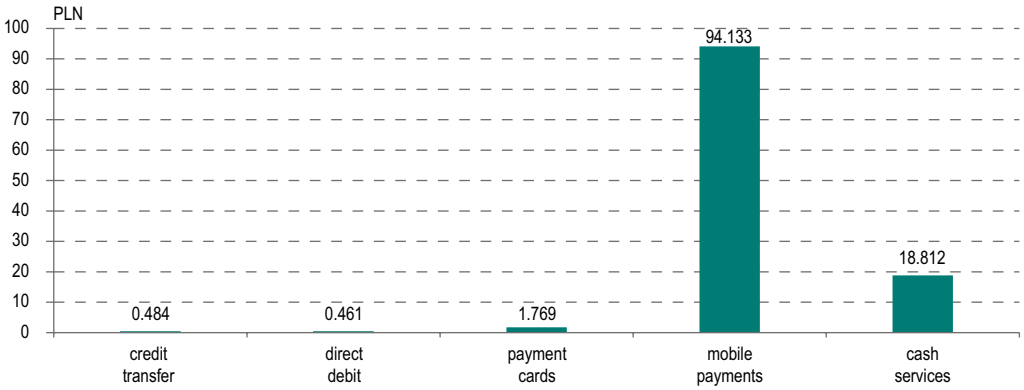
Chart 13. Breakdown of banks' costs into direct and indirect costs for individual payment instruments/services



Mobile payments turned out to be the most expensive payment instrument per transaction (Chart 14) (as much as PLN 94 per transaction). This is due to the fact that in 2015 these were systems which already required banks to incur significant costs to enable offering these payments (e.g. costs of implementing and maintaining central systems and mobile applications available to customers), whereas the scale of payment transactions made with their use was still insignificant.

High unit costs are also related to cash services – about PLN 19. On the other hand, significantly lower unit costs were observed for payment cards – PLN 1.77. The least expensive payment instruments included direct debit (PLN 0.46) and credit transfer (PLN 0.48). The latter instrument clearly benefits from economies of scale, as the fixed costs of maintenance of systems on the side of banks (both within the back office

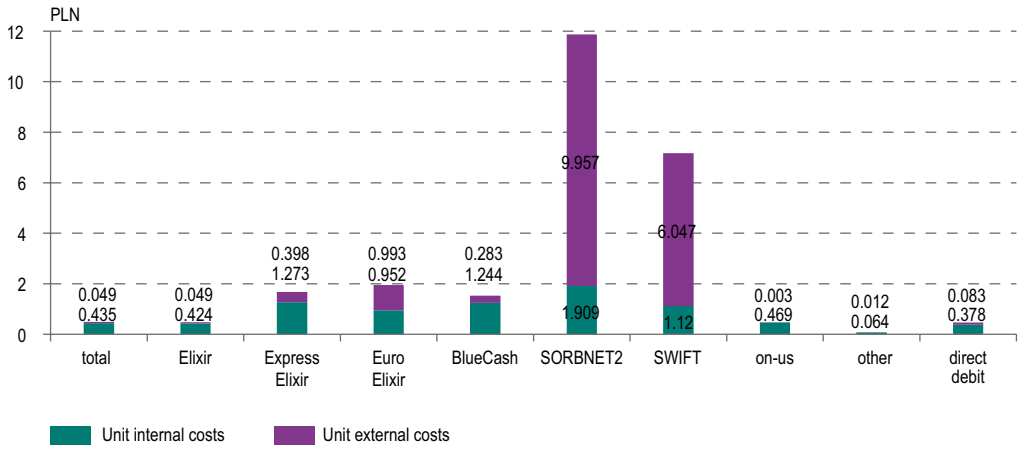
Chart 14. Unit private costs of banks broken down by payment instrument/service



and the electronic front office) are distributed over a very large number of ordered transactions (cf. Chart 4).

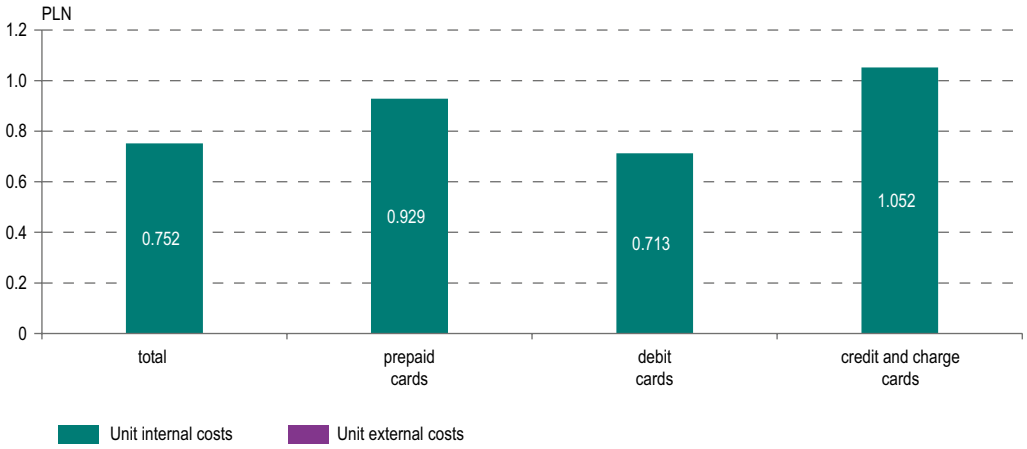
Chart 15 presents banks' unit costs for individual types of credit transfer and for direct debit, including the breakdown into internal and external costs. Both in the case of credit transfer and direct debit, internal costs prevailed in banks (PLN 0.44 and PLN 0.38, respectively). The highest unit cost was generated by the SORBNET2 transfer (almost PLN 12) and SWIFT transfer (over PLN 7), which was determined mainly by high values of external costs. Taking into account the typical consumer transfers made at the bank, the *on-us* transfer (PLN 0.47) and Elixir (PLN 0.47) turned out the least expensive.[59] However, the costs for innovative

Chart 15. Credit transfer and direct debit – unit internal and external costs in banks



[59] The unit cost for Elixir transfers and *on-us* transfers is very similar. Although the Elixir system recorded higher external costs due to a higher average transaction value (PLN 12.349 for *on-us* transfers and PLN 2.039 for Elixir transfers), higher internal costs were assigned to *on-us* transfers.

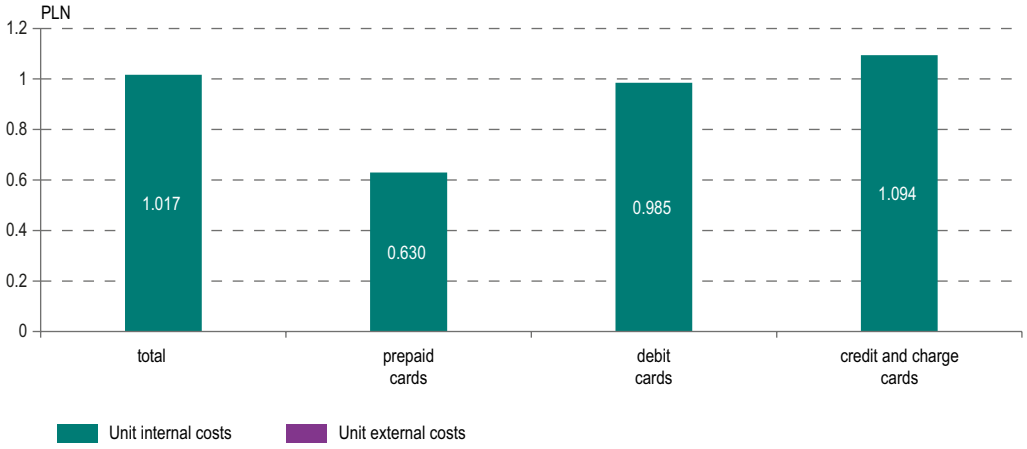
Chart 16. Payment cards, transactions in retail and service outlets – unit internal and external costs of banks



services, which undoubtedly include instant credit transfer systems, were much higher. For both systems of this type operating in Poland a similar level of costs was registered – Express Elixir (PLN 1.67) and BlueCash (PLN 1.53) – with higher external costs in the case of the former system. Transfers executed within the Euro Elixir system were slightly more expensive (about PLN 2). In their case, external costs, i.e. mainly fees to the National Clearing House, had a visible share. Direct debit should be considered a cheap instrument for servicing by the banking sector – the unit cost was PLN 0.46.

For payment cards, no external costs were recognised (cf. Chart 8), but this was due to the fact that the survey did not cover payment organisations (their fees were included in the internal costs of banks). In the case of payment cards in physical points of sale (Chart 16), the cheapest type of payment card in unit terms was a debit card (PLN 0.71), followed

Chart 17. Payment cards, CNP transactions – unit internal and external costs of banks

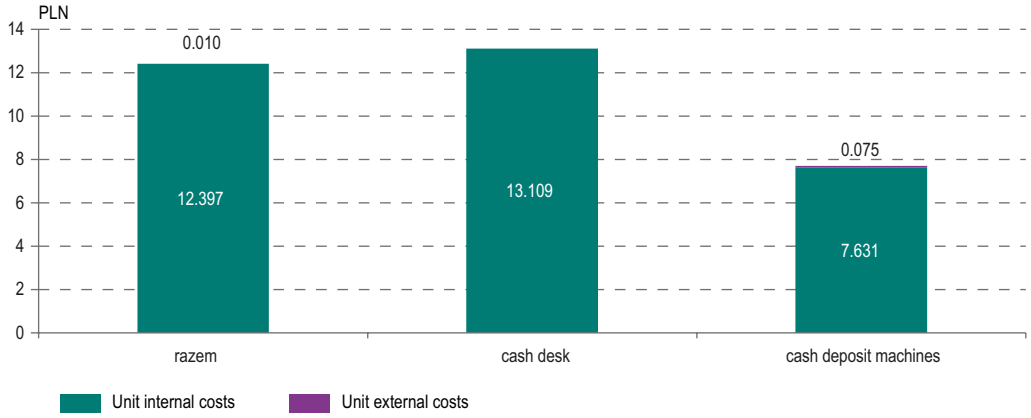


by a prepaid card (PLN 0.93), while the most expensive credit instrument was a credit and a charge card (slightly more than PLN 1). This was due to the relatively small number of credit card and charge card transactions and inclusion, in the case of such cards, of certain specific cost items such as the cost of credit risk (in the expert part allocated by banks according to the bank's internal methodology).

Payment cards in a remote environment (Chart 17) generated higher unit costs than in physical retail establishments (PLN 1 and 80 groszy, respectively). This resulted from a higher share of the most expensive credit cards in remote transactions (PLN 1.1) and a higher cost for debit cards in this environment (PLN 0.99). In the case of *card-not-present* transactions, pre-paid cards were much cheaper (PLN 0.63) from the point of view of banks.

When analysing the unit costs of cash transactions, it can be seen that for cash payments (Chart 18), internal costs prevail. Higher internal costs are associated with payment at a bank cash desk (PLN 13.1) and they are much higher than internal costs of operation in a cash deposit machine (PLN 7.6). This can be justified by the need for greater involvement of employees in the cash withdrawal service at the bank cash desk.

Chart 18. Cash deposit transactions – unit internal and external costs

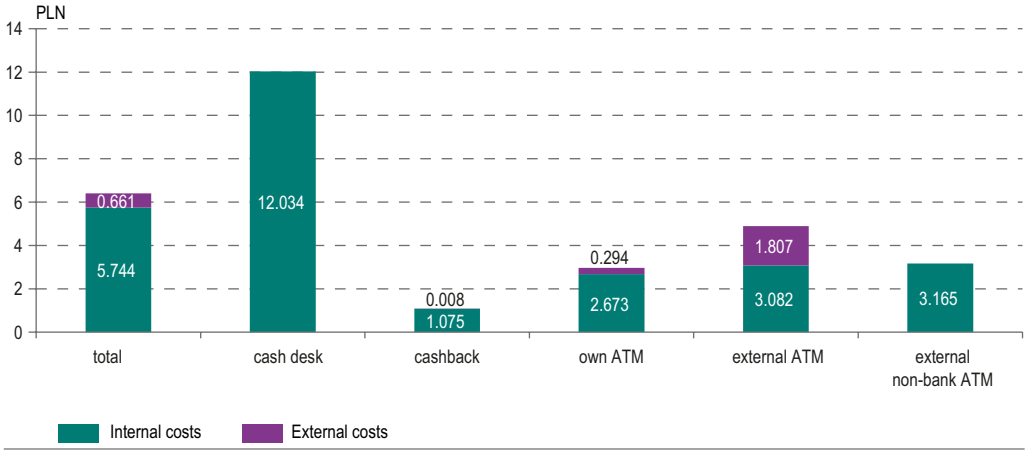


The highest external costs for cash withdrawals were observed for transactions in ATMs not owned by the client's bank (approx. PLN 1.8). Their total cost amounted to PLN 4.9. The cost of the operation was lower in a non-bank ATM[60] owned by an independent ATM network – (approx. PLN 3) and in an in-house ATM (approx. PLN 2.9). On the other hand, banks' cost of a single transaction at the cash desk amounted to PLN 12 and included only internal costs. Payments of this type were the most expensive. It is also worth noticing that deposits and withdrawals at the cash desk generate similar unit costs, which should not be surprising due

[60] The absence of external costs in this case was due to the fact that independent ATM networks were not included in the model. This meant that the costs incurred for the benefit of ATM networks were recognised as internal costs.

to the very similar nature of these two activities. The unit internal and external costs of cash withdrawals at banks are shown in Chart 19.

Chart 19. Cash withdrawal transactions – banks' unit internal and external costs



4.2.4. Results of the survey on payment infrastructure providers

The total number of transactions on the side of infrastructure providers in Poland in 2015 amounted to 4.5 billion, of which the research sample covered 3.2 billion (about 70%). In the case of acquiring services, 2.6 billion transactions were performed, while 1.4 billion

Chart 20. Number of retail transactions broken down by payment instrument/service

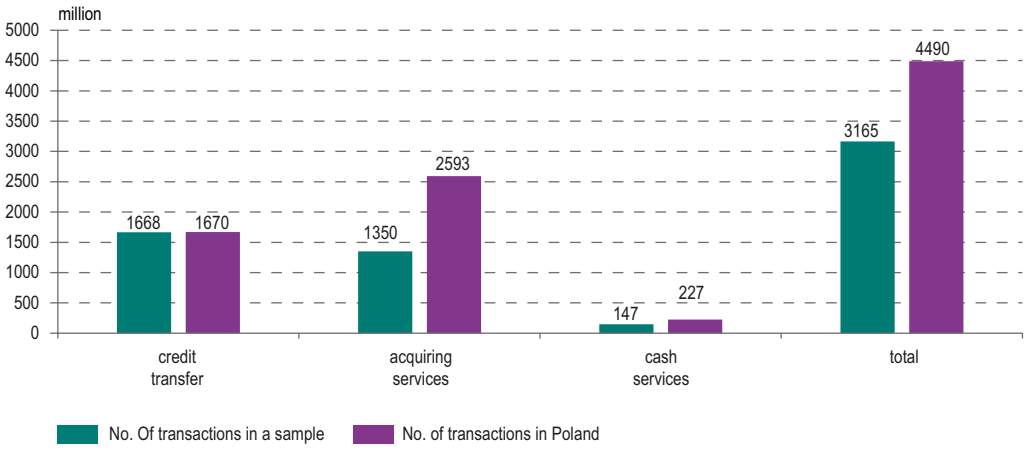
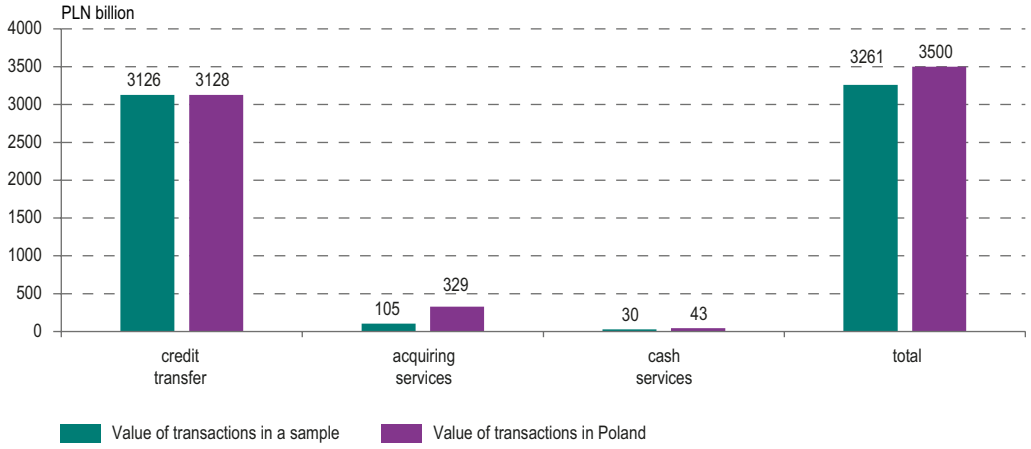


Chart 21. Value of retail transactions broken down by payment instrument/service

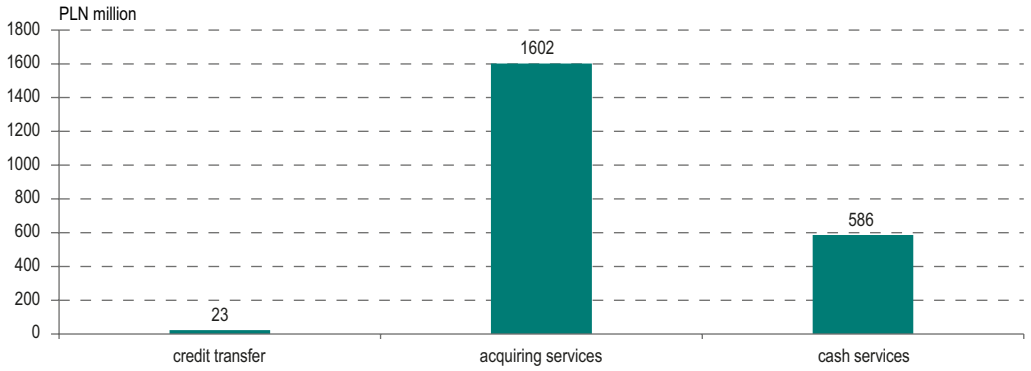


transactions were reported in the research sample, which accounted for just over 50%. High representativeness (99.9%) was recorded for credit transfer as well as for cash services (65%).[61]

In 2015, transactions for the amount of PLN 3.5 trillion were performed through payment infrastructure providers. 93% of the transaction value was represented in the sample. This was affected by the high representativeness for the credit transfer (almost 100%). With respect to acquiring services, transactions for the total amount of PLN 329 billion were handled, while the entities included in the research sample held only 32% of their overall value in Poland. Moreover, the total value of cash transactions amounted to PLN 43 billion, while for the sample it was PLN 30 billion (70%).

Chart 22 shows private costs of payment infrastructure providers. The highest costs were incurred due to the provision of acquiring services (PLN 1.6 billion) and cash services (PLN 586 million).

Chart 22. Private costs of payment infrastructure providers broken down by payment instrument/service



[61] Deposits and withdrawals at the cash desk were categorised as cash services.

Costs incurred for the provision of acquiring services covered over 70% of private costs of payment infrastructure providers (Chart 23), for cash services it was about 27%, and for transfers – only 1%. Such a drastic disproportion between the costs incurred by infrastructure entities in the case of credit transfers and payment card acquiring services may seem surprising. However, it results from two basic reasons. First of all, in the case of acquiring services, there is a need to invest in the construction and bearing the costs of maintaining and servicing the network of payment terminals in local points of sale scattered across Poland. On the other hand, clearing houses maintain only central systems, with no need to finance external infrastructure and equipment on the side of customers. Secondly, a considerable part of the costs of acquirers is associated with fees to the banking sector (mainly the interchange fee[62]) which are not borne by clearing houses in handling of credit

Chart 23. Breakdown of private costs of payment infrastructure providers into payment instrument/services

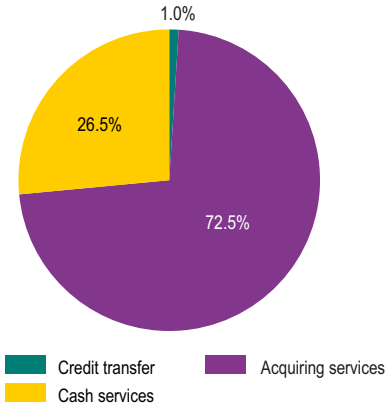
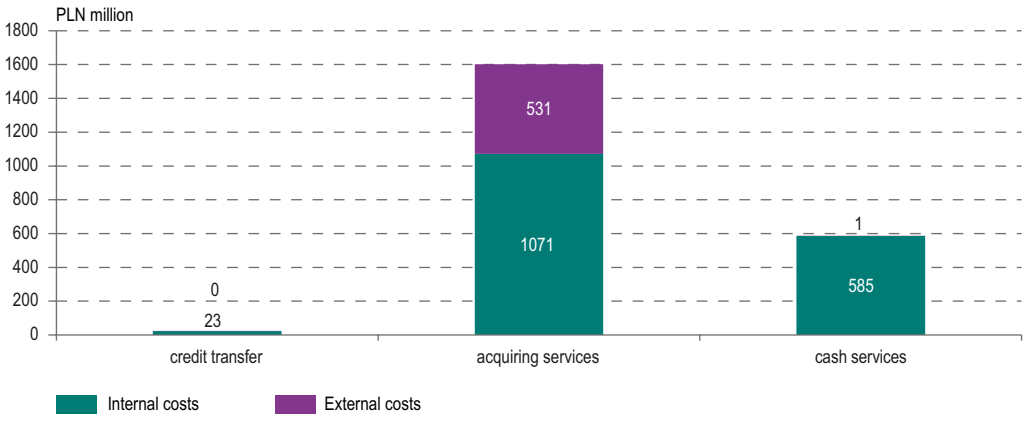


Chart 24. Internal and external costs of payment infrastructure providers broken down by payment instrument/service



[62] Maciejewski K., *Znaczenie opłaty interchange dla rozwoju rynku kart płatniczych w Polsce*, [Role of interchange fee for the development of the market of payment cards in Poland] "Copernican Journal of Finance & Accounting", 2013, Vol.2, no. 2, pp. 111–124.

transfers. The latter reason is presented in detail in Chart 24 in the form of external costs in acquiring services.

Almost all costs incurred for providing cash services and transfers were internal (Chart 24). On the other hand, in the case of acquiring services, about one-third of the costs were external costs. At this point it should be stressed that the share of external costs of acquiring services in 2015 was still significantly lower than in the previous years due to the reduction of the interchange fee in Poland on several occasions.[63]

When analysing the distribution of internal costs (Chart 25), it can be seen that most of them were related to acquiring services (64%) and cash services (35%).

Chart 25. Breakdown of internal costs of payment infrastructure providers into payment instrument/services

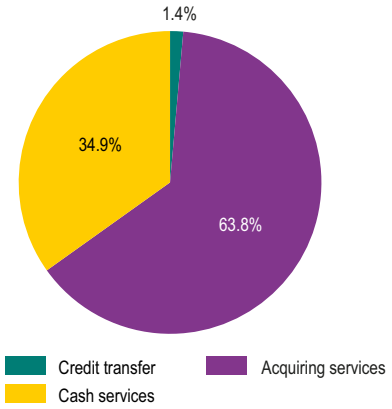
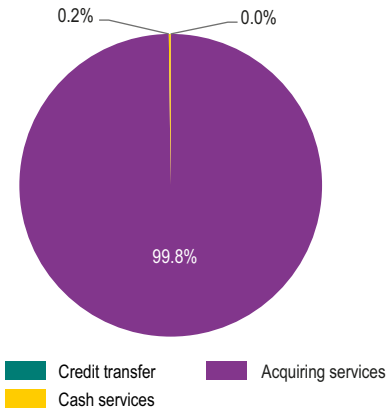


Chart 26. Breakdown of external costs of payment infrastructure providers into payment instrument/services



[63] Narodowy Bank Polski, *Analiza skutków obniżenia opłaty interchange w Polsce*, [Analysis of effects of reducing the interchange fee in Poland], Warsaw 2015, http://www.nbp.pl/systemplatniczy/interchange/obnizenie-oplaty-interchange.pdf.

Chart 27. Share of internal costs of payment infrastructure providers in GDP broken down by payment instrument/services

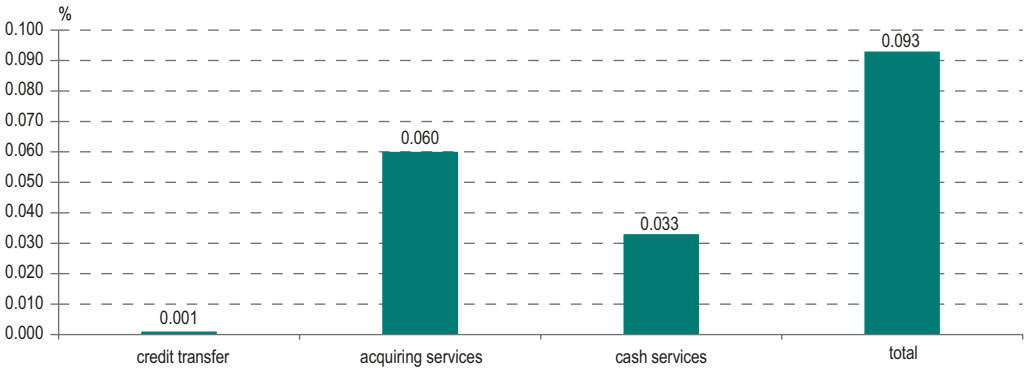
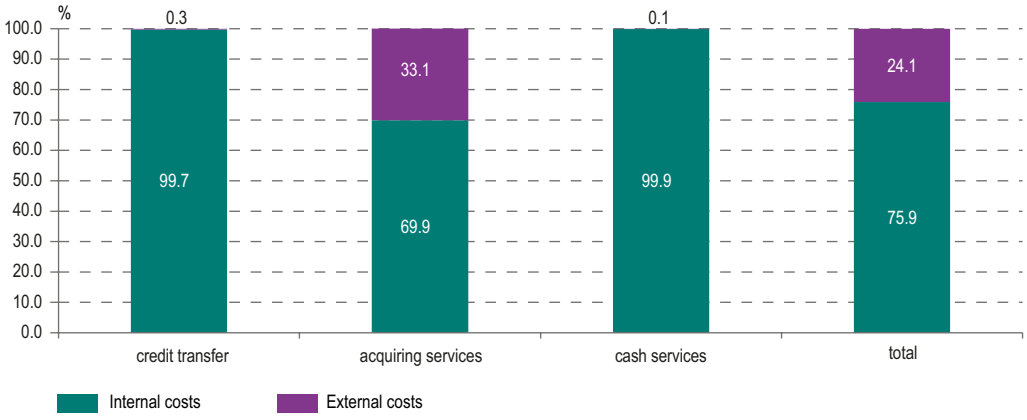


Chart 28. Breakdown of private costs of payment infrastructure providers into internal and external costs for individual payment instruments/services



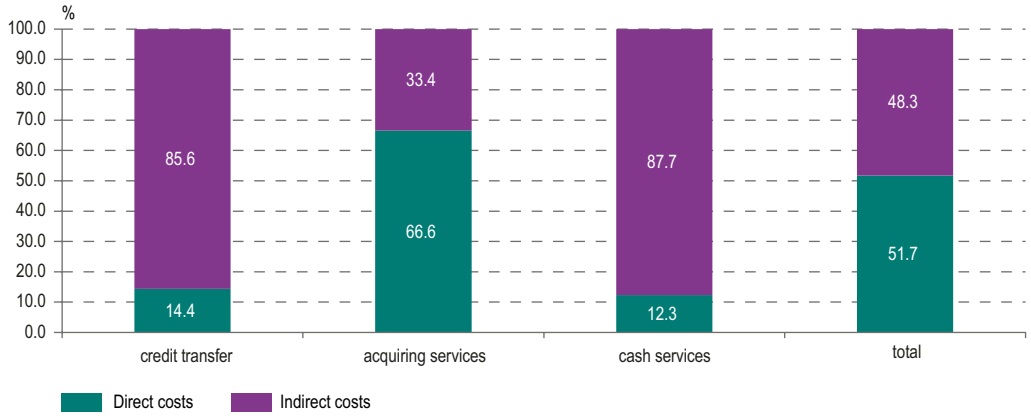
Almost the whole value of external costs was incurred in connection with the provision of the acquiring service (Chart 26). It was almost 100%, while cash services accounted for 0.2%.

Internal costs borne by payment infrastructure providers in 2015 accounted for almost 0.1% of Poland's GDP (Chart 27). Most of them were related to acquiring services (0.06%), a significant part – to cash services (0.033%), while a small share was associated with credit transfer (0.001%). The overall level of internal costs in relation to GDP by payment infrastructure providers should be recognised as low. This allows to conclude that the Polish clearing houses and acquirers operating on the Polish market are highly cost effective.

The majority of the costs (75.9%) borne by infrastructure entities were internal costs (Chart 28), while external costs constituted about one-fourth. The highest share of internal costs (almost 100%) was observed for cash services and for credit transfers. The share of external costs was noticeable only in the case of acquiring services (33.1%).

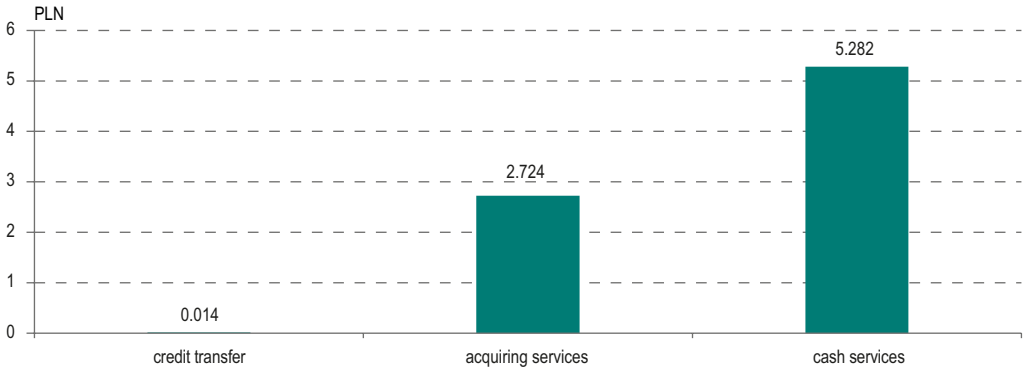
Chart 29 presents the breakdown of costs into direct and indirect costs. It can be observed that for payment infrastructure providers they are divided almost equally between direct costs (51.7%) and indirect costs (48.3%). Direct costs clearly prevail in the case of acquiring services (66.6%), while for credit transfers and cash services they definitely make a minority (14.4% and 12.3%, respectively).

Chart 29. Breakdown of costs of payment infrastructure providers into direct and indirect costs for individual payment instruments/services



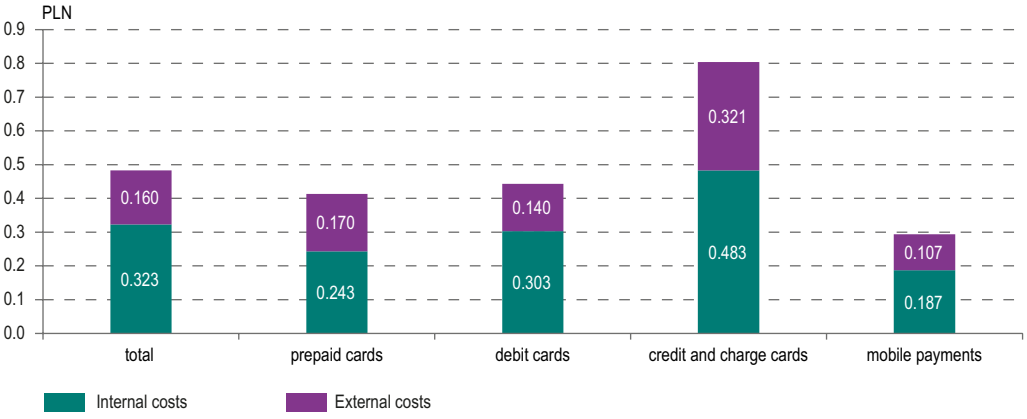
In unit terms (Chart 30), cash services were most expensive (PLN 5.3), acquiring services were about two-fold cheaper (PLN 2.7). In addition, the negligible unit costs of a credit transfer (PLN 0.01) are worth noticing.

Chart 30. Unit private costs of payment infrastructure providers broken down by payment instrument/service



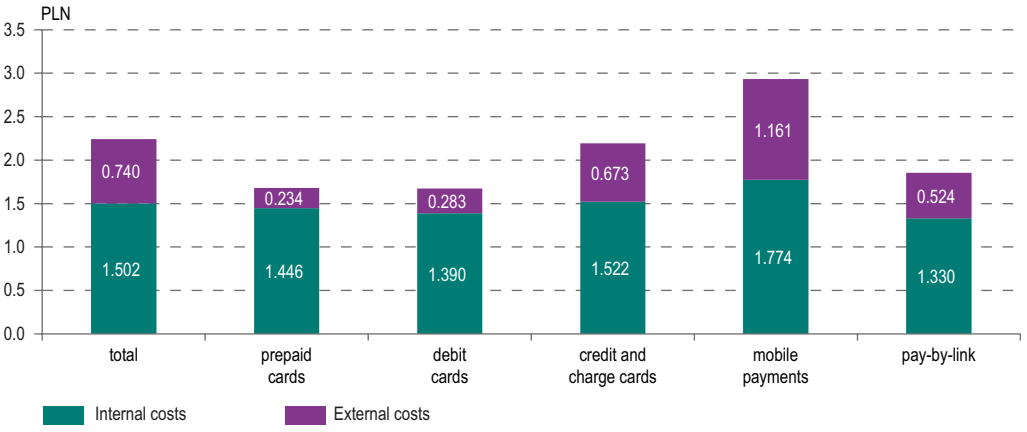
A more detailed analysis of unit costs for acquiring services in the area of payment cards used at physical points of sale (Chart 31) provided important information. In the case of all types of cards, most of the costs were internal costs. Private costs were the highest in the case of credit and charge cards (PLN 0.80). Acquiring for debit cards (PLN 0.44)

Chart 31. Payment cards, transactions in retail and service outlets – unit internal and external costs of payment infrastructure providers



was slightly more expensive than acquiring for prepaid cards (PLN 0.41). Acquiring for mobile payments (PLN 0.30) was the least expensive. This is an interesting result, as it indicates that acquirers were able to implement acceptance of mobile payments in a very effective way on payment terminals they operated (through software updates), avoiding an increase in unit costs for this innovation. This is all the more important as the introduction of mobile payments by banks generated relatively high costs, visible in double-digit unit transaction costs. The low-cost implementation of acceptance for mobile payments is very important for them to get access to terminal networks, which creates a real opportunity to quickly reach the critical mass[64] and a positive external network effect for this innovation.[65]

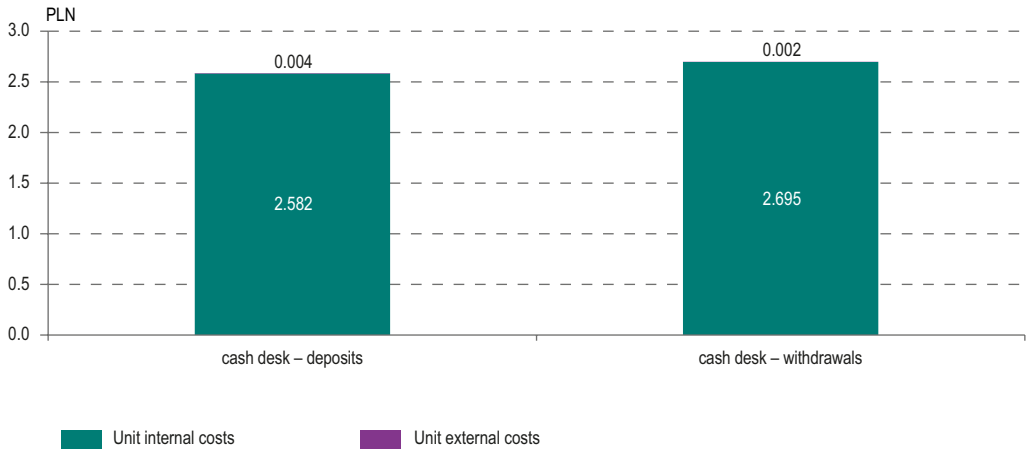
Chart 32. Payment cards, CNP transactions – unit internal and external costs of payment infrastructure providers



[64] Van Hove L., *Electronic money and the network externalities theory: lessons for real life*, "Netnomics", 1999, Vol.1, no. 2, pp. 137–171.

[65] Bounie D., François A., and Van Hove L., *Consumer Payment Preferences, Network Externalities, and Merchant Card Acceptance: An Empirical Investigation*, "Review of Industrial Organization", 2017, Vol.51, no. 3, pp. 257–290.

Chart 33. Cash deposit and withdrawal transactions – unit internal and external costs



As part of the survey, the unit costs of acquiring services in remote transactions were also analysed (Chart 32). Most of the costs were related to internal costs. The most expensive was *acquiring* for transfers (excluding pay-by-link) – the total of about PLN 3. The cost of *acquiring service* for pay-by-link was PLN 1.85. In the case of payment cards, the most expensive was *acquiring service* for credit and charge cards (PLN 2.2). The costs of *acquiring* for prepaid and debit cards were very similar (PLN 1.68 and PLN 1.67, respectively). In general, *acquiring* in the framework of remote transactions generates 2–3 times higher costs for cards than in the case of transactions at physical points of sale. At the same time, cards proved to be as cost-effective for acquirers as pay-by-link payments.

4.3. Costs of CIT companies

An important group of entities operating on the payment market are also CIT companies which bear costs related to the provision of cash handling and transport services. Cash is processed for and on behalf of banks while customers of transport services are banks and commercial entities. The survey addressed to CIT companies was to acquire information on the amount of costs related to offering customers services of storing and preparing cash and transport, as well as data on the number and value of coins and banknotes used within the above mentioned service areas. Survey questionnaires were addressed to the largest players operating in the market of cash services. The return rate of the questionnaires was insufficient (NBP received a questionnaire from only one company, not fully completed). Therefore, the costs on the side of CIT companies were estimated on the basis of data on costs incurred for these entities and included in questionnaires filled in by banks and enterprises. A margin of PLN 0 was assumed, which means that the costs declared by banks and enterprises were accepted as internal costs of CIT companies.

4.3.1. Results of the cost survey of CIT companies

Chart 36 presents external costs of banks and enterprises incurred for the services of CIT companies (the total of PLN 551.5 million). Almost two thirds of them were borne by banks

Chart 34. Number of retail transactions handled by CIT companies on the bank side

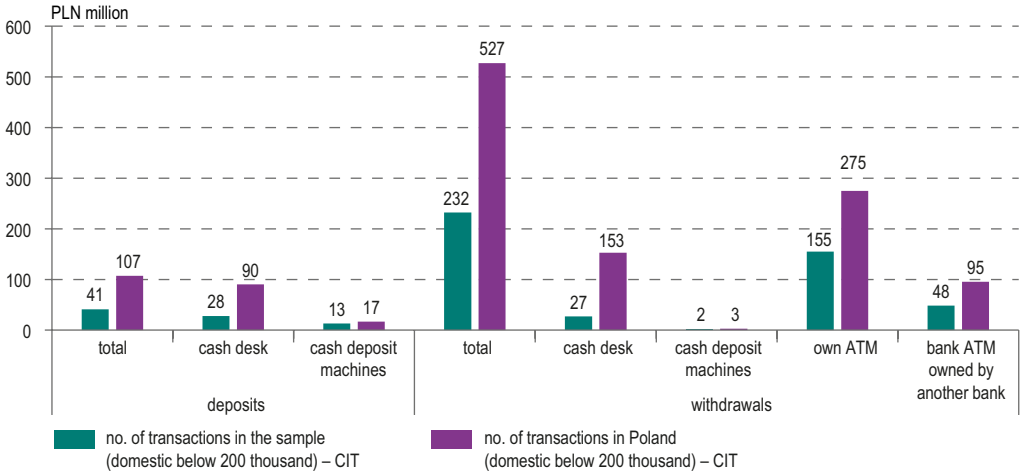
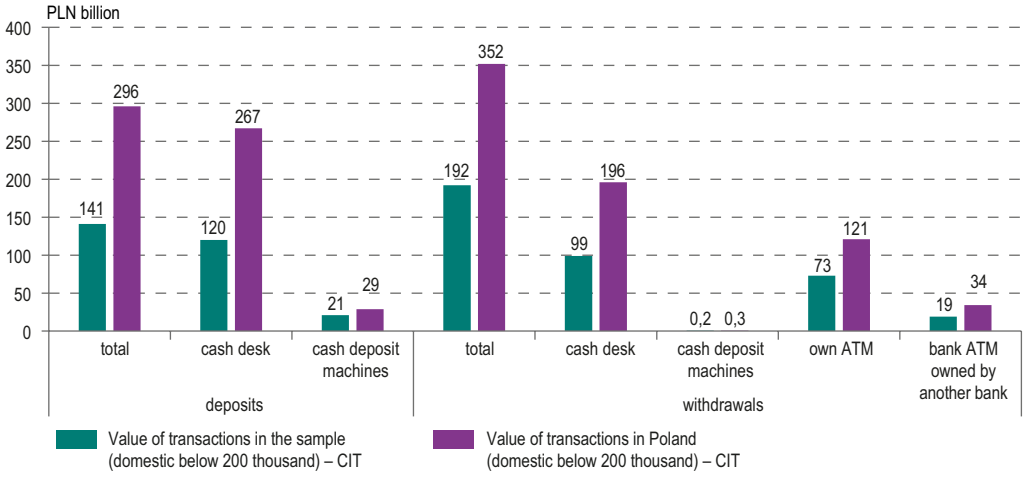


Chart 35. Value of retail transactions handled by CIT companies on the bank side



(PLN 348.1 million), and about one third – by enterprises (PLN 203.4 million[66]). This means that with the assumptions made in the survey (see subparagraph 4.3), the internal costs of CIT companies were estimated at PLN 551.5 million, which accounted for 0.031% of Poland's GDP for 2015 (Chart 37).

Chart 38 shows the costs of withdrawals were much lower than the costs of cash deposits. In the case of cash withdrawals, the operation of a bank cash desk was most expensive (PLN 0.42). Banks' costs of servicing ATMs incurred for the benefit of CIT companies

[66] In the case of enterprises, only the total costs were estimated.

Chart 36. External costs incurred by banks and enterprises for the benefit of CIT companies

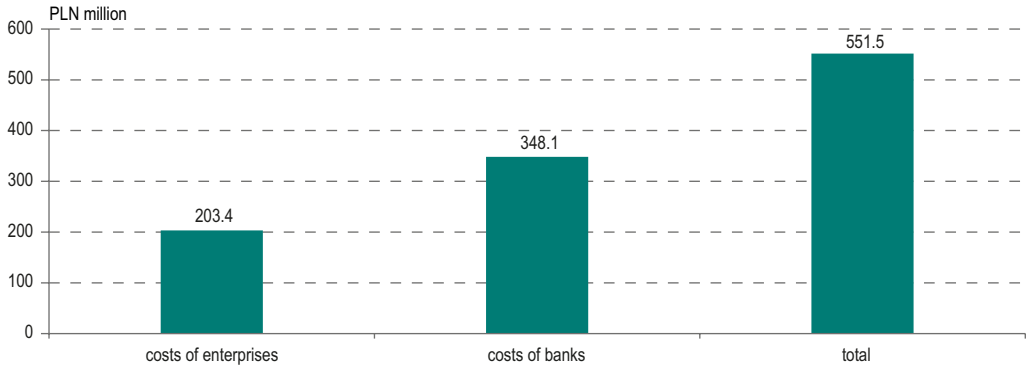


Chart 37. Share in GDP of external costs incurred for the benefit of CIT companies

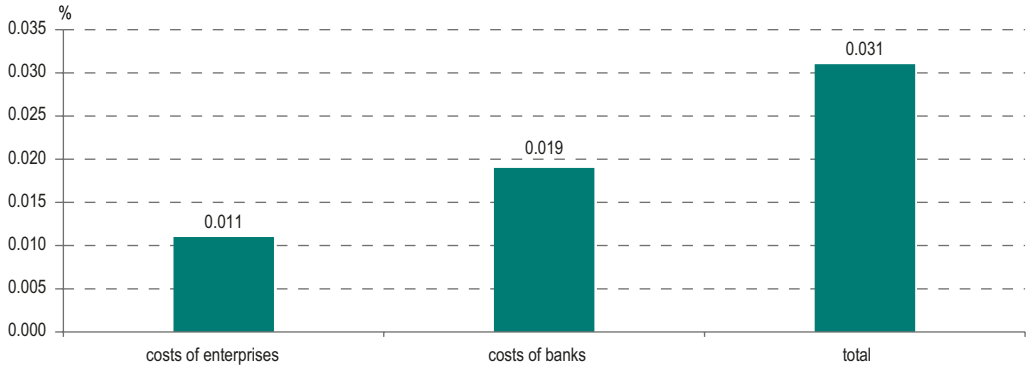
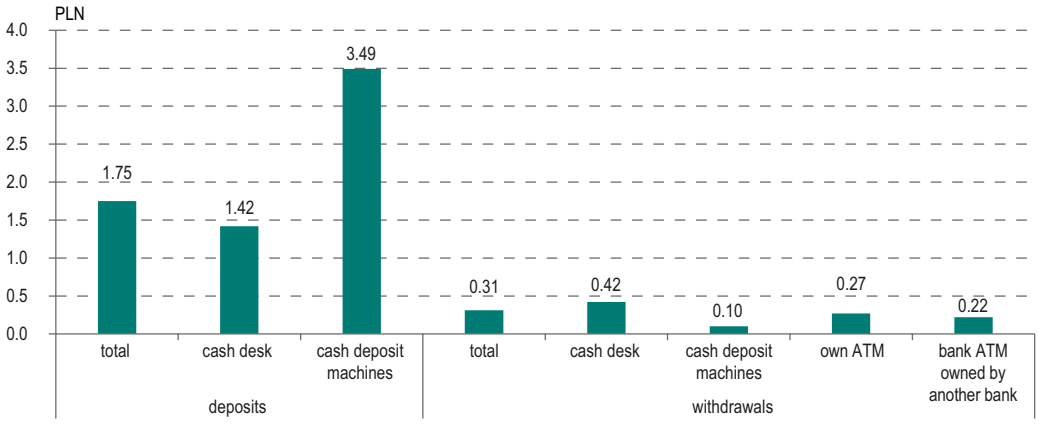


Chart 38. Unit cost of banks incurred for the benefit of CIT companies



amounted to over PLN 0.20, while PLN 0.10 was allocated to the *cash back* service. Chart 38 presents unit costs of banks incurred for the benefit of CIT companies in the scope of cash deposits (the total of PLN 1.75) and cash withdrawals (the total of PLN 0.31). The operation of cash deposit machines turned out most expensive (PLN 3.49). This may be due to the labour intensity of the processes necessary to be undertaken in this case by the cash transporting and handling companies, while banks are accountable for most of the activities and costs associated with handling cash deposits at the cash desk.

4.4. Costs of retailers

The survey addressed to retailers as well as other groups of respondents, covered retail payments, i.e. payments made between a consumer and an enterprise[67], with the additional assumption that the enterprise is not a wholesale business and the value of the transaction does not exceed PLN 200,000.

4.4.1. Methodology

4.4.1.1. Data sources

The estimation of the costs of payment instruments incurred by entrepreneurs from the retail trade and services sector in 2015 was based on two sources:

1. primary data acquired under the questionnaire survey,
2. market and sector data derived from a survey designed by POLASIK Research and conducted by the research agency KANTAR TNS.[68]

In the original questionnaire survey (cf. Subparagraph 4.4.1.2), a very large amount of data gaps was observed. This was due to the failure to reach certain categories of entrepreneurs. In addition, over-representation of entities accepting payment cards in the sample proved to be very high. The lack of data and the unavailability of a fully representative sample made it impossible to estimate the final costs on a macroeconomic scale. As a consequence, the extrapolation (estimation) of primary data concerning payment costs was performed, using cost drivers[69] originating from another business survey implemented in the recent years and conducted by POLASIK Research (cf. Subparagraph 4.4.1.3).

The analysis of the results of the survey also revealed that sellers had problems with accurate estimation of the time spent on handling a single payment transaction. They resulted from the fact that they are involved in many activities within the sales process (talking to the customer, showing the product, counting the value of the products to be sold, packing the goods, etc.). Consequently, the average payment processing time reported in the responses by a very large number of respondents was unreliable (e.g. 0 or 1 second or 5 hours). Accordingly, the results of earlier research studies were used to estimate the costs

[67] An enterprise means, for example, an independent retail and service outlet, a commercial or franchise network, an organisation, a cooperative or any other form of organisation.

[68] Polasik M., *Rynek płatności detalicznych w Polsce: Zasięg akceptacji – Wolumeny transakcji – Szanse dla innowacji*, [Market of retail payments in Poland. Range of acceptance]; Toruń 2017.

[69] The drivers included the number of entities accepting a given payment method, the number of transactions performed using the particular payment method, the turnover value of a given payment method as well as the number of cash registers, terminals and points of sale.

associated with devoting sales people's time to handling the payment process at physical points of sale.

For this purpose, the publication of Polasik *et al.* was used[70], based on research using video chronometric method, which recorded the course of several thousand transactions carried out at points of sale and then analysed them on the basis of the dedicated IT system. The results of the research enabled a detailed distribution of the sales and payment process into the activities performed by the seller, the customer and the technical equipment. The "seller engagement time for POS payment service" was defined for the purpose of examining the cost of payment as: "the time from the moment the customer service is completed by the seller and information on the amount to be paid is provided, to the moment the receipt and transaction confirmation (for cards) are printed and handed over to the customer".[71] It is worth noting that this time includes the involvement of the seller in the payment process, excluding the time spent on sales customer service. Estimation of the transaction duration defined in this way required additional calculations based on detailed results of the Polasik *et al.*[72] study. After taking into account the cost of salaries of sellers in the respondent's enterprise (according to primary data), the time was used to estimate the cost of handling a single transaction using a given method. The table below shows the average time the seller has been involved in POS payment processing (Table 6).

Table 6. Average time of the seller's involvement in payment processing in retail and service outlets

Method of payment	Time in seconds
Cash	20.39
Traditional (contact) card with PIN	41.37
Contactless card (online)*/**	31.84
Mobile payment	54.01

*It was assumed that as a result of the PSC recommendation, no offline transactions on a larger scale occurred in Poland in 2015. The duration of an online proximity transaction is 30.39 seconds (Polasik et al., 2013).

**In 2015, the share of proximity transactions above PLN 50 was approximately 13%. These transactions required the use of a PIN code, which extended the payment time by approximately 11.14 seconds.[73]

Source: M. Polasik et al., *Time efficiency of Point-of-Sale payment methods: Empirical results for cash, cards and mobile payments*, op. cit.

4.4.1.2. Characteristics of primary data acquired under the questionnaire survey

The questionnaire survey of the costs of payment instruments among entrepreneurs was conducted for NBP using CAPI method in the period from 16 January to 16 November 2016 on a sample of 1,302 respondents. The interviews were conducted by a research agency selected by NBP in a tender procedure.

[70] Polasik M. et al., *Time efficiency of Point-of-Sale payment methods: Empirical results for cash, cards and mobile payments*, „Lecture Notes in Business Information Processing", Springer, Heidelberg 2013, Vol. 141, pp. 306–320.

[71] A similar methodology was applied by the Bank of Canada in 2016 to calculate the duration of a transaction for the purpose of examining payment costs Kosse A. et al., *The Costs of Point-of-Sale Payments in Canada*, "Bank of Canada Staff Discussion Paper", 2017, no. 4.

[72] Cf. the course of the transaction presented in Chart 2 and Chart 3; Polasik M., et.al., Time Efficiency…, op. cit. pp. 313–314.

The research sample distinguished 3 groups of entities:

1. physical points of sale – 1,002 entities,
2. e-commerce – 150 entities,
3. mass creditors – 150 entities.

The research sample was constructed by dividing into 20 branches listed below (Table 7) and the size of employment in the following brackets: less than 10 employees, 10–49 employees, 50–249 employees and more than 250 employees.

Table 7. Distribution of the survey sample by industry and employment size

Size of employment / Industry	0–9	10–49	50–249	250+	Total
Supermarkets and hypermarkets	0	0	15	14	29
Small grocery stores	27	27	0	0	54
Household appliances, consumer electronics, computers and electronics stores	24	24	21	0	69
Clothing and footwear stores	32	34	20	13	99
Cosmetic stores, pharmacies	22	25	19	4	70
Bookshops, newspaper kiosks, paper articles	31	20	10	0	61
Fuel stations	21	20	21	0	62
Tourist offices and airlines	17	12	8	3	40
Hotels and motels	17	13	10	7	47
Catering – restaurants, pubs and cafés	21	16	17	10	64
Entertainment and culture; sport and recreation	24	19	19	14	76
Construction and furniture stores	24	21	10	0	55
Transport (taxi, bus tickets) and public transport	17	19	17	14	67
Cosmetic and hairdressing services	21	19	5	0	45
Medical services	18	10	10	10	48
Sale and servicing of motor vehicles	22	19	20	2	63
Other trading activities (including food vending machines)	48	51	20	9	128
Other service activities (including home services)	21	24	21	9	75
Bill issuers	40	42	35	33	150
Total	**447**	**415**	**298**	**142**	**1302**

4.4.1.3. Characteristics of market and sectoral data

In the survey, a representative nationwide sample of 1,631 entities was obtained. The research sample was selected by dividing into 22 branches listed below (Table 8) and the size of employment in the following brackets: less than 10 employees, 10–49 employees, 50–249 employees and more than 250 employees. The distribution of the sample by size of place and location (region and voivodeship) was consistent with the distribution for the population of the surveyed types of entities according to data provided by Statistics Poland.[74] The results allowed to draw conclusions regarding the whole sector of retail trade and services in Poland.

Table 8. Breakdown of the retail market by industry, used for extrapolation of data on the costs of payment execution

Industry	Specific industries
Super- and hypermarkets FMCG	Supermarket/Hypermarket
Smaller grocery stores	Smaller grocery store
Household appliances/RTV/ electronics	Household appliances / RTV shop/PC shop/electronics shop
Clothing and footwear stores	Clothing store/ footwear store
Cosmetic stores, medical shops, pharmacies	Cosmetic shop - chemist/ pharmacy/medical shop
Construction markets	Construction Market/Wholesale of construction materials available for individual customers
Fuel stations	Fuel station
Bookstores, kiosks and press lounges	Bookstore/Kiosk/Lounge with newspapers
Off-store trading	Direct sales / Selling machines / Parking meters
Other trading services	Confectionery/ Jewellery/ Embroidery/ Meat shop/Liquor store/ Gardening or zoo shop/ Sport shop/ Multi-brand shop
Public transport/communication	Rail passenger transport/ Urban transport/ Sub- and inter-urban buses/Toll on motor-ways/ Ticket machines/ Taxi corporations
Travel agency/rental alone.	Travel agency/tourist office/airline/car rental
Catering	Bar/Restaurant/ Nightclub/Pub/Canteen
Hotels and motels	Hotel/Motel/Guesthouse

[74] GUS data concerning entities (retailers from trade and service sectors) active on the market. Two types of bases constituted a source: (1) SP-3 survey on 0–9 enterprises, (2) F-02 reports for 10+ enterprises.

Industry	Specific industries
Paid medical services, dentist	Clinic/outpatient clinic/dentist/Paid medical office/Practice/Eye doctor/Optician
Entertainment/culture/sport	Cinema/Theatre/Gallery//Museum/sports and leisure facility
Sale and repair of vehicles	Sale of motor vehicles and spare parts / Repair of motor vehicles
Other services	Hairdressing / Beauty treatments/Laundries/ Other minor services
Home delivered services	Construction services/Renovations/ Hydraulic services/Electrical services
Products electronically accessible	Access to Paid Content, Multimedia/Games & Entertainment/Applications, Software
Bill issuers	Public infrastructure /Telecommunication services and media/ housing services, including cooperatives and housing communities, paid car parks/other mass creditors

Source: M. Polasik, *Rynek płatności detalicznych w Polsce: Zasięg akceptacji – Wolumeny transakcji – Szanse dla innowacji…[A market of retail payments in Poland: Range of acceptance – Opportunities for innovation…,]* op. cit.

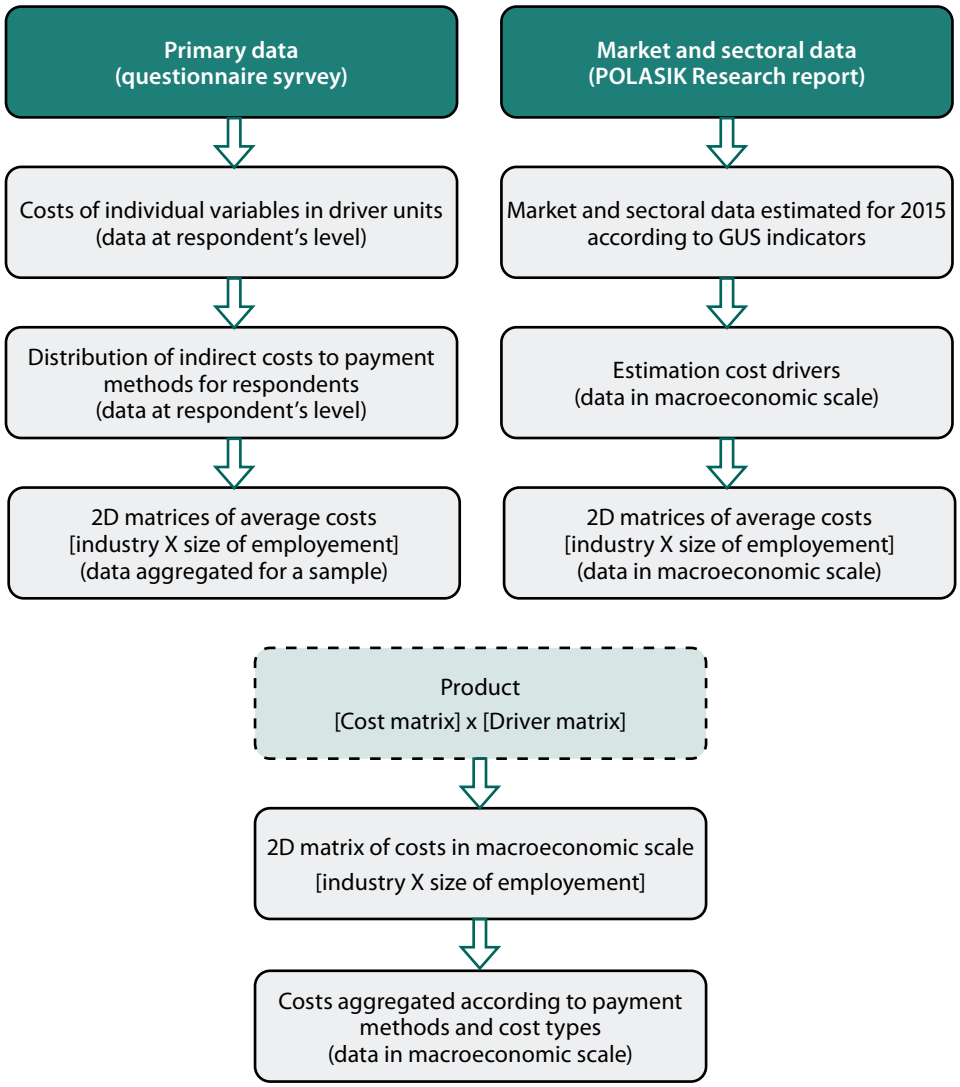
The database of drivers on which the extrapolation was made, was created on the basis of market and sector data after carrying out an analysis taking into account industry-based weighting, employment size, card acceptance and e-commerce trade. Each of the above-mentioned industries has been described in detail by the Polish Classification of Activities (PKD) codes. The distribution of the sample took into account the assignment of enterprises to specific industries, in accordance with the PKD of the dominant, actual activity and the size of employment. Due to the fact that the values of drivers in the above mentioned report were calculated for 2016, it was necessary to reassess these data for 2015. This was done on the basis of GUS reports on retail sales growth.

4.4.1.4. Methodology for aggregation and extrapolation of data to the macroeconomic scale

The universal methodology used to extrapolate data obtained in the course of surveys of enterprises to macroeconomic parameters of the national economy was developed in February 2017 by M. Polasik and A. Meler as part of the work of the POLASIK Research Agency. It is presented in Diagram 3.

Therefore, the cost structure in relation to the drivers was derived from the original data, e.g. the depreciation cost of the cash register was referred to the number of cash registers and the average depreciation cost of a single cash register became the input data derived from the original data. Subsequently, each cost item from the primary data was assigned an appropriate driver from the POLASIK Research study. For example, the average depreciation cost of a single cash register has been assigned to the total number of cash registers in the country, broken down by industry and employment size.

Diagram 3. Methodology for estimation and extrapolation of costs of payments to the macroeconomic scale



Source: The methodology was developed by M. Polasik and A. Meler as part of the work of the POLASIK Research Agency, February 2017.

4.4.1.5. Calculation of the output unit and the procedure for limiting the impact of extreme values by the so-called winsorized mean method

In the scope of calculating costs of individual variables in units of the drivers (Diagram 3), the average of the respondents' responses to the survey questionnaire was used (primary data). Due to the fact that there were large differences in the number of entities providing responses for each cost variable, the principle of determining how to calculate the average for each cost variable by selecting one of the following options was adopted:

S1 the average is calculated for each category in the matrix: industry x employment. This is the most demanding option in terms of the quantity of the source data (which can be applied if the size of individual categories is sufficiently large);

S2 the average is calculated for each industry but without the breakdown into the size of employment;
S3 the average is calculated for each employment bracket, but without any breakdown into industries;
S4 the average is calculated for the entire database of primary data. It is a variant most resistant to data deficiencies, but losing internal differentiation.
S5 the average is calculated on aggregates of industries. This is a variant derived from S2 but the industries therein are aggregated into several blocks of industries similar in terms of payment costs.

The average as an indicator is very susceptible to extreme indications, i.e. a small number of indications with values significantly differing from others may significantly change the value of the average. In the adopted method of combining information from two databases, such a phenomenon could generate serious errors. In order to avoid this risk, at the stage of calculating the costs of individual variables in units of drivers (Diagram 3; this is the starting unit for the estimates from the primary data), the average was subject to the winsorized mean procedure.[75] This procedure consists in converting a specified number of extreme values in the primary data into maximum values for the remaining pool of indications. The general rule of thumb was to apply the winsorized mean value that is distant from the average value by 3 standard deviations up and down. In selected cases with specific distributions these values were modified.

Notwithstanding the averaging procedure, the primary data have been revised for some variables. This was the case when results of other surveys or other reliable data sources were available that defined boundary conditions for the potential range of response for a given variable and the respondents' responses were outside this range (e.g. when the respondent declared accepting only one type of payment card (debit or credit), which is not possible), or when the responses were contradictory to known technical parameters of the devices.

4.4.2. Number and value of transactions by individual payment instruments

4.4.2.1. Number and value of transactions in retail sales in Poland

In 2015, enterprises in Poland accepted approx. 15.6 billion transactions made using all methods. Of these, more than three quarters of transactions were performed in cash, and every fifth transaction was made by credit card or bank transfer. Other methods accounted for approximately 3% of the total number of transactions. Chart 39 presents the percentage shares of the methods in the number of transactions, and Chart 40 presents the volumes of transactions performed using particular payment methods.

[75] Wilcox R., *Introduction to Robust Estimation and Hypothesis Testing*, Academic Press, Amsterdam 2013, Issue 3.

Chart 39. Share of individual payment instruments in the number of transactions

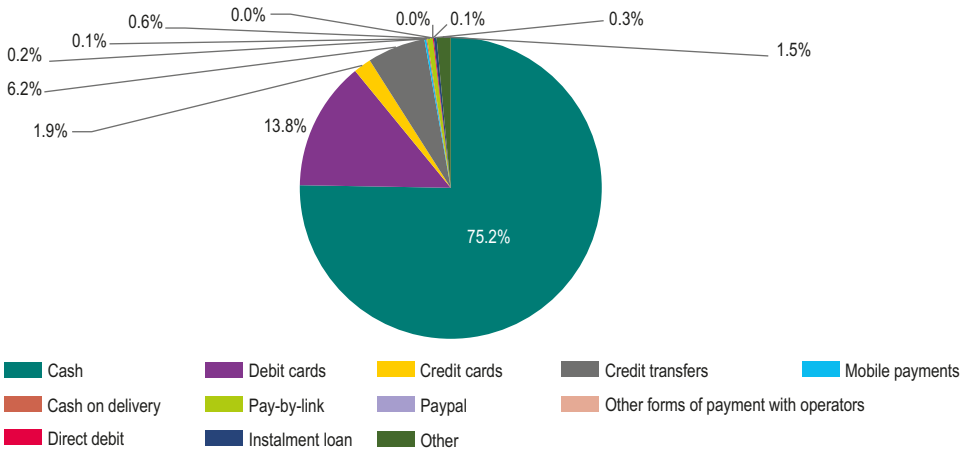
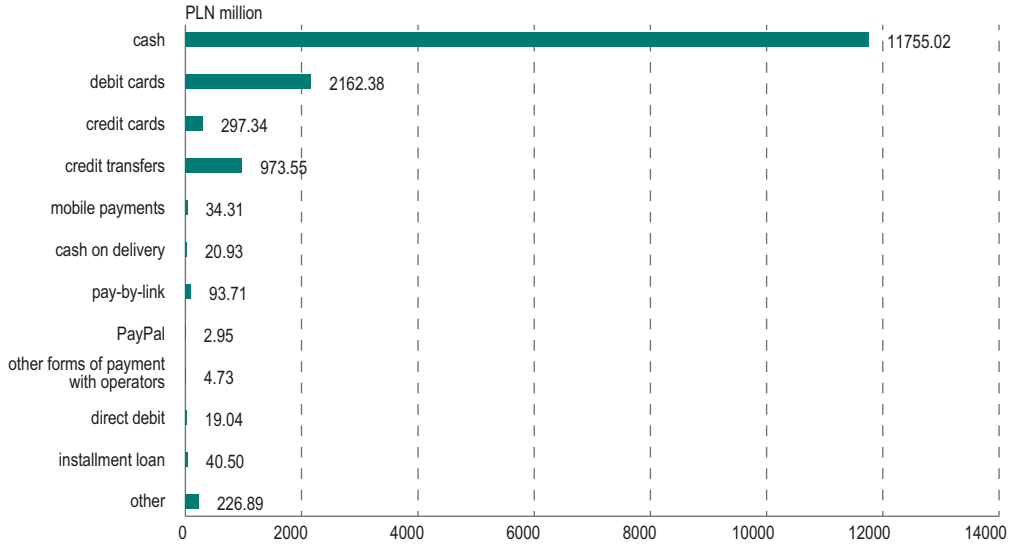


Chart 40. Number of transactions in individual payment instruments



In the case of transaction value, an increase in the importance of non-cash payment methods, such as payment cards and credit transfers, as compared to cash, is visible in relation to the number of transactions (Chart 41). This applies in particular to bank transfers performed to the enterprise account (31% of the transaction value).

Taking into account the value of the transactions performed, approximately half of the transactions were performed in cash. Chart 42 shows the value of transactions performed with the use of individual payment instruments in PLN billion.

Chart 41. Share of individual payment instruments in the value of transactions

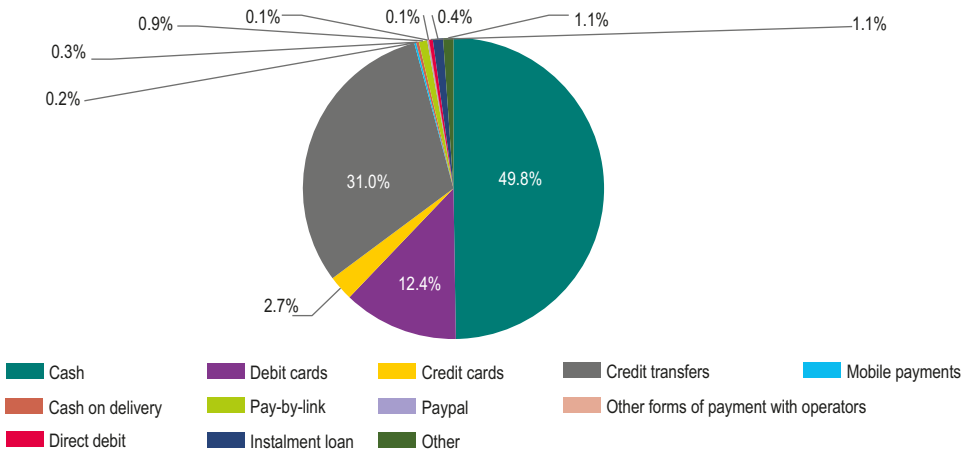
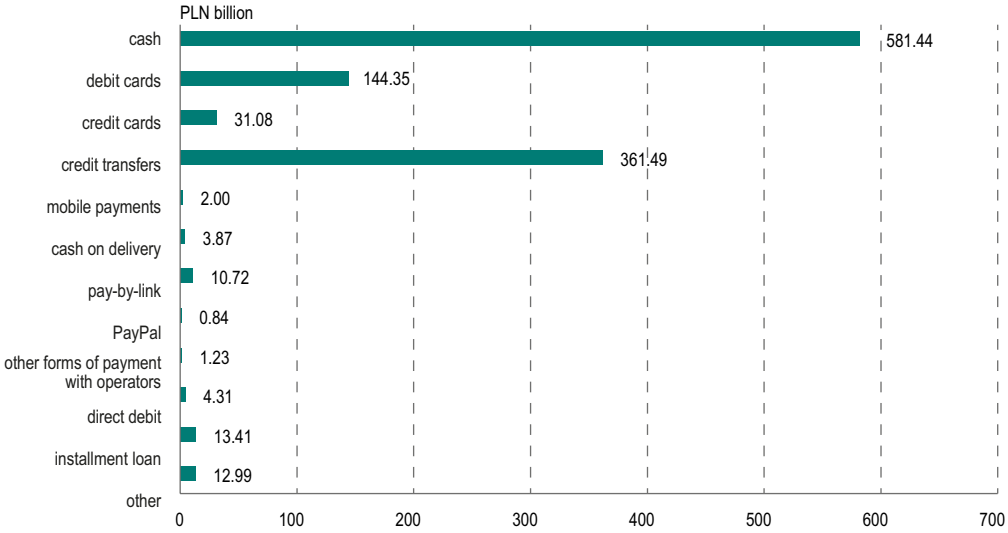


Chart 42. Value of transactions by individual payment instruments



In accordance with the division of the research sample into 3 groups of entities (cf. 4.4.1.2), further detailed estimates of the number, value and costs of transactions in enterprises will be presented according to the breakdown into:

1. physical points of sale,
2. e-commerce,
3. mass creditors.

4.4.2.2. Number and value of transactions at physical points of sale

In 2015, approximately 14.5 billion transactions were performed at physical points of sale using all methods, of which approximately 80% of transactions were performed in cash, approximately 17% by payment card and just over 1% by bank transfer. Mobile payments, instalment credit and other payment methods accounted for just over 2% of the number of transactions (Chart 43 and Chart 44).

Chart 43. Share of individual payment instruments in the number of transactions among physical points of sale

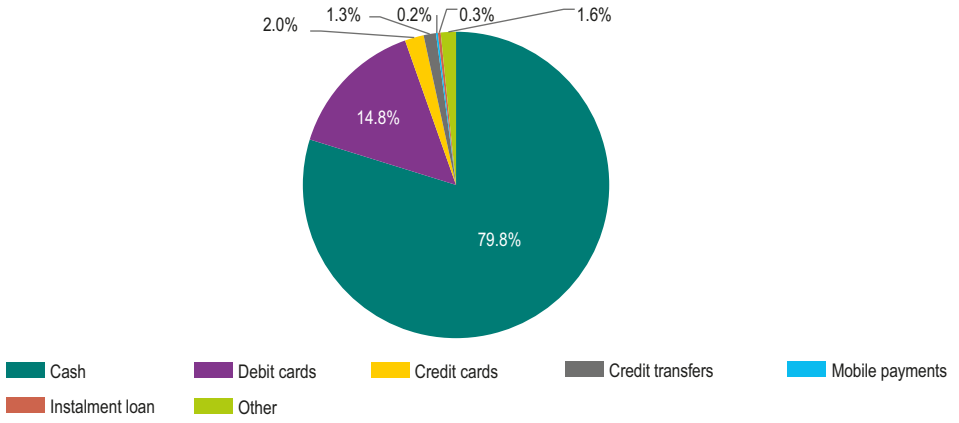
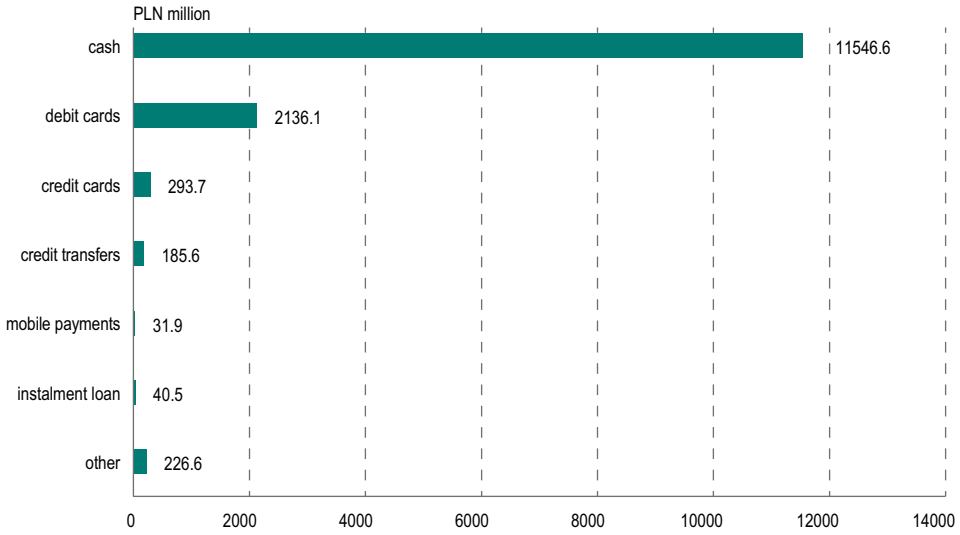


Chart 44. Number of transactions executed by individual payment instruments in physical points of sale



In the case of transaction value, an increased importance of payment instruments such as credit transfers and payment cards is visible. In the scope of sales through physical

distribution channels, slightly over a half of the transaction value was settled in cash (56.5%), about 23% by bank transfer and 17% by payment card. Other methods accounted for almost 3% of the total value of transactions. Share of individual payment instruments in the value of transactions among physical points of sale is presented in Chart 45.

Chart 46 presents the value of transactions performed by means of individual payment methods in PLN billion. Out of PLN 972 billion of the value of transactions, PLN 549 billion were performed by cash, followed by the application of bank transfers (PLN 227 billion of transactions). The total value of transactions executed with cards amounted to PLN 169 billion, while other methods played a marginal role.

Chart 45. Share of individual payment instruments in the value of transactions among physical points of sale

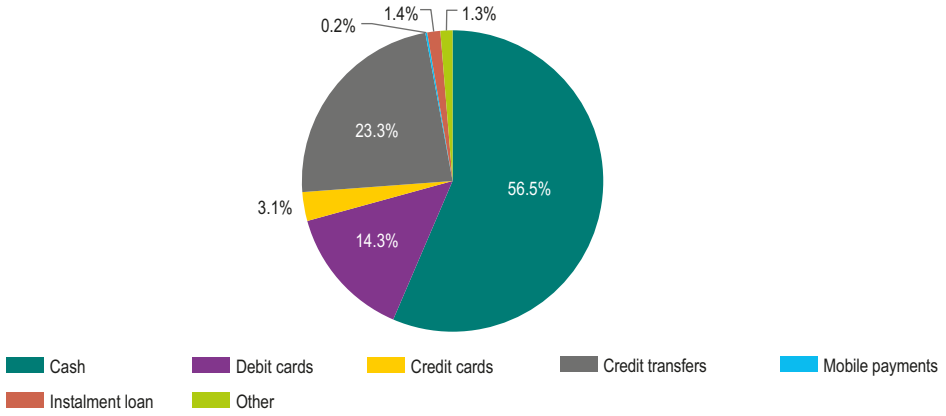
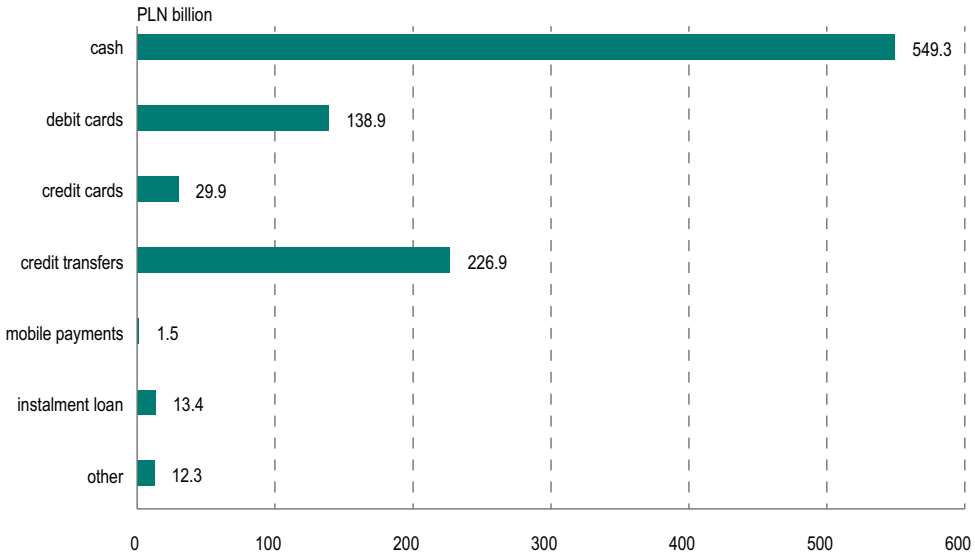


Chart 46. Value of transactions executed by individual payment instruments among physical points of sale



4.4.2.3. Number and value of transactions in e-commerce

E-commerce is the retail market segment with the greatest diversification of payment methods used. Chart 47 presents the percentage share of particular methods in the number of transactions, and Chart 48 presents the volumes of transactions performed with the use of individual payment instruments in e-commerce. The first place in terms of frequency of use was occupied by pay-by-link transfer (almost 46%), followed by bank transfer to the seller's account (22%) and payment cards (14.5% in total), while cash on delivery was only fourth (12%). Other methods did not exceed the 5% share threshold.

Chart 47. Share of individual payment instruments in the number of transactions in e-commerce

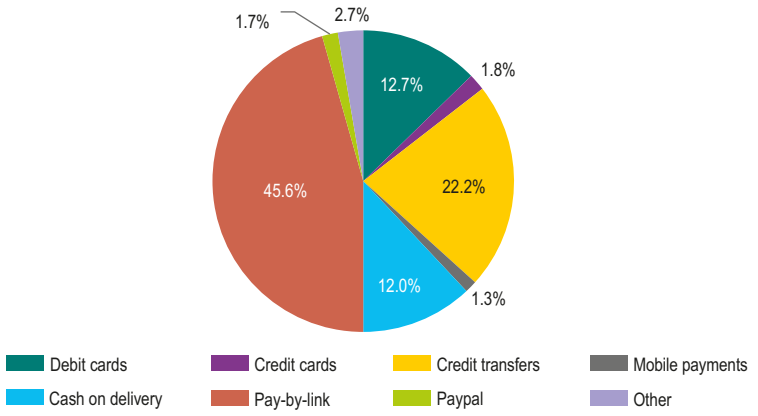


Chart 48. Number of transactions in individual payment instruments

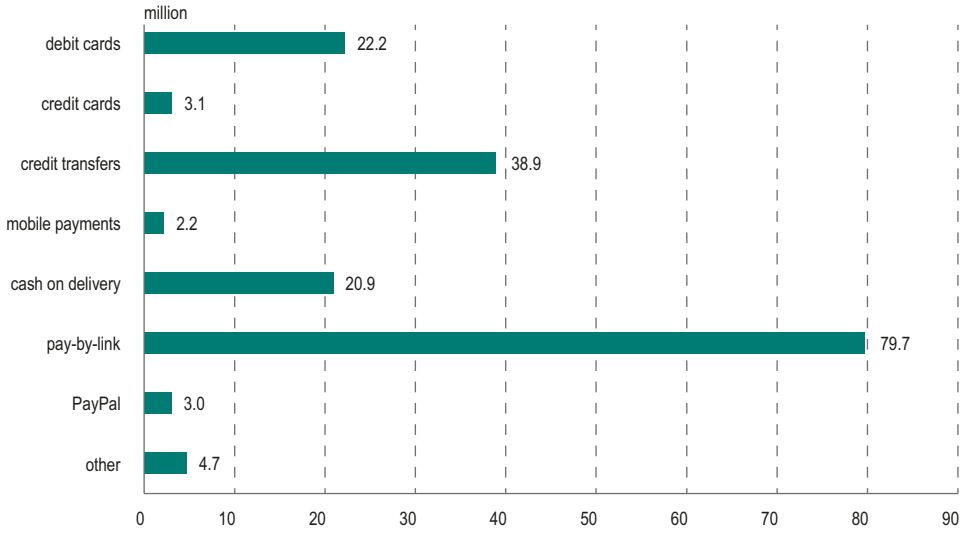


Chart 49. Share of individual payment instruments in the value of transactions in e-commerce

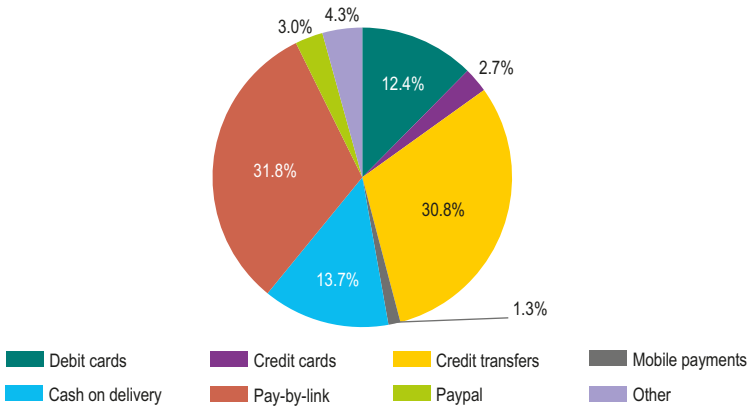
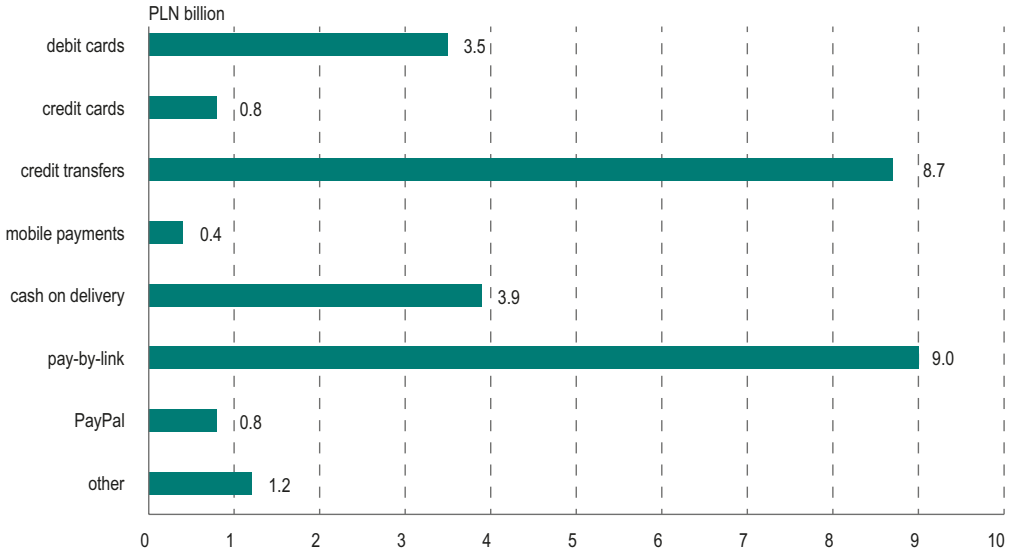


Chart 50. Value of transactions by individual payment methods



Among the payment methods covered, only four exceeded the threshold of 20 million payments executed in e-commerce (pay-by-link, bank transfer, debit card and cash on delivery). Credit cards and PayPal, very popular in e-commerce on the American market[76], play an insignificant role on the Polish market. Transaction volumes are presented in Chart 48.

[76] Polasik M., Kunkowski J., and Maciejewski K., *Efekt sieicowy na rynku usług płatniczych stosowanych w handlu internetowym*, [Network effect on the market of payment services used in e-commerce] „Zeszyty Naukowe Uniwersytetu Szczecińskiego. Ekonomiczne Problemy Usług", 2012, no. 87, p. 545.

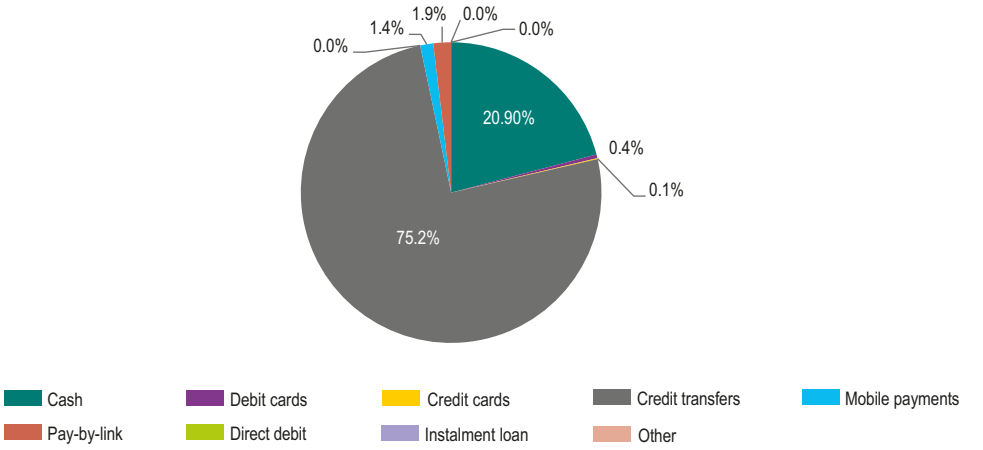
In terms of transaction value, the share of individual payment instruments is similar to their share in terms of the number of transactions. The pay-by-link is most significant, followed by credit transfer, whereas payment cards and cash on delivery play a slightly less important role (than in the case of the number of transactions).

In e-commerce transactions for the total value of PLN 28.2 billion were performed (Chart 50). The pay-by-link payments represented one third of this turnover (PLN 9.0 billion) and a credit transfer to an account had a similar share (PLN 8.7 billion). Card transactions reached the value of PLN 4.3 billion (15%), while cash on delivery amounted to PLN 3.9 billion (14%). Several less popular payment methods operated by Internet operators accounted for transactions for a total value of PLN 1.2 billion.

4.4.2.4. Number and value of payments of bills in favour of mass creditors

The segment of payments of bills is dominated by two payment instruments. The chart below shows the share of individual payment instruments in the number of transactions in the scope of bill payments (Chart 51). Credit transfers had the highest share of 75% followed by cash payments, which constituted 21%. Other payment instruments played a marginal role.

Chart 51. Share of individual payment instruments in the number of transactions for mass creditors



In 2015, mass creditors accepted over 996 billion transactions in total. Among these transactions, they accepted 749.1 million credit transfers and 208.4 million cash transactions (Figure 52). Other payment instruments played a marginal role.

Over three-fourths of the value of bills was paid by bank credit transfer (Chart 53), reaching the value of PLN 125.9 billion out of over PLN 167.2 billion of the total value of bills (Chart 54). One fifth of the value of bills was paid with the use of cash (PLN 32.1 billion), whereas all other methods, including payment cards, direct debit and pay-by-link, accounted for only 5.5% of the transaction value (PLN 9.2 billion in total).

Chart 52. Number of transactions by individual payment instruments for mass creditors

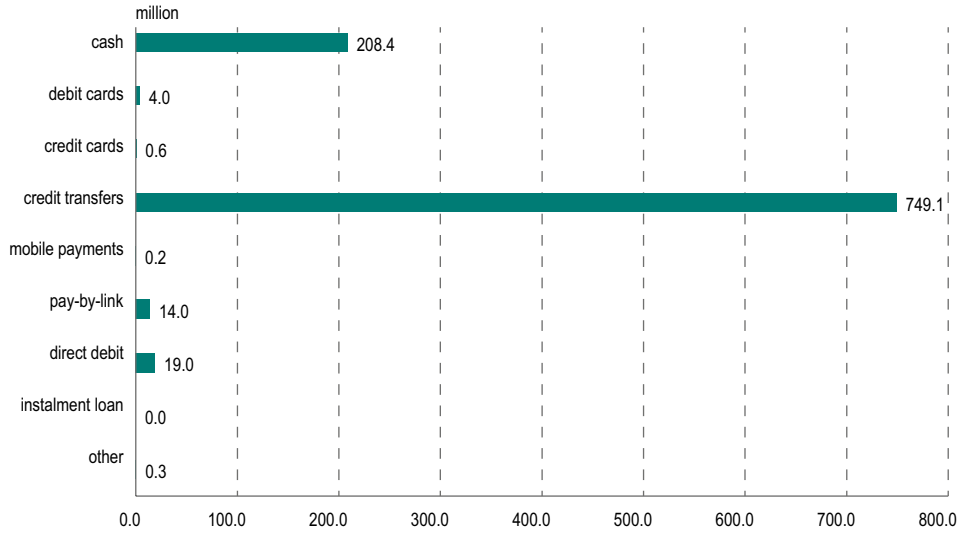


Chart 53. Share of individual payment instruments in the value of transactions for mass creditors

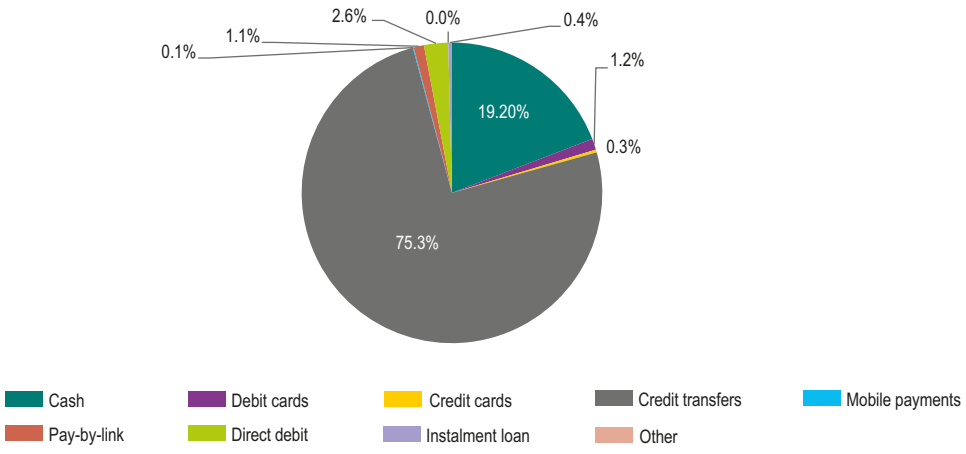
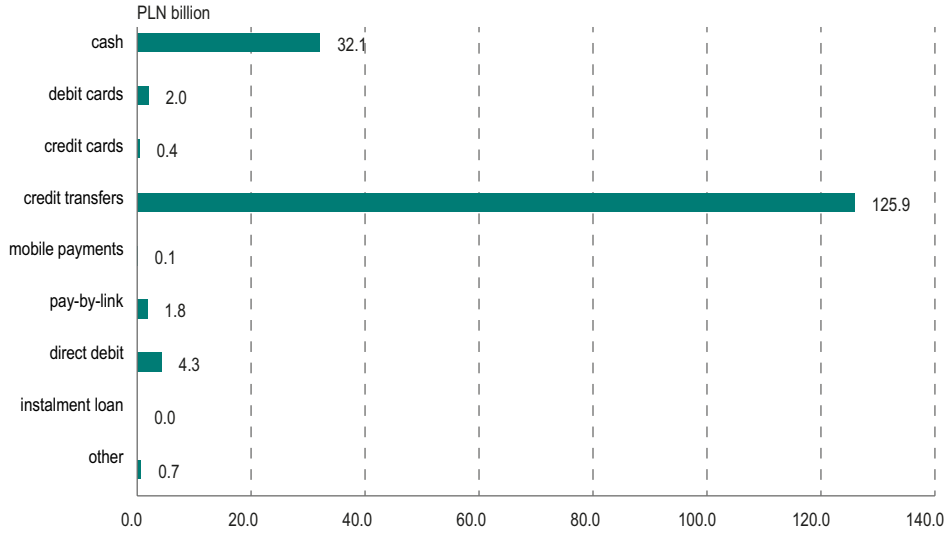


Chart 54. Value of transactions by individual payment instruments for mass creditors



4.4.3.Private costs of payment handling borne by retailers according to payment methods

The table below (Table 9) presents private costs of payment instruments (PLN 11.2 billion). The highest costs were generated by cash (over PLN 7 billion). The second most important payment instrument in this respect was the debit card (PLN 2.7 billion).

Table 9. Private costs of payment instruments

Payment instrument	Internal - non-salary	Internal - salaries	External	Private costs
Cash	2,050.1	4,165.0	1,108.5	7,323.7
Cash on delivery	108.8	8	14.9	131.7
Transfer	145.9	146.1	0.6	292.6
Direct debit	0.5	84.8	36.2	121.5
Pay-by-link	5.8	51.1	66.8	123.8
Debit card	307.2	947.7	1,395.5	2,650.4
Credit card	42.7	130.3	264.5	437.6
Mobile payments	10.7	11.2	14.7	36.5
PayPal	0.1	3.7	21.5	25.3
Other instruments used by aggregators	0.04	6.0	6.2	12.2
Other	6.9			6.9
Total	**2,678.8**	**5,554.0**	**2,929.3**	**11,162.1**

4.4.3.1. Internal and external costs of individual retail payment methods

Cash had the highest share in private costs, regardless of the analysed group of enterprises – about 66% (Chart 55). The next instrument – payment cards – had 28% share in costs, while credit transfers – about 3%. The other methods played an insignificant role.

Chart 55. Share of individual payment instruments in private costs among retail and service outlets

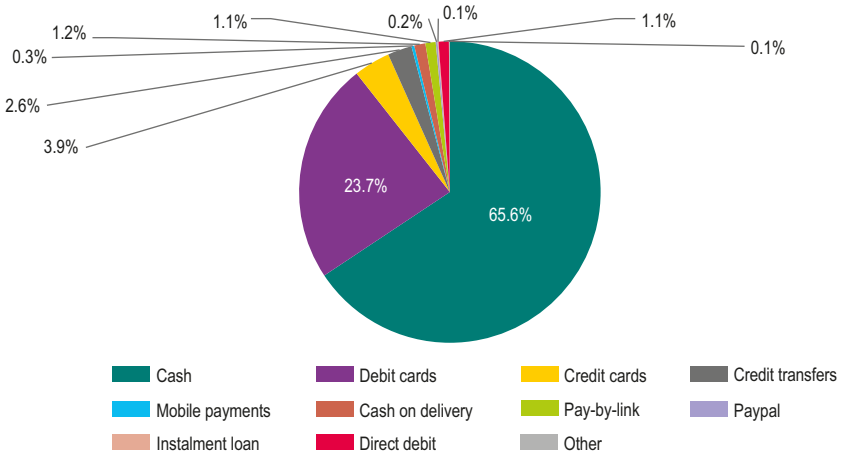
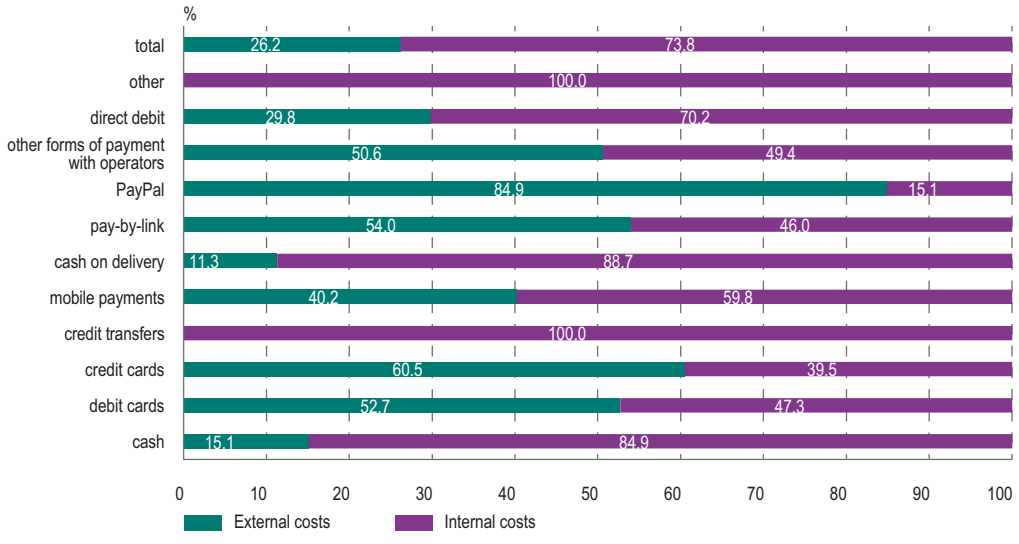


Chart 56. Share of external and internal costs in private costs of individual payment instruments



Individual payment methods demonstrated various distribution of internal and external costs (Chart 56). Internal costs accounted for the majority of the total cost of payment processing (74%), while external costs constituted 26%. The highest share of external costs

was recorded in the case of PayPal, payment cards as well as in the case of operators of other payment forms. In the case of cash, external costs constituted only 15.1%, however, given the high overall costs of cash, they were significant. The highest share of internal costs was recorded for credit transfers, cash and direct debit.

4.4.3.2. Costs of individual payment instruments in physical points of sale

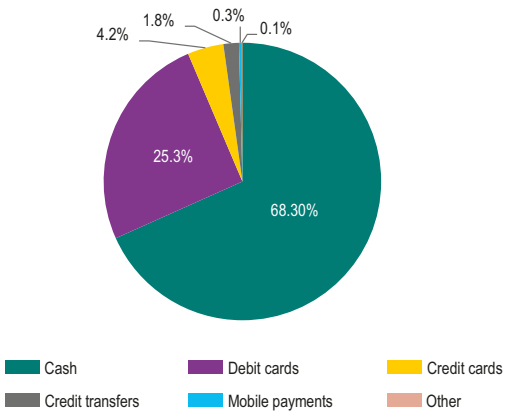
Internal and external costs of individual payment instruments in physical points of sale (PLN million) are presented in Table 10. The highest share of salaries in private costs of the particular instrument can be observed for cash (57.6%) and for debit cards (35.4%). The total share of salaries in costs amounted to 50%. The lowest share of external costs in total costs was recorded for credit transfers (only 0.1%) and for cash (15%). Overall, the indicator stood at 26.3%.

Table 10. Internal and external costs of individual payment instruments in physical points of sale

Sales channel	Payment instrument	Internal - non-salary	Internal - salaries	External	Private costs
Physical trade	Cash	1,917.1	4,023.3	1,046.8	6,987.2
	Debit card	300.2	916.5	1,373.3	2,590.1
	Credit card	41.7	126.0	260.0	427.7
	Mobile payments	10.5	8.3	10.9	29.7
	Credit transfer	143.0	41.0	0.1	184.1
	Other	6.9	-	-	6.9
Total		**2,419.4**	**50,115.2**	**20,691.1**	**10,225.7**

In physical points of sale, the highest share of private costs was observed for cash (68%), for payment cards it was less than 30%, for transfers – 1.8% (Chart 57).

Chart 57. Share of individual payment instruments in private costs among physical points of sale



4.4.3.3. Costs of individual payment instruments in e-commerce

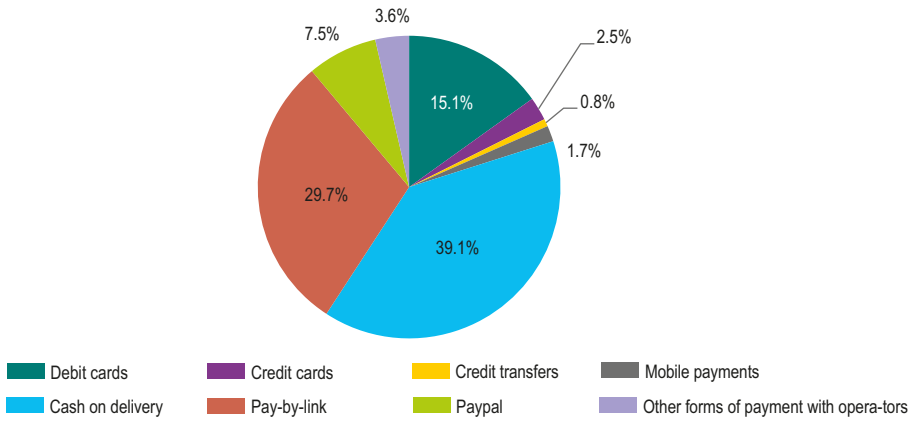
Internal and external costs of individual payment instruments in e-commerce (PLN million) are presented in Table 11. The share of salaries in costs amounted to 26.2%, which is much less than in the case of physical retail and service outlets (cf. Table 10). The highest share of salaries can be observed for credit transfers (88.8%), the lowest – for cash on delivery (6.1%) and PayPal (14.7%). On the other hand, external costs have the highest importance in the case of PayPal (84.9%) and the lowest in the case of cash on delivery (11.3%) and transfers (0.2%). Their overall rate was 38.09%.

Table 11. Internal and external costs of individual payment methods in e-commerce (in PLN million)

Sales channel	Payment instrument	Internal - non-salary	Internal - salaries	External	Private costs
E-commerce	Cash on delivery	108.8	8.0	14.9	131.7
	Pay-by-link	5.5	33.5	61.1	100.1
	Debit card	4.8	28.0	18.0	50.8
	PayPal	0.1	3.7	21.5	25.3
	Other for aggregators	0.04	6.0	6.2	12.2
	Credit card	0.7	3.9	3.8	8.4
	Mobile payments	0.01	2.8	2.8	5.6
	Credit transfer	0.3	2.5	0.01	2.8
Total		**120.2**	**88.3**	**128.3**	**336.8**

In e-commerce, the highest share in private costs was recorded for cash on delivery (less than 40%), followed by pay-by-link (ca. 30%) and then payment cards (ca. 18%), which is presented in Chart 58.

Chart 58. Share of individual payment instruments in private costs in e-commerce



4.4.3.4. Costs of individual payment instruments in payments to mass creditors

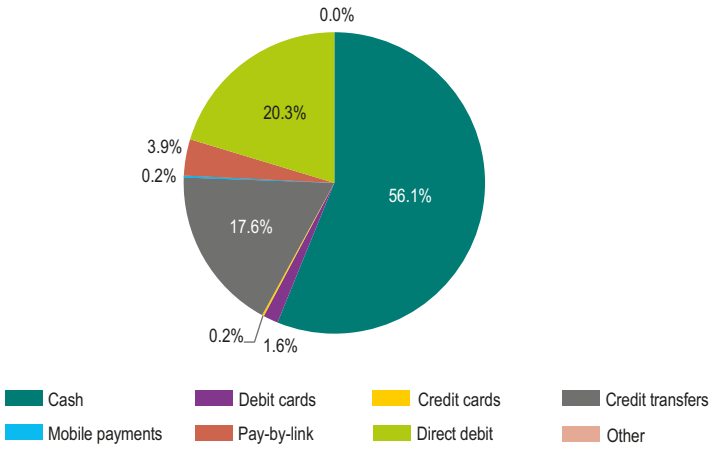
Internal and external costs of individual payment instruments in payments of bills (PLN million) are presented in Table 12. Salaries accounted for over 58% of total costs (the highest share – in the case of credit transfers, pay-by-link and direct debit) while external costs accounted for only 18% (the highest share – for mobile payments).

Table 12. Internal and external costs of individual payment instruments of mass creditors (in PLN million)

Sales channel	Payment instrument	Internal - non-salary	Internal - salaries	External	Private costs
Mass creditors	Cash	133.1	141.7	61.7	336.5
	Credit transfer	2.7	102.6	0.5	105.7
	Direct debit	0.5	84.8	36.2	121.5
	Pay-by-link	0.3	17.7	5.7	23.7
	Debit card	2.2	3.1	4.1	9.5
	Credit card	0.3	0.4	0.7	1.5
	Mobile payments	0.1	0.1	1.0	1.2
	Other	0.0			0.0
Total		**139.2**	**350.4**	**109.9**	**599.6**

In payments of bills, the highest private costs were reported for cash (56%), direct debit (over 20%) and credit transfers (approx. 18%), which is presented in Chart 59. These estimates indicate the ineffectiveness of direct debits for bill issuers, contrary to the banking sector (cf. Chart 7) – since at a very small number of transactions it generates 20% of costs, mainly resulting from employee salaries.

Chart 59. Share of individual payment instruments in private costs for mass creditors



4.4.4. Indicators of assigning costs of transaction execution to payment methods by retailers

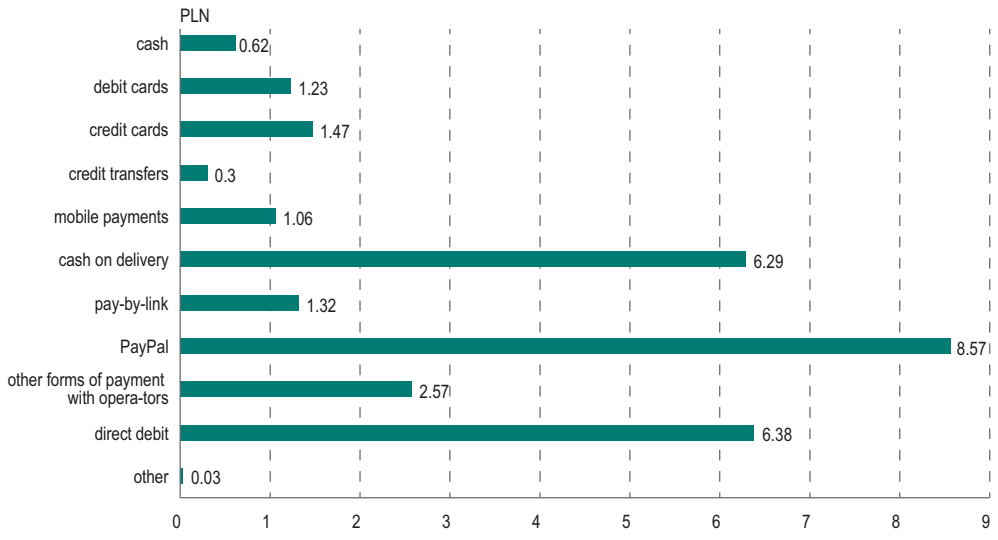
4.4.4.1. Unit costs of transaction execution by individual payment methods within retail sales

Table 13 presents private costs of payment execution for a single transaction (in PLN) in the three analysed sales environments and as a total.

Table 13. Unit private cost of transaction execution by individual payment instruments

Payment instrument	Physical tradinge	E-commerce	Mass creditors	Total
Cash	0.61	-	1.61	0.62
Debit card	1.21	2.29	2.37	1.23
Credit card	1.46	2.74	2.63	1.47
Credit transfer	0.35	0.07	0.14	0.30
Mobile payments	0.93	2.52	5.09	1.06
Cash on delivery	-	6.29	-	6.29
Pay-by-link	-	1.26	1.69	1.32
PayPal	-	8.57	-	8.57
Other for aggregators	-	2.57	-	2.57
Direct debit	-	-	6.38	6.38
Other	0.03	-	0.01	0.03
Total	**0.67**	**1.93**	**0.60**	**0.71**

Chart 60. Unit private cost of transaction execution by individual payment instruments



Taking into account the unit private costs of payments (Chart 60), bank transfer turned out to be the cheapest method of payment (PLN 0.30). It is therefore not surprising that it is preferred by many small businesses, especially in e-commerce. The second cheapest payment instrument per transaction was cash (PLN 0.62) which, despite the reduction in the interchange fee, was significantly cheaper than payment cards in 2015. In terms of a unit price, debit card was about twice as expensive (PLN 1.23) as cash. On the other hand, credit card (PLN 1.47) was slightly more expensive than debit card. The most expensive instruments in terms of the unit price were not very popular (PayPal, direct debit and cash on delivery). For creditors, the most expensive instrument was direct debit, so it can be difficult to promote this payment method among creditors with the current costly procedures.

It is worth noting that in the case of costs of enterprises, higher expenditures related to the acceptance of innovative payment methods are not clearly visible. In particular, mobile payments have proven to be a rather cheap method (with the exception of bill payments). While PayPal is very expensive to operate in e-commerce, pay-by-link transfers are cheap for merchants. Traditional methods such as cash on delivery paid to the courier and direct debit are more expensive.

4.4.4.2. Share of payment costs in the value of transaction by individual payment instruments in retail sales

Table 14 provides the percentage share of private costs of payment execution in the total value of transactions executed with the use of a given payment instrument in the three sales environments examined and in aggregate. In terms of value, the data confirm the cost advantage of bank transfer over all other methods accepted by enterprises. At the same time, it should be noted that payment cards (in terms of private costs) are more expensive than cash payments (comparing cash with debit cards, which are more popular in Poland than credit cards) by 0.58 percentage points. Assuming that merchants take financial decisions taking into account the value of sales rather than the number of transactions, the competitiveness of cards has already become high.

Table 14. Share of private costs of payment execution in the value of transaction by individual payment instruments

Payment instrument	Physical trading	E-commerce	Creditors	Total
Cash	1.27%	-	1.05%	1.26%
Debit card	1.86%	1.45%	0.49%	1.84%
Credit card	1.43%	1.11%	0.34%	1.41%
Credit transfer	0.08%	0.03%	0.08%	0.08%
Mobile payments	1.93%	1.57%	1.18%	1.83%
Cash on delivery	-	3.41%	-	3.41%
Pay-by-link	-	1.12%	1.34%	1.15%
PayPal	-	3.00%	-	3.00%
Other for aggregators	-	0.99%	-	0.99%

Payment instrument	Physical trading	E-commerce	Creditors	Total
Direct debit	-	-	2.82%	2.82%
Other	0.06%	-	0.00%	0.05%
Total	**1.05%**	**1.19%**	**0.36%**	**0.96%**

4.4.5. Summary and referring costs of payment handling by retailers to Gross Domestic Product

The highest share in costs on the part of enterprises was recorded for internal costs related to salaries (less than 50%) (Chart 61). The share of internal non-salary costs and external costs was similar – about 25%. The total share of internal costs was almost 74%.

Chart 61. Share of internal and external costs in retail sales

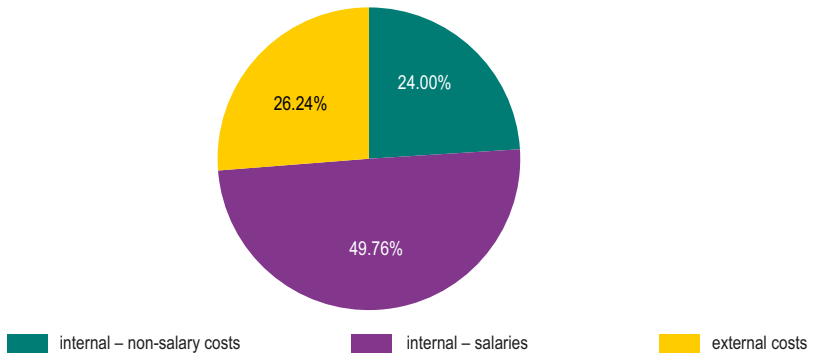


Chart 62. Share of payment costs incurred by retailers in relation to GDP by cost type

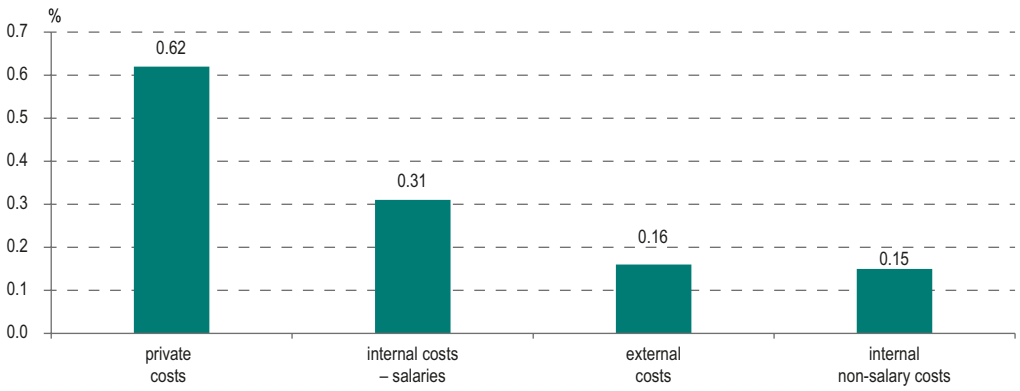
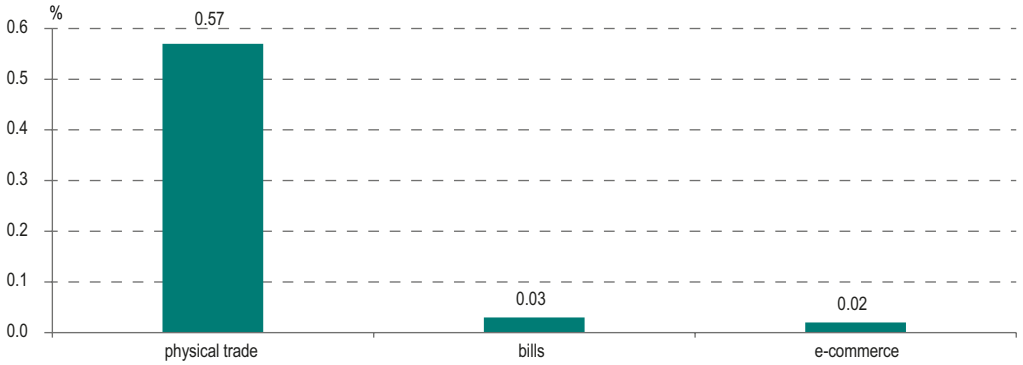


Chart 63. Share of private payment costs incurred by retailers in relation to GDP by market segment

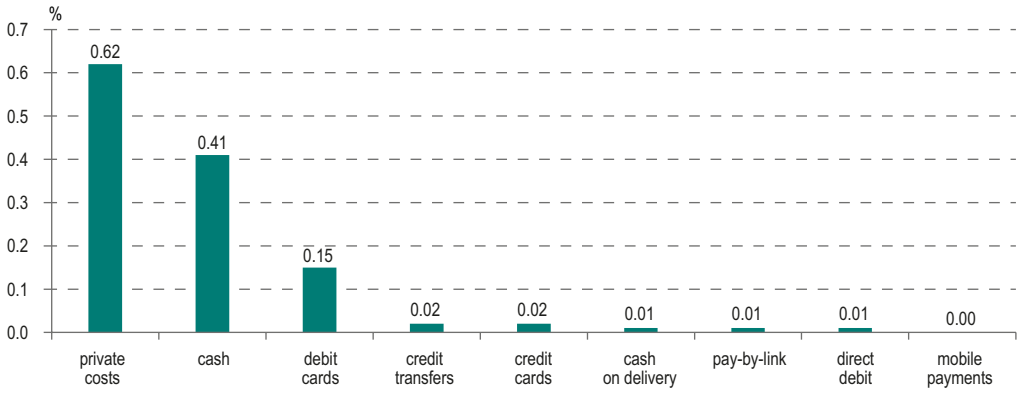


Total private costs of retailers in Poland, amounting to PLN 11.2 billion, constituted 0.62% of GDP (Chart 62). In this figure, internal costs amounted to PLN 8.2 billion, which accounted for 0.47% of GDP. It is worth noting that the greatest burden for the economy are internal costs which result from expenditures on salaries of employees of retailers (0.31% of GDP) (cf. Chart 61), related to the cost of their working time spent on handling payment and settlement processes (Chart 62).

External costs accounted for 26% of payment handling costs (cf. Chart 61). Moreover, it can also be noted that almost all payment costs of retailers are generated in the segment of sales carried out in physical points of sale (Chart 63).

Cash is the most popular method of payment among Polish enterprises. Almost all entities accept it in physical points of sale but the range of its acceptance is also high among mass creditors. This is one of the reasons why more than three-fourths of the total number of transactions (cf. Chart 39) and almost half of the overall value of transactions (cf. Chart 41) were performed in cash. Due to such a high popularity, cash is the payment method generating the highest handling costs for the Polish retail sector. Private costs for cash amounted to

Chart 64. Share of private payment costs incurred by retailers in relation to GDP by payment instruments



PLN 7.3 billion (cf. Table 9) and accounted for more than 65% (cf. Chart 59) of all costs incurred in servicing individual payment methods by these entities in 2015. On the other hand, payment cards, the second most popular payment method in retail and service outlets, accounted for 28% of these costs (cf. Chart 55), in the amount of PLN 3.1 billion (cf. Table 9).

Bank transfer generated lower costs than payment cards – at a level of PLN 0.29 billion (cf. Table 9), making 2.6% of the overall costs (Chart 55). Cash and cash on delivery were popular payment methods among mass creditors and e-commerce operators, respectively. Other payment methods played a lesser role on the Polish market. As a result of the above distribution of private costs (Chart 64), private cost of cash places the greatest burden on retailers (at a level of 0.41% of GDP).

4.5. Consumer costs

In line with the concept of social and private costs, costs of payment instruments to consumers comprise the time taken to execute transactions, the fees paid to service providers and the losses incurred due to the use of payment instruments. It should be borne in mind, however, that the valuation of the above mentioned costs may be disputable. Indeed, some consumers do not consider the waiting time in line or the time spent to get to an ATM to withdraw cash as costs. In addition, the availability of cost-oriented data is in many cases limited. For the reasons mentioned above, in recent years only 6 central banks have decided to estimate the cost of payments borne by consumers according to the concept of social costs.[77] It is also worth noting that in the European cost survey, the results of which were published in 2012[78], consumer costs were not taken into account.

Estimation of costs of payment instruments borne by consumers on the Polish market was performed in two variants. In the first variant described in this subchapter, the starting point was the approach applied by the European Central Bank within the so-called residual consumption method. It used the data published by the Statistics Poland concerning the value of household consumption in Poland in 2015, which was used to calculate the value of cash transactions and then the number of cash transactions. The cost results obtained under this variant were used to estimate the total cost of payment instruments on the Polish market (Chapter 5.2). The use of this consumer cost estimation variant, based on macroeconomic data for the Polish economy, ensured that the consistency of data in the research project in relation to the number of transactions was maintained. As in the case of estimating the number of transactions among enterprises, GUS data were used in this variant. In the second variant, presented in Annex No. 2, the results of the questionnaire survey conducted by NBP in 2016 among consumers and, partially, the results of the diary survey conducted by NBP in 2011 were used to calculate the number of cash transactions and selected transactions performed by other methods. Moreover,

[77] Gresvik O. and Haare H., *Costs in the Norwegian payment system*…, op. cit., p. 16; Turján A. et al., *Nothing is free: A survey of the social cost of the main payment instruments in Hungary*…, op. cit., p. 27; Danmarks Nationalbank, *Costs of payments in Denmark*…, op. cit.; Norges Bank, *Costs in the Norwegian payment system*…, op. cit., p. 16; Stewart C. et al., *The evolution of payment costs in Australia*, "Reserve Bank of Australia Research Discussion Paper", 2014, no. 2014–14; Kosse A. et al., *The Costs of Point-of-Sale Payments in Canada*…, op. cit.

[78] Schmiedel H., Kostova G.L., and Ruttenberg W., *The social and private costs of retail payment instruments: a European perspective*…, op. cit., p. 7.

this variant uses other important data obtained in the 2016 questionnaire survey, i.e., for example, the level of fees paid by consumers for holding an account and a payment card as well as for making payment transactions using the selected method. Due to the greater consistency of the results of applying the residual consumption method with the GUS data and the estimates of the number of cash payments from the survey of entrepreneurs than in the case of the consumer questionnaire survey method, the first method, i.e. the residual consumption method, was used for the final estimation of costs of payment instruments incurred by consumers. The second variant of calculations was included in the report only for comparative purposes, while the estimates obtained from it were not included in the final calculations of the costs of payments on the Polish market.

4.5.1. Methodology

In the first variant, the costs of payment instruments borne by consumers on the Polish market were estimated using the residual consumption method. The aim of this method is to determine the value of cash transactions at points of sale as the residual value representing the difference between the value of household consumption and the value of non-cash transactions. The advantage of using this method is that compliance of data as regards the number and value of transactions performed by consumers with data for enterprises and the banking sector is ensured.

The "residual consumption" method is one of the methods for estimating cash transactions used by the European Central Bank in its European survey on social and private costs of payment instruments.[79] In this study, the value of household consumption derived from Eurostat was reduced by categories of consumption of products and services for which it was assumed that the payment was deferred[80], i.e. non-cash. These categories included: the use of housing, health, education, financial services and other products and services. Subsequently, the value of non-cash transactions performed with payment cards, for which reliable statistical data were available in the Statistical Data Warehouse (SDW) of the ECB, was deducted. The value obtained was the value of cash transactions which, divided by the average value of cash transaction, made it possible to estimate the number of cash transactions executed by households. In the European survey, this value amounted to EUR 18.

Due to the specific nature of the Polish market, the residual consumption method has been modified for the needs of estimating consumer costs.[81] In this calculation procedure, the starting point was also the value of consumption in the household sector which was derived from the GUS which developed the said value in accordance with the recommendations of the European System of National and Regional Accounts in the European Union and estimated it for Poland in 2015 at a level of PLN 1,038,271 million.[82] This value was reduced by the value of bill payments and e-commerce transactions, estimated in the survey of enterprises, as well as by the value of transactions made by credit transfer, direct debit and mobile payments in retail trade and by data on the value of non-cash transactions performed with the use of payment

[79] Ibid., pp. 22, 44–47.
[80] In practice, this means non-cash payment with the use of credit transfer or direct debit.
[81] It should be noted that the assumptions introduced in the ECB survey could have significantly affected the quality of data estimation under this method. The limitations of this method were also highlighted by the ECB in its report Schmiedel H., Kostova G.L., and Ruttenberg W., *The social and private costs of retail payment instruments: a European perspective*…, op. cit., p. 47.
[82] *Small Statistical Yearbook of Poland*, Statistics Poland, Warsaw 2018, pp. 158–160.

cards, in accordance with the NBP reporting system. The result obtained constituted the value of cash transactions executed by households and also comprised the shadow economy with regard to the execution of payments according to GUS data adjusted by estimates.[83] This value amounted to PLN 510 billion. The next step in the procedure was to calculate the number of cash transactions as a quotient of the value of cash transactions and the average value of cash transactions obtained under another NBP study concerning factors affecting the volume of cash transactions in Poland, amounting to PLN 48.14.[84] The number of cash transactions performed in points of sale was estimated at 10.6 billion and, taking into account cash payments for bills and cash payments on delivery of goods purchased online, this number amounted to almost 11 billion. The number of non-cash transactions performed with the use of payment cards is collected and published by NBP (similar to the value of such transactions used at an earlier stage of the procedure to estimate the value of cash transactions). The remaining categories related to the number of non-cash transactions, i.e.: transactions by credit transfer, direct debit, mobile payments and payments performed by other methods, were estimated based on the results for enterprises (Chapter 4.4) and data collected by NBP in relation to transactions performed by individual customers. In particular, the number of bill payments made by different methods, including, inter alia, the above mentioned number of cash bill payments, was estimated on the basis of the results of the study concerning *Poles on banking services and payments*.[85] On the other hand, the number of payments made for purchases in the e-commerce environment using individual methods, including the number of cash transactions on delivery, was determined on the basis of the results for enterprises (Chapter 4.4.2.3). The estimated number of transactions performed by consumers in 2015 for individual payment methods is summarised in Table 15.

The next step in estimating consumer costs was to determine the time spent on performing individual types of transactions. The following data sources were used for this purpose:

1. data obtained in a chronometric survey conducted in Poland in 2009, which recorded the course of several thousand transactions carried out in points of sale[86]; the time of execution of individual categories of transactions from a consumer perspective was used for calculations, as presented in Table 15,
2. data obtained from the study developed by Symetria company[87], based on the technique of recording transactions in video format; details can be found in Table 15,
3. data on cash payments for bills to mass creditors in terms of consumer waiting time in the line, based on the results of a 2015 survey conducted by Millward Brown on behalf of BillBird S.A.[88]; the average waiting time in line by a household to pay one bill was estimated at about 3 minutes,

[83] Schneider F., *The shadow economy in Europe, 2011: Using electronic payment systems to combat the shadow economy*, 2011.

[84] Manikowski A., *Raport z badania czynników oddziałujących na wielkość obrotu gotówkowego w Polsce* [Report of the survey on factors affecting the level of cash transactions in Poland], Narodowy Bank Polski, Warsaw 2017, p. 57, https://www.nbp.pl/systemplatniczy/obrot-gotowkowy/raport-gotowka-2016.pdf.

[85] Koźliński T., *Wybrane wyniki badania Polaków nt. korzystania z usług bankowych i płatności 2016* [Selected results on Poles' survey concerning the use of bank services and payments 2016], Narodowy Bank Polski, Warsaw 2017, https://www.nbp.pl/systemplatniczy/obrot_bezgotowkowy/Polacy-na-temat-uslug-bankowych_2016.pdf.

[86] Polasik M. et al., "Time efficiency of Point-of-Sale payment methods: Empirical results for cash, cards and mobile payments", op. cit.

[87] Symetria, *Pomiary czasu trwania transakcji płatniczych w handlu elektronicznym. Raport z badania*, [Measurements of payment transaction duration in e-commerce. Survey Report], 2018.

[88] BillBird S.A., *Polacy szukają nowych sposobów płacenia rachunków* [*Poles are looking for new ways to pay their bills*], 2015, https://www.billbird.pl/aktualnosci/polacy-szukaja-nowych-sposobow-placenia-rachunkow.

4. data on the time spent by consumers on cash withdrawals in 2015, determined as 43 seconds under the study, the results of which were presented in the report on *Development of ATM network in Poland versus interchange fees and surcharges*.[89], [90]

The above mentioned data on the execution time of a particular transaction are presented, including the data source, in Table 15.

Table 15. Data concerning the number of transactions, transaction costs and transaction execution time from a consumer perspective

Method of payment	Number of payments (annual)	Unit transaction costs (in PLN)	Time of transaction execution	
			Average time (in seconds)	Data source
Cash transactions (in points of sale)	10,595,483,353	0.00	39.61	M. Polasik et al.
Cash transactions for bills	377,446,585	2.90	114.34	M. Polasik et al.
Cash on delivery transactions	20,928,518	6.00	39.61	M. Polasik et al.
Payment card – a single filling in of the template with card data (CNP) – debit card	12,438,458	0.00	69.00	Symetria
Payment card – a single filling in of the template with card data (CNP) – credit card	8,998,865	0.00	69.00	Symetria
Payment card with PIN (in points of sale) – debit card	982,295,597	0.00	56.29	M. Polasik et al.
Payment card with PIN (in points of sale) – credit card	119,048,519	0.00	56.29	M. Polasik et al.
Proximity payment card with PIN (in points of sale) – debit card	1,148,734,616	0.00	40.19	M. Polasik et al.
Proximity payment card without PIN (in points of sale) – credit card	139,219,961	0.00	40.19	M. Polasik et al.
Standard one-off transfer (POS + e-commerce) with entering of the recipient and IBAN (ad hoc)	163,324,182	0.08	74.00	Symetria
Standard transfer defined payee (bill payment)	542,225,725	0.08	47.00	Symetria
Transfer in the bank branch	21,971,940	6.97	114.34	M. Polasik et al.
Pay-by-link (e-transfer with redirection to the bank's website)	97,365,340	0.00	47.00	Symetria
Standing payment order	20,687,196	0.19	0.00	–
Direct debit	19,044,023	0.00	0.00	–
PayPal or other card wallet	3,068,394	0.00	33.00	Symetria
Mobile payments (online) + P2P	2,218,104	0.00	35.00	Symetria
Mobile payments (in points of sale)	24,208,785	0.00	68.16	M. Polasik et al.
Total	**14,298,708,163**	–	–	–

[89] Górka J., *Rozwój sieci bankomatów w Polsce a opłaty interchange i surcharge*, [Development of ATM network in Poland versus interchange and surcharge fees], "Gospodarka Narodowa", 2011, No. 7–8, pp. 89–112.

[90] Some central banks, e.g. the Hungarian central bank, in its survey on the cost of payment instruments (see paragraph 2.4.5), included in their internal costs of cash for consumers the time spent to reach an ATM and the time spent by the cash withdrawing person to return. However, such additional internal cash costs were not recognised by other central banks studying the costs of payment instruments for consumers, e.g. the Norwegian central bank and the Danish central bank. This approach was also applied by NBP. Recognising such costs by NBP in this survey, estimated in Poland at an average of 8 minutes in the nationwide NBP survey in 2016, would increase internal costs of cash for consumers by PLN 587.5 million and the unit cost of cash per transaction from PLN 0.9 to PLN 14.5, i.e. by PLN 0.5.

For the purposes of the survey, it was also assumed that the transaction time treated as an alternative cost of free time will be assessed based on the average annual net disposable income per person in the household, determined by the GUS[91] for 2015 at PLN 12.9 thousand, which made PLN 6.4 net per one theoretical working hour.

The data described in subparagraphs 1 and 2 above were then converted into hourly values and, including the number of transactions assigned to the particular method and the average annual disposable income per person in the household (in hourly terms), were used as product factors to calculate the internal costs of consumers. The cost of standing in line while making cash bill payments was also added to these costs, using the time described in subparagraph 3 above for calculations and the alternative cost of free time used for cash withdrawal from an ATM (Subparagraph 4 above) was added, taking into account the NBP data on the number of such transactions (688.4 million transactions), which was proportionally distributed among three cash payment methods according to the number of cash transactions driver. These calculations enabled obtaining the total internal costs on the consumer side.

The last component of estimating consumer costs were external costs, i.e. costs of fees paid by consumers. Under this stage, the following fees were taken into account:

- unit transaction fees (due to transaction execution) due to: cash bill payments in the amount of PLN 2.9[92], cash payments on delivery of goods ordered in the online store in the amount of PLN 6, credit transfer in the online banking service – PLN 0.08[93], standing order transactions in the amount of PLN 0.19[94] and transfer transactions in a bank's branch PLN 6.97[95];
- monthly fees charged on consumers for the use of a payment card set within the framework of cyclical data collection by NBP at a level of PLN 24 per year per card[96];
- fees due to costs of holding savings and settlement accounts (ROR), divided proportionally according to the number of ROR-related transactions (non-cash transactions and cash withdrawals from an ATM), excluding credit cards, measured by the ratio of allocation of staff to payment services defined in the survey of banks' costs, i.e. 26% of total ROR costs[97];
- in the case of other payment methods, no fees were charged.

[91] Excluding social transfers, including age-related benefits and survivors' pensions –according to data published by the GUS.

[92] Price list for postal orders and payment financial services in Poczta Polska S.A. in domestic and cross-border transactions (valid from 10 March 2015), Poczta Polska, http://cennik.poczta-polska.pl/plik,1/cennik_oplat_za_przekazy_pocztowe_i_uslugi_finansowe_platnicze_w_poczcie_polskiej_sa_w_obrocie_krajowym_i_zagranicznym_dotyczy_umow_zawatych_do_dnia_9032015_r_17042018.pdf

[93] Weighted average for the period of December 2015, data related to natural persons [in:] Narodowy Bank Polski, *Porównanie wysokości prowizji i opłat związanych z rozliczeniami pieniężnymi w złotych w polskim sektorze banko-wym w okresie czerwiec 2015 r. – grudzień 2015 r. Załącznik nr 1 – Rachunki bankowe, grudzień 2015 r.*, [Comparison of the level of commissions and fees related with monetary settlements in PLN in the Polish banking sector in the period June 2015-December 2015. Annex No. 1 – Bank accounts, December 2015]; Warsaw 2016, https://www.nbp.pl/systemplatniczy/prowizje_i_oplaty/raport_2_2015_zal1.pdf.

[94] Weighted average for the period of December 2015 [in:] Ibid.

[95] Weighted average for the period of December 2015 [in:] Ibid.

[96] Weighted average for the period of December 2015 [in:] Narodowy Bank Polski, *Porównanie wysokości prowizji i opłat związanych z rozliczeniami pieniężnymi w złotych w polskim sektorze banko-wym w okresie czerwiec 2015 r. – grudzień 2015 r. Załącznik nr 2 – Karty debetowe, grudzień 2015 r.*, [Comparison of the level of commissions and fees related with monetary settlements in PLN in the Polish banking sector in the period June 2015-December 2015. Annex No. 2 – Debit cards, December 2015]; Warszawa 2016, https://www.nbp.pl/systemplatniczy/prowizje_i_oplaty/raport_2_2015_zal2.pdf.

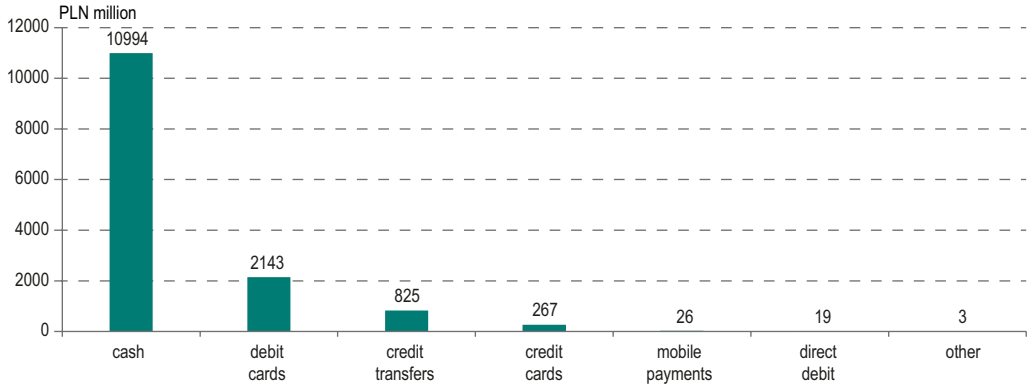
[97] Other ROR costs relate to other products and services offered by banks within ROR, e.g. loans, overdrafts, deposits, cash withdrawals.

The aforementioned data on fees combined with data on the number of transactions made it possible to estimate the external costs of consumers, whereas in the case of payment card fees, the annual cost of fees (PLN 23.94)[98] for all payment cards issued to individual customers at the end of 2015 (32.22 million cards) was distributed proportionally to all card transactions (payments and cash withdrawals in the ATM) measured by the number of transactions. The cost of holding RORs whose number at the end of 2015 amounted to 36.56 million[99] was distributed proportionally between all electronic payment methods (performed using payment cards and other non-cash payment instruments/ services) and cash withdrawals in ATMs, measured by the number of transactions.

4.5.2. Number of transactions

In 2015, consumers executed the total of approx. 14.3 billion transactions. Chart 65 presents the number of transactions performed by consumers, broken down into basic payment instruments. Most transactions were carried out in cash (almost 11 billion), which accounted for 76.9% of all transactions. With the use of payment cards (debit and credit cards), individuals clients performed the total of 2.4 billion non-cash transactions (16.9% of all transactions). On the other hand, the number of credit transfers performed by natural persons amounted to 0.8 billion transactions (5.9%) and for direct debits – 0.19 billion (0.1%). By contrast, mobile payments (proximity and remote, including for transport services) were estimated at 0.26 billion (0.2%).

Chart 65. Number of payments performed by consumers broken down by payment instruments/ services



4.5.3. Internal and external costs borne by consumers

In 2015, total consumer costs amounted to over PLN 4.1 billion, with the highest costs of cash transactions exceeding PLN 2.6 billion. In the case of cash, external costs accounted for 62% and internal costs – for 38%. Costs of debit cards amounted to PLN 0.9 billion, with external costs accounting for 80% and internal costs – 20%. A similar structure of external

[98] Due to the lack of data on monthly fees for credit cards, it was assumed that these fees are at the same level as fees for debit cards, i.e. PLN 23.94 per annum.

[99] Narodowy Bank Polski, *Biuletyn Informacyjny no. 12/2015*, Warsaw 2016, 41, http://www.nbp.pl/publikacje/biuletyn_informacyjny/2015/2015_12_pl.pdf.

and internal costs occurred in the case of costs for credit cards (86% and 14%), which were estimated at PLN 0.16 billion in total, and costs for credit transfers (79% and 21%), estimated at PLN 0.39 billion in total. The value of cost of performing transactions by other payment instruments was much lower (PLN 6 million for mobile payments, PLN 2 million for direct debit and PLN 1 million for other).

Chart 66. Internal and external costs of consumers broken down by payment instruments/services

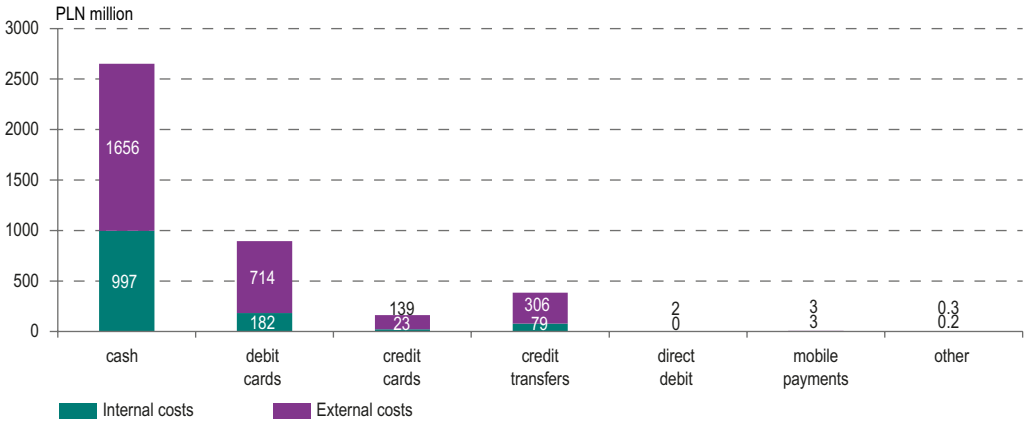
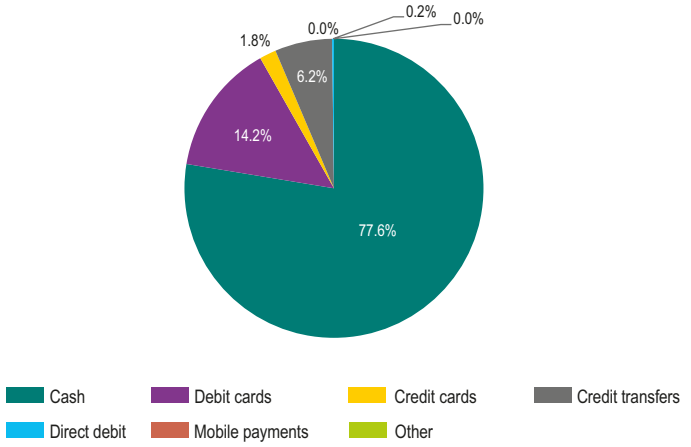


Chart 67. Breakdown of consumers' internal costs into payment instruments/services

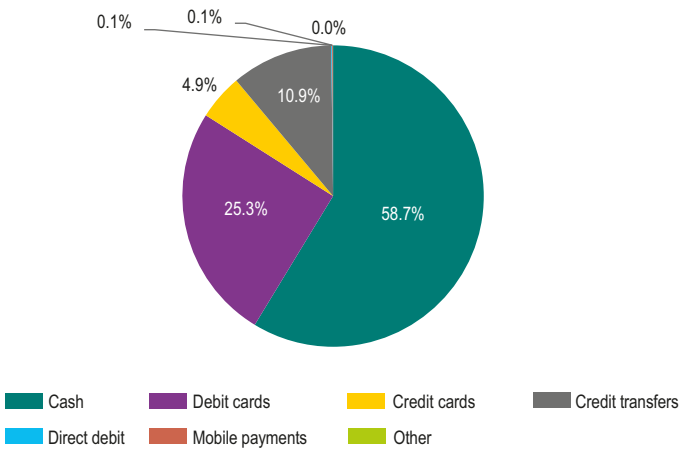


The total internal costs of consumers amounted to PLN 1.284 billion and external costs – to PLN 2.821 billion. Thus, external costs incurred for the benefit of banks represented the predominant part of all payment costs incurred by consumers (68.7%). Consumers incurred the highest internal costs in the case of cash transactions – PLN 1.0 billion (Chart 66), which accounted for 77.6% of all consumers' internal costs (Chart 67). The total internal costs incurred by consumers due to using debit and credit payment cards amounted to PLN 0.2 billion, i.e. 14.2% of internal costs, and for transfers – PLN 0.08 billion, i.e. 6.2%

of internal costs. In relation to mobile payments and other methods, internal costs were marginal and, in the case of direct debit, no internal costs were found.

In the case of external costs (Chart 68), the highest share was represented by cash costs (58.7%) amounting to PLN 1.66 billion, followed by external costs of using payment cards (30.2%) estimated at PLN 0.85 billion, and external costs of transfer orders (10.9%) amounting to PLN 0.31 billion (cf. Chart 66). The share of external costs assigned to other payment methods (direct debit, mobile payments, other) was low and ranged from 0.1% to 0.01%.

Chart 68. Breakdown of consumers' external costs into payment instruments/services



Private costs of payment instruments for consumers (Chart 69) amounted to 0.23% of GDP. In particular, costs of cash transactions accounted for 0.15% of GDP, costs related to payment cards – in total, to 0.06% of GDP while costs for credit transfers – to 0.02% of GDP. Other payment instruments and services generated insignificant costs in relation to the value of GDP.

A debit card turned out to be the basic payment instrument with the lowest internal unit cost per transaction (Chart 70) (PLN 0.08), followed by a credit card (less than PLN 0.09), cash (PLN 0.09)[100] and a transfer order (PLN 0.09). In relation to less popular payment methods in 2015, direct debit was the most cost effective for consumers (no internal costs on the part of consumers). On the other hand, unit internal costs per transaction for mobile payments were estimated at PLN 0.12, and for the card wallet recognised under the item "Other" this cost was estimated at PLN 0.06 (due to the marginal nature of this item, it will not be analysed in broader terms). Taking into account external unit costs, cash appeared to be the cheapest among basic instruments (PLN 0.15), followed by a debit card (PLN 0.33) and a credit transfer order (PLN 0.36). The external cost per transaction was estimated at PLN 0.11 for direct debits, mobile payments and other services.

[100] As mentioned in Subchapter 5.5.1., the recognition of the costs of reaching an ATM, estimated in this survey in Poland for an average of 8 minutes, would result in an increase in internal cash costs for consumers by PLN 587.5 million and unit cash costs per transaction from 9 grosz to 14.5 grosz, i.e. by 5.5 grosz.

Chart 69. Share of private costs of consumers in relation to GDP broken down by payment instrument/services

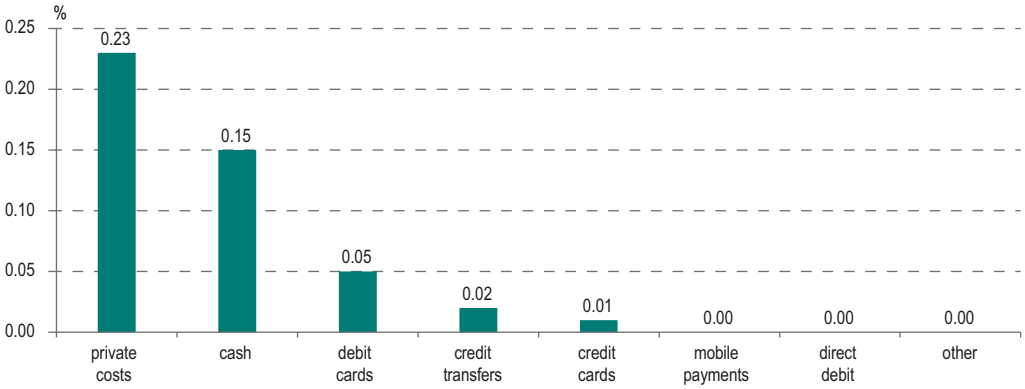
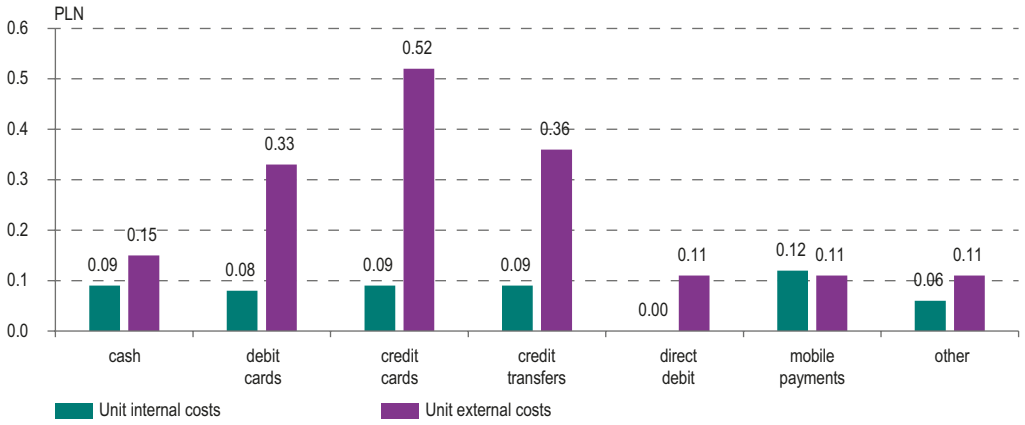


Chart 70. Unit private costs of consumers broken down by payment instrument/service



4.5.4. Selected conclusions concerning the costs borne by consumers

From a consumer perspective, in 2015 the cheapest payment method among the available methods was direct debit generating the total unit costs at the level of PLN 0.11. Mobile payments (PLN 0.23) were the second and cash was ranked the third (PLN 0.24). This cost amounted to PLN 0.41 for a debit card and PLN 0.45 for a credit transfer. The highest unit cost per transaction was estimated at PLN 0.61 for credit cards. The item "Other" was not taken into account in the summary of the results due to its marginal nature.

It is worth noting that in the analysed period the internal costs of consumers, determined as an estimate of the cost of time spent on making payments, amounted to PLN 1.3 billion and although they were more than twice as high as costs related to the total value of fees for making payments and fees for holding a payment card and maintaining a ROR (PLN 2.8 billion), they should be considered a significant cost factor.

Chapter 5

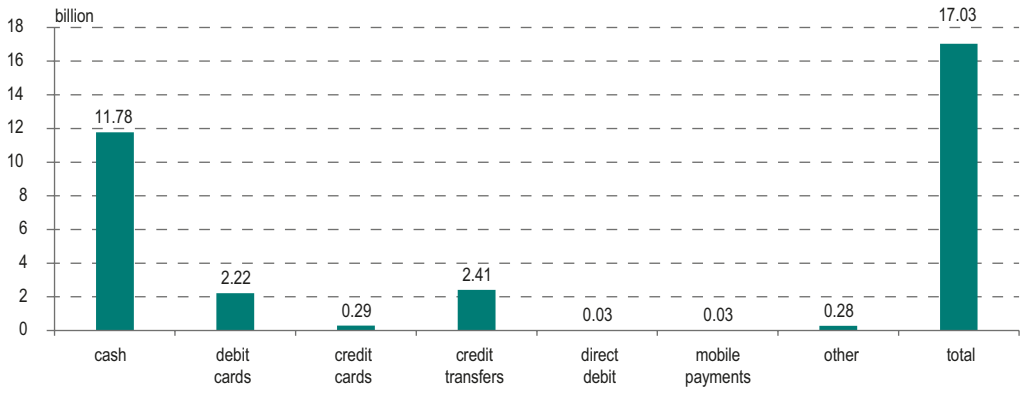
Private and social costs of payment instruments – a summary of results of the study

Private and social costs of payment instruments – a summary of results of the study

5.1. Number and value of retail transactions in Poland

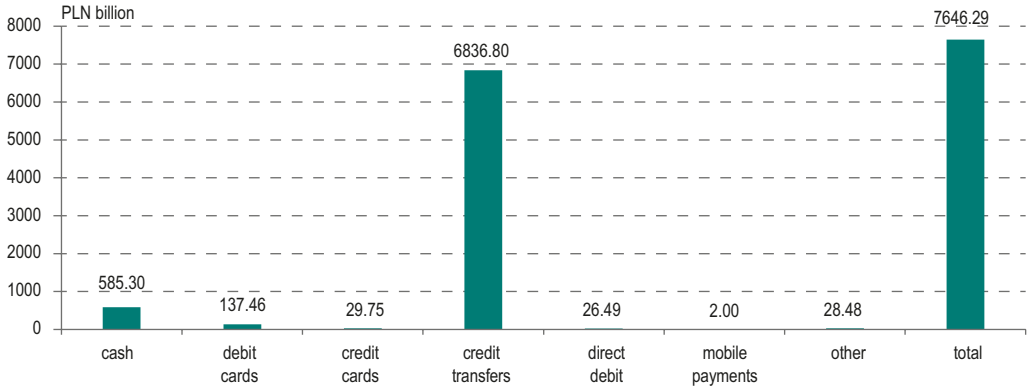
Chart 71 presents the number of retail transactions for which the costs for the entire Polish market presented in this chapter were estimated. In the case of cash, the number estimated based on the survey of retailers was used (Subchapter 4.4). The number of transactions for other payment instruments is based on NBP statistical data and estimates made in Chapter 4.2., based on the results of the survey of banks and payment infrastructure providers. At this point, it is worth emphasizing again that retail transactions worth up to PLN 200 thousand were examined, not only those performed by individual customers. Data on the number of payments clearly indicate the continually predominant role of cash on the Polish retail payment market (its share in the total number of retail payments was 69.2%).

Chart 71. Number of retail transactions in Poland in 2015



The data for transaction values presented in Chart 72 were derived from analogous sources, as in the case of the number of transactions. The highest transaction value was observed for credit transfers (almost PLN 7 trillion, i.e. 89.41% of the value of all retail payments). It should be stressed, however, that it results from the fact that the survey methodology (cf. Chapter 3) also includes retail transactions other than related to the purchase of goods and services, which in the case of transfers demonstrate a significantly higher average amount. The transaction value for other instruments was much lower.

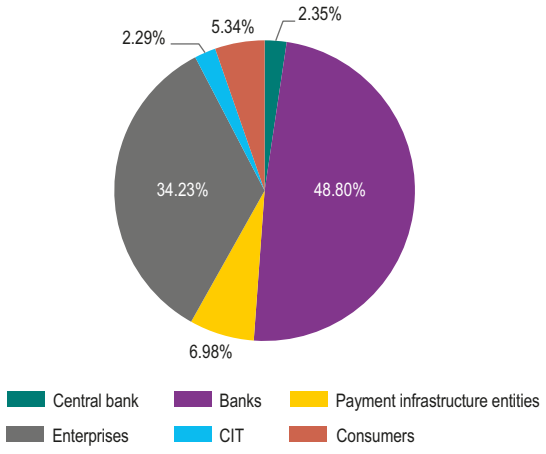
Chart 72. Value of retail transactions in Poland in 2015



5.2. Social costs of payment system participants in Poland

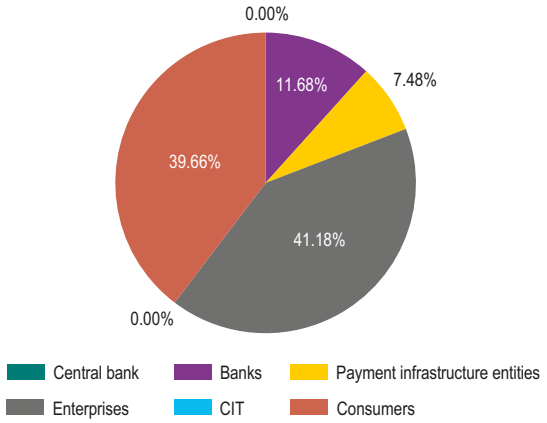
This subchapter provides a breakdown of costs borne by different groups of entities covered by the survey. The highest share in social costs, i.e. total internal costs (Chart 73),was recorded for banks (49%), followed by retailers (34%). The share of payment infrastructure providers was also noticeable (7%). A minor share was recorded for consumers (5.34%), the central bank (2.35%) and CIT companies (2.29%). Therefore, the obtained results of the study allow for stating that the banking sector and payment infrastructure providers jointly bear the highest costs of handling retail payments in Poland. In this respect, the Polish market turned out to be similar to the average share of participants in the social costs for the 13 European countries surveyed by the ECB (cf. 2.4), although the share of the banking sector in Poland was slightly higher than in the above-mentioned countries (half of the social costs of payments were incurred by banks and payment infrastructure providers).

Chart 73. Share of entities in total social costs



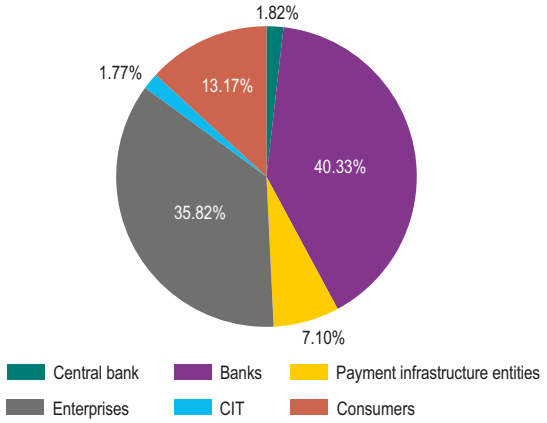
On the other hand, taking into account total external costs, the largest share was observed for enterprises – 41%. Consumer participation stayed at a similar level of 40%, which means that consumers bear substantial charges, mainly to banks and other payment service providers, in connection with performing retail payments. Almost 12% of external costs were incurred by banks and 7.5% – by payment infrastructure providers. This breakdown is presented in Chart 74.

Chart 74. Share of entities in total external costs



On the other hand, taking into account the sum of social and external costs, i.e. private costs, the highest share in private payment costs was recorded for banks (40%) and retailers (36%). The aforementioned sectors of the economy were therefore burdened with payment costs to a similar extent. Just over 13% of the cost of private payments was borne by consumers. The other actors were much less important in private costs. This breakdown is presented in Chart 75.

Chart 75. Share of entities in private costs



5.3. Total and unit costs of retail payments

In 2015, total costs of retail payments in Poland amounted to PLN 31.16 billion, of which social costs amounted to PLN 24.05 billion (Chart 76). Taking into account the seigniorage would result in the reduction of total and social costs by approximately PLN 2.38 billion to PLN 28.78 billion and PLN 21.67 billion, respectively. Payment system participants incurred the highest costs in connection with cash handling – PLN 21.08 billion, of which social costs amounted to approx. PLN 17.6 billion (if the study covered the seigniorage, these costs for cash would amount to PLN 18.70 billion and PLN 15.22 billion, respectively). Such a scale of cash handling costs is associated with a large number of cash transactions (cf. Chart 71). Costs for other payment instruments were lower. For debit cards they amounted to the total of PLN 6.12 billion (including PLN 3.71 billion of social costs), while for credit transfers they reached PLN 2.42 billion (including mostly social costs at a level of PLN 1.79 billion). Costs of other instruments were relatively less significant in the general account.

The aforementioned results indicate that the social costs of cash estimated in the survey (amounting to PLN 17.6 billion) accounted for 73.1% of the total social costs of payments in Poland, with a simultaneous share at a level of 69.2% in the total number of retail payments. This small (4 percentage points) difference in both shares means, especially considering possible underestimation in the studies, that cash and non-cash payments generate a share in social costs quite similar to the actual share of both groups of payment instruments in the entire retail payment market, with only a minor prevalence of non-cash payments.

Chart 76. Internal and external costs of payment instruments

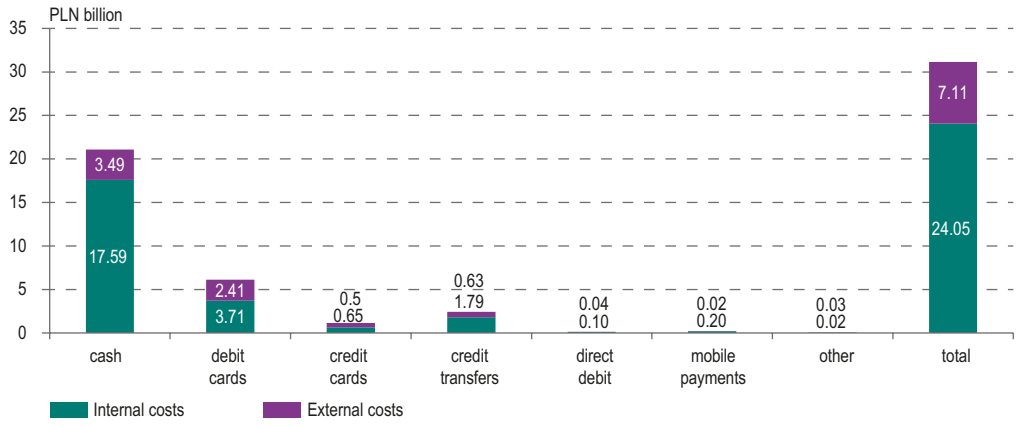
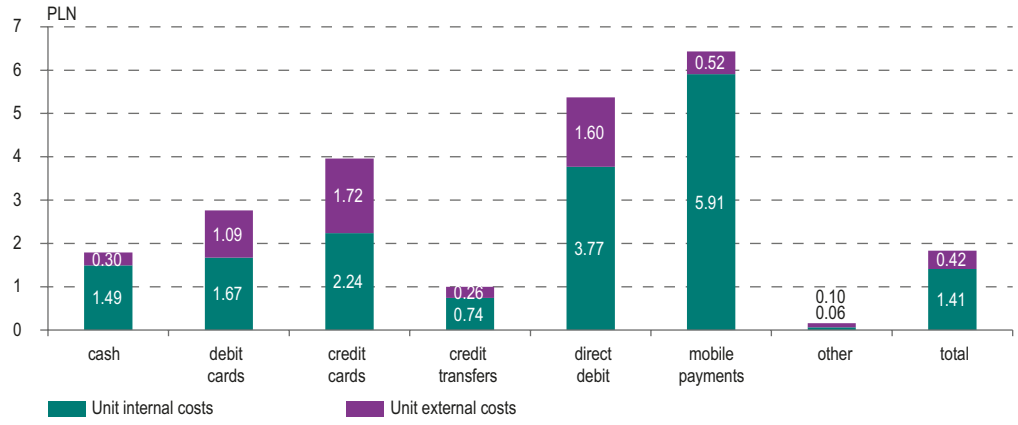


Chart 77 presents unit costs of payment instruments. The average social cost of a payment instrument in Poland was estimated at PLN 1.41 per transaction. The least expensive payment instrument in terms of social costs per unit was a credit transfer order (PLN 0.74). Cash was the second most important instrument in terms of cost-effectiveness. The unit social cost for cash amounted to PLN 1.49 (if the seigniorage of the central bank was taken into account, the cost would be lower by PLN 0.20 and it would amount to PLN 1.29). On the other hand, the unit social cost of debit cards was estimated at PLN 1.67 while credit cards were slightly

more expensive (PLN 2.24). The most expensive instruments were direct debit (PLN 3.77) and mobile payments (less than PLN 6). The highest private costs were recorded for credit cards (PLN 1.72) and direct debit (PLN 1.60). The weighted average cost of a retail payment transaction in Poland amounted to PLN 0.42.

Chart 77. Unit social and private costs of payment instruments



The above results have shown that a bank transfer turned out to be the cheapest unit payment instrument (Chart 77) and therefore also the cheapest electronic instrument of all instruments surveyed.

These results show a very significant difference between the Polish payment system and the compared systems of 13 countries participating in the ECB survey, where cash was the cheapest payment instrument[101], followed by a debit card while bank transfer was one of the most expensive instruments (cf. 2.4).

The system-wide advantage of bank transfer, in terms of cost effectiveness, over all other payment methods in Poland, requires further detailed comparative research with the European results in order to explain it. Based on the analysis of the results of this survey, a working hypothesis may be put forward that Polish banks, building a modern payment system in the 1990s, without encumbrances, obsolete technical solutions (so-called legacy systems) and inertial customer habits, created an exceptionally efficient system of bank transfer settlements on a European scale. This has facilitated the popularisation of bank transfers and the very high number of transactions – compared to other electronic instruments –effectively keeps unit costs at an extremely low level. This is probably also supported by the economies of scale – a large share of fixed costs and low variable costs, consisting in the fact that transfer orders in Poland are mostly ordered through electronic channels which are cheap to maintain. However, the verification of this hypothesis would require conducting new analyses described in Subchapter 6.1. It should be borne in mind, however, that both in 2015 and now, credit transfers were and are used in Poland

[101] One of the factors in achieving such a result could have been the assumption made in the ECB survey that costs related to euro banknotes should not be included in the central bank cash costs.

mainly in payments to so-called mass creditors (e.g. payments for gas, energy, rent), e-commerce or P2P payments, i.e. between natural persons. Thus, transfers are currently rarely used (except in the case of high amount transfer payments for the purchase of certain services or goods, or industry-specific ones, e.g. hotels) in physical retail and service outlets. Transfers are therefore currently not a suitable substitute for cash and card payments which dominate in retail and service outlets. However, this situation may change in the future in the light of a further considerable development of instant payment systems. At the same time, it should be noted that payment cards in Poland turn out to be PLN 0.18 more expensive than cash payments.

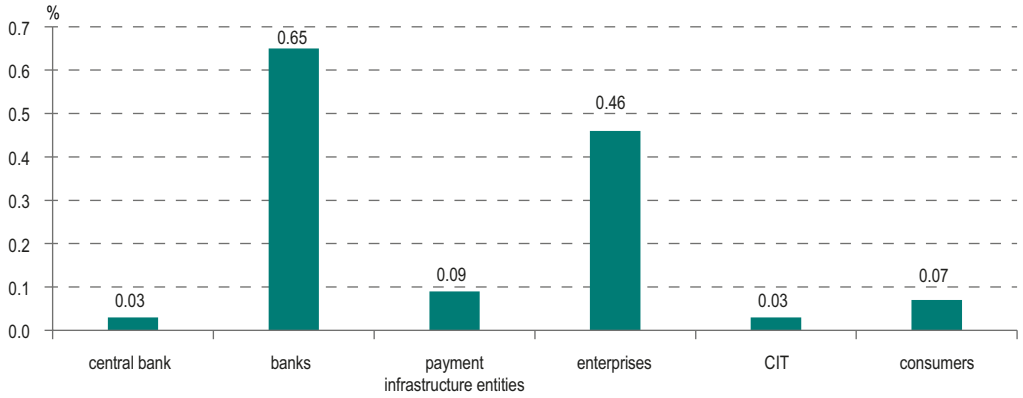
The analysis of the unit costs of retail payments has shown that innovative payment methods demonstrate higher unit costs of transaction execution than traditional methods. It is most visible in the case of mobile payments, which turned out to be the most expensive of the surveyed payment instruments – the unit social cost of a transaction amounted to PLN 5.91 (**Chart 77**). Detailed analyses carried out as part of the bank survey (cf. 4.2.2, Chart 14) showed that in private costs borne by banks for payment services, expenditure on mobile payments amounted to about 1/10 of analogical costs for payment cards, despite more than a thousand times less transactions. This is an important measure of the innovativeness of the Polish banking sector, as it points to the fact that the banking sector implements significant investments in the development of mobile payment systems, which is a typical process during the introduction of innovation, which has yet to gain popularity among customers. A similar phenomenon occurred in the case of another important innovation, namely the Express Elixir and BlueCash instant payment systems, each of which is more than three times more expensive than the Elixir system used on a mass scale (Chart 15). In the initial period of market presence, innovative solutions often demonstrate unfavourable economies of scale.

On the part of acquirers, mobile payments were among the cheapest instruments to handle (cf. 4.2.3, Chart 31). This result suggests how effectively the acceptance of mobile payment terminals in Poland was implemented (through software updates), which allowed to avoid high implementation costs on the payment acceptance side. Gaining an access to a large network of acceptance through mobile payments at a low cost offers a potential opportunity for market success. It is worth noting that in terms of costs borne by enterprises, it did not show a clear correlation between the costs of acceptance of the method and its innovativeness. This suggests that in the future detailed research should be undertaken to clarify the distribution of costs between participants in the payment chain and the effects of this phenomenon for their decision-making process, as described in Subchapter 6.3.

5.4. Social costs of retail payments in relation to GDP

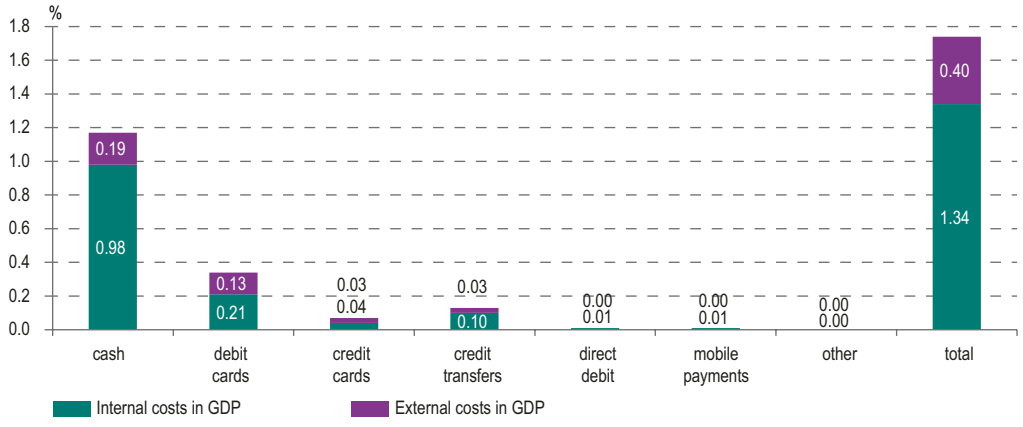
The highest share of social costs of payment instruments in GDP was recorded by banks (0.65% of GDP) and enterprises (0.46% of GDP). The share of payment infrastructure providers (0.09% of GDP) and consumers (0.07%) was less noticeable, while the central bank's social costs (excluding the seigniorage) and CIT companies amounted to 0.03% of GDP each. In this comparison, the level of costs borne by payment infrastructure operators should be regarded as low. This allows to conclude that the Polish clearing houses and acquirers active on the Polish market are highly cost effective.

Chart 78. Share of social costs in GDP



Referring the obtained results to the scale of the national economy, the social costs of payments in Poland were estimated at 1.34% of GDP (Chart 79), and at 1.27% of GDP if consumers' costs were not taken into account. If the survey included a seigniorage, the ratio of social costs of payments to GDP in Poland for 2015 would amount to 1.20% of GDP and 1.13% of GDP, respectively.

Chart 79. Share of social and private costs in GDP



Comparing results obtained in these surveys, assuming the knowledge about all methodological differences between the survey in Poland and other EU countries under the ECB survey[102], it should be noted that the average share of social costs of payments in GDP according to the ECB in 2009 in the EU amounted to 1% (cf. Subchapter 2.4). Thus, the overall level of social costs of payments in Poland in comparable conditions, i.e. without considering

[102] They mainly included: a broader subject matter of the Polish survey (among others, taking into account the costs of mobile payments) as well as a different base year of the survey.

consumer costs estimated at about 0.07% of GDP, i.e. amounting to 1.27% of GDP, can be considered as higher by 0.27 percentage points than the average level in the EU. The higher level of social costs in the ECB survey was generally characteristic for countries with a high share of cash payments, e.g. Hungary (total social costs of payments, including consumer costs, amounted to 1.5%, thus, they were 0.16 percentage points higher than for Poland) or South European countries. This is shown in detail in Charts 83 and 84 which compare the level of social costs of payment instruments (excluding consumer costs) in Poland and other 13 EU countries participating in the ECB study (Chart 81) and in Poland and the 5 clusters in which the ECB has grouped all EU countries (both participating and non-participating in the survey). The first comparison shows that the social costs of payment instruments in Poland were higher than in 10 countries participating in the survey and lower than in 3 countries. At the same time, very low unit costs for bank transfer transactions indicate a large potential for cost reduction in the case of popularising non-cash transactions, owing to the effect of the economies of scale of operation of clearing systems for this instrument (a proposal for in-depth research on this problem is included in Subchapter 6.1). The highest share of total social costs in GDP was recorded for cash (0.98% of GDP). The share of social costs of debit payment cards in GDP was five times lower than for cash. The social costs of transfer amounted to 0.1% of GDP. Other instruments had a much less significant share of costs in GDP. The above results were primarily influenced by, among others, the share of a given instrument in the total number of retail payments.

It is worth noting that in its report for 2009 data the ECB estimated social costs of payments in Poland, grouped in cluster 5 (together with 7 other Central and East European countries), at 1.01% of GDP (based on extrapolation of data obtained for 13 countries participating in the survey, cf. Subchapter 2.4.4). The 0.26 percentage point higher level of costs defined in the 2015 NBP survey may result mainly from the methodological differences mentioned above as well as the inaccuracy of the estimates adopted by the ECB for Poland which did not participate in the ECB survey (similarly for other countries in Cluster 5, which, like Poland, Latvia and Romania, but besides Hungary, did not participate in this survey).

Chart 80. Social costs of payment instruments as a percentage of GDP according to the ECB survey in 13 countries participating in this survey and in Poland

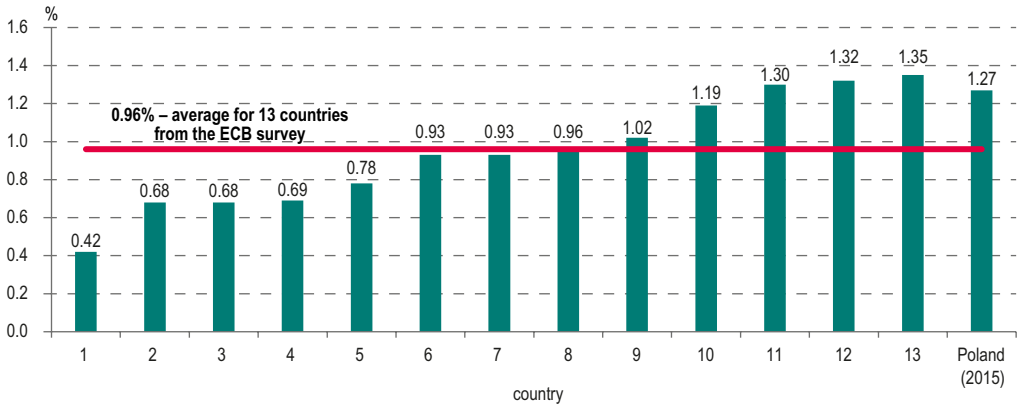
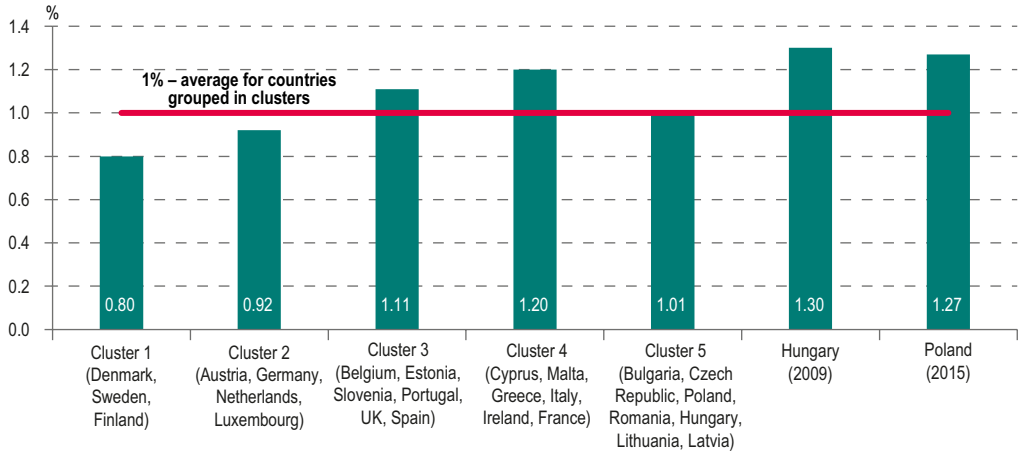


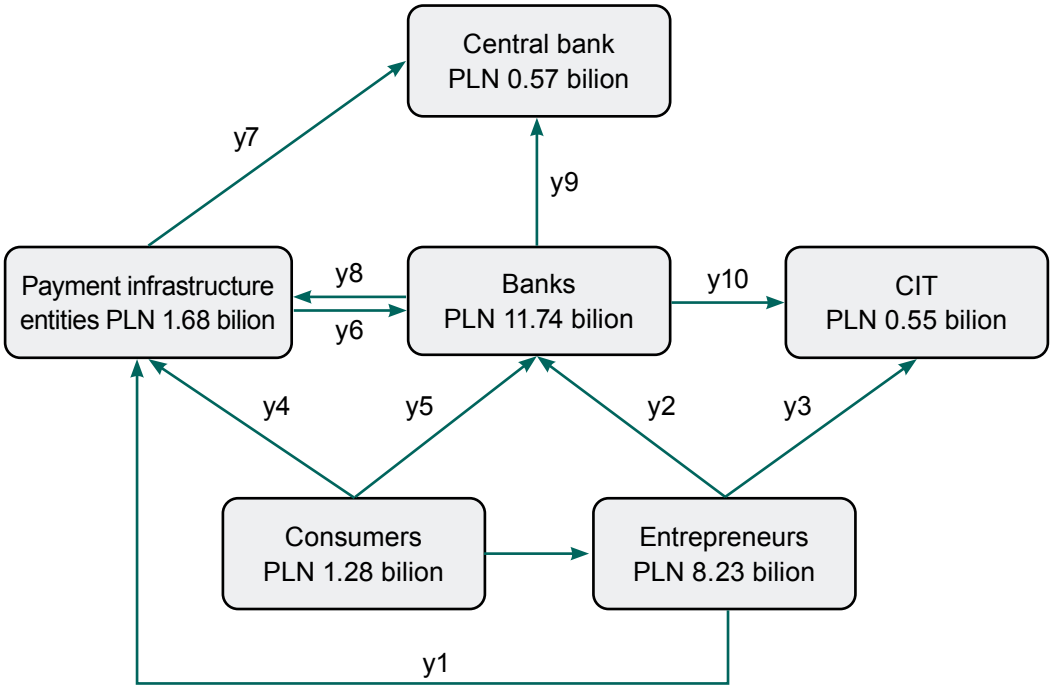
Chart 81. Social costs of payment instruments as a percentage of GDP according to ECB study broken down into clusters of EU countries as well as in Hungary and Poland



5.5. Graphic representation of survey results

The results of the first survey of the costs of payment instruments in Poland can be summarised in the form of Diagram 4, presenting the amounts of internal and external costs of five basic parties of the payment chain covered by the survey.

Diagram 4. Cost flows between participants of the Polish payment system



Symbols: x – internal costs; y – external costs

The amounts placed inside the blocks with the names of entities indicate internal costs of the entities surveyed. At the same time, the external costs of individual entities should be treated as the sum of their costs in favour other entities. Consequently, external costs:

– of entrepreneurs amount to PLN 2.93 billion and consist of costs for payment infrastructure providers (y1), banks (y2) and CIT companies (y3);
– of consumers amount to PLN 2.82 billion and consist of costs for payment infrastructure providers (y4) and banks (y5);
– of payment infrastructure providers amount to PLN 0.53 billion and consist of costs for banks (y6) and the central bank (y7);
– of banks amount to PLN 0.83 billion and consist of costs for payment infrastructure providers (y8), the central bank (y9) and CIT companies (y10).

External costs of CIT companies were not estimated in the survey.

The total private costs of payments in Poland in 2015 amounted to PLN 31.2 billion (total internal and external costs) while the social costs (total internal costs) of retail payments in Poland were estimated at PLN 24.1 billion (if seigniorage was taken into account, these costs would amount to PLN 21.67 billion).

Chapter 6

Outlook of the development of surveys on costs of payment instruments in Poland and in the EU

Outlook of the development of surveys on costs of payment instruments in Poland and in the EU

6.1. Survey on fixed and variable costs of payment instruments on the Polish market

The analysis of costs broken down into fixed and variable costs is another possible step in deepening the analysis of the costs of payments. Such a breakdown makes it possible to draw application conclusions since it allows to determine the effectiveness of payment instruments, among others by calculating the so-called threshold points, i.e. the amount of the transaction for which costs of two instruments are equal (see Subchapter 2.2). This is an interesting direction in the area of studying costs of payments, therefore, NBP plans to estimate the costs in such terms as a supplement to this study in 2019–2020.

The implementation of this task of estimating the costs of retail payments divided into fixed and variable costs will enable:

1. determining the threshold values above which the use of a payment instrument starts to generate savings for the economy.
2. developing simulations of the forecasted cost levels for individual payment instruments in the case of assumed scenarios of changes in the structure of the number and value of the payments made.
3. developing recommendations for public institutions to optimise the costs and effectiveness of the payment system functioning in Poland.

6.2. Repeating the survey on costs of payment instruments on the Polish market

In 2015, The European Central Bank put forward for discussion the idea of repeating the cost survey based on an example of the research project whose results had been published in 2012.

Repeating the survey on retail payment costs in Poland for the new base year seems justified due to a number of changes in the parameters of the payment system functioning which, in a few years' horizon, may potentially affect significant changes in the aforementioned costs. In particular, changes fostering a relatively higher attractiveness of non-cash instruments may occur, such as:

1. the impact of regulatory changes in the reducing of the interchange fee, including the impact on banks' costs of issuing payment cards and the analysis of the level of costs in relation to the regulatory interchange fee rates and the level of fees collected from consumers for the use of cards.

2. the introduction of the Payment Accounts Directive (PAD)[103] aimed at reducing fees associated with the use of the basic payment account and related services for a part of consumers.
3. The effects of the introduction of the Payment Services Directive 2 (PSD2)[104], related to the emergence of new business models in the payment services market and the standardisation of payment processing, affecting the costs of operation of the banking sector and prices for consumers and businesses.
4. the improvement of processes associated with payment handling, including modernisation of payment infrastructure and enhancing consumer experience in the use of payment cards, mobile payments and other non-cash instruments, resulting in reducing the transaction execution time.
5. the dynamic progress of financial technology (FinTech) and related changes in the cost structure and in the structure of use of particular payment methods by consumers.

It is worth adding that in 2015, the European Central Bank put forward for discussion the idea of repeating the cost survey based on an example of the research project whose results had been published in 2012. The research methodology was reviewed and simplified. However, due to the under-representation of the number of countries willing to participate in that project, the decision was taken to postpone it.[105] The central banks which did not declare their participation in the project emphasized the high labour-intensity of the survey on payment costs, particularly in the case of surveys on enterprises.

6.3 Survey on the impact of diversification of private costs and non-cost factors on the decisions of payment system participants

An important objective of future in-depth studies may be a better understanding of the impact of the diversification of private costs on the situation and decisions of individual participants in the payment system. In particular, it is necessary to examine the effects of cheap instruments for one participant and, at the same time, expensive instruments for another participant, e.g. mobile payments (cheap for consumers, expensive for banks and business-neutral).

It is worth stressing that cost is only one of the factors in selecting a payment instrument to perform or accept a retail payment and this choice should be left to the discretion of consumers or entrepreneurs; therefore, the level of private or social costs calculated for individual payment instruments from the NBP survey should not be the only element determining such a choice. Therefore, analysis should also include factors other than cost which determine the choice of a payment instrument.

[103] Directive 2014/92/EU of the European Parliament and of the Council of 23 July 2014 on the comparability of fees related to payment accounts, payment account switching and access to payment accounts with basic features (Text with EEA relevance), OJ L 257, 28.8.2014, p. 214–246, http://data.europa.eu/eli/dir/2014/92/oj.

[104] Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC (Text with EEA relevance), OJ L 337, 23.12.2015, p. 35–127, http://data.europa.eu/eli/dir/2015/2366/oj.

[105] NBP has declared its willingness to participate in the project.

Annexes

Annex No. 1. Determinants of the NBP research project

The possibility of undertaking the project was primarily influenced by the work carried out in 2011–2012 by the Working Group on Interchange Fees (ZRIF), established by the Payment System Council. The group developed the *Programme for the reduction of card fees in Poland*[106] with a proposal for self-regulation consisting in a gradual reduction of interchange fees in Poland by 2017 to the average level of fees in the EU (0.7% for debit cards and 0.84% for credit cards in 2011).[107] Although the programme was not implemented, the work of the Team pointed to the need and possibility of estimating the costs of payment instruments for key players in the payment market. It is worth noting that ZRIF activities contributed to the self-regulatory partial reduction of interchange fees for non-cash transactions executed by payment card in Poland as of 1 January 2013 (on average by about 0.3–0.7 percentage points of the transaction value). As a result of the inability to adopt the *Programme…*, a regulatory option was initiated, which led to appropriate amendments to the Act on Payment Services which, as of 1 July 2014, reduced the interchange fee to 0.5% of the transaction value. Another regulatory change that entered into force in January 2015 reduced the interchange fee to 0.2% for debit cards and to 0.3% for credit cards, i.e. the same level which became applicable in other European Union Member States on 1 December 2015.

So far, no other comprehensive survey of the cost of payments has been conducted in Poland. Since 2009, one survey has been carried out, but it covered only one of several important stakeholder groups, i.e. merchants. In 2012, at the request of the Foundation for the Development of Non-Cash Transactions, a *Cash and payment card acceptance survey among Polish entrepreneurs*[108] was conducted on the Polish market under which the costs of cash and payment card payments were obtained and presented from the point of view of one group of entities in the payment chain, i.e. entrepreneurs. However, due to important developments in the payment card market, including the significant reduction in the *interchange* fee, the results of the survey on the comparison of the costs of payment cards and cash should be considered obsolete. In 2013, the Payment System Council, a consultative and advisory body at the NBP Management Board, decided that it would be worthwhile to estimate the costs of payments on the side of all major market players according to a uniform research methodology.

[106] Working Group on Interchange Fees at the Payment System Council, *Programme for the reduction of card fees in Poland*, Narodowy Bank Polski, Warsaw 2012, http://www.nbp.pl/aktualnosci/wiadomosci_2012/redukcja_oplat.pdf.

[107] Narodowy Bank Polski, *Analysis of effects of reducing the interchange fee in Poland…*, op. cit.

[108] Górka J., *Badanie akceptacji gotówki i kart płatniczych wśród polskich przedsiębiorców. Raport badawczy*, [Survey on acceptance of payment cards and cash among Polish entrepreneurs. Research report], Warsaw 2012, http://frob.pl/wp-content/uploads/2013/02/BADANIE-AKCEPTACJI-GOTÓWKI-I-KART-PŁATNICZYCH-WŚRÓD-POLSKICH-PRZEDSIĘBIORCÓW.pdf. It was commissioned by the Foundation for the Development of Non-Cash Transactions. The project was carried out under the auspices of Narodowy Bank Polski. Primary data from Polish entrepreneurs were collected by the Millward Brown SMG KRC research institute using the CAPI method. The research sample covered 1,006 companies.

The research project on the costs of payment instruments was carried out by Narodowy Bank Polski. The survey covered the most important entities involved in the Polish payment market: the central bank, banks, payment infrastructure providers, retailers, cash transporting and handling companies and consumers. The surveys of particular groups of respondents were designed in such a way as to make it possible to compare the results for the Polish payment system with the results of the aforementioned survey conducted in 2009–2012 under the leadership of the European Central Bank (cf. Subchapter 2.4).

One of the elements of the *Assumptions of research on the costs of payment instruments on the Polish market*, adopted by the Payment System Council on 21 March 2013, was the creation of Steering Committee of the Research Project and the Working Group in November 2013. The Steering Committee of the Research Project on the costs of payment instruments on the Polish market, chaired by Mr Piotr Wiesiołek, Vice-President of Narodowy Bank Polski – First Vice-President of Narodowy Bank Polski, was composed of representatives of:

- NBP,
- Polish Bank Association – an organisation representing the banking sector,
- Foundation for the Development of Non-Cash Transactions – an organisation representing merchants,
- Committee of Acquirers – an organisation representing the payment infrastructure,
- Krajowa Izba Rozliczeniowa S.A. (National Clearing House) – an organisation representing the payment infrastructure,
- Polish Organisation of Cash Service Companies – an organisation representing cash transport and handling companies.

The Steering Committee acted pursuant to the *Principles of organising the work of the Steering Committee of Research Project on the costs of payment instruments on the Polish market* adopted at the first meeting of the Committee. This group was responsible for the due implementation of the project. The tasks of the Steering Committee included in particular: supervising the implementation of the research project in accordance with the adopted schedule, appointing task forces to implement the research project, taking decisions on significant current issues related to the project and approving the final report of the survey.

The role of the Steering Committee was also to appoint the Working Group for examining costs of payment instruments on the Polish market, consisting of NBP employees and other entities. The Working Group consulted substantive issues, Narodowy Bank Polski was the coordinator of the Working Group whereas its chairman was Mr Adam Tochmański, Director of the Payment Systems Department at NBP. The Group acted pursuant to the *Principles of organising the work of the Working Group for examining costs of payment instruments on the Polish market*, adopted at the first meeting of the Group.

As part of the Working Group's activities, a significant part of the work was carried out based on the following working subgroups:

- working subgroup for the central bank,
- working subgroup for banks,
- working group for payment infrastructure providers,
- CIT working subgroup,
- working subgroup for merchants,
- working subgroup for consumers.

As part of their work, the working subgroups, in particular, supported the development of questionnaire surveys for their area of interest as well as developed positions on important issues related to the project, taking into account the characteristics of the particular group of entities they represented.

It is worth adding that as the urgent need arose to launch a tender procedure at NBP to select a research agency to collect and elaborate data on costs of payments by enterprises, the DSP prepared a document entitled *Elements of the methodology for examining the costs of payment instruments on the Polish market*. In addition to the core element, the proposed reference year of the survey, i.e. 2015 involving the whole project, the document also referred specifically to the cost survey on the part of retailers and comprised its basic assumptions. This document was approved by the Steering Committee in October 2015.

The main assumptions of the survey are described in the document *Methodology of the NBP research project on the costs of payment instruments on the Polish market* drafted at Narodowy Bank Polski. On 13 May 2016, this document was submitted to the members of the Working Group for their opinion. This material was then submitted for the opinion of an external expert on methodology.[109] At the final stage, the research methodology was approved by the Steering Committee during the meeting at the NBP Head Office on 15 June 2016. Its approval made it possible to undertake subsequent stages of work under the research project, in accordance with the timeframe described in this document, including in particular sending questionnaires to respondents.

The progress of work under the research project was reported in the cyclical material prepared by the DSP and published on the website of Narodowy Bank Polski, entitled *Assessment of the Polish payment system functioning*. In addition, the research project milestones in 2014, 2015, 2016 and 2017 were described in materials prepared for PSC meetings in December 2014, 2015, 2016 and 2017.

The report was approved by the Steering Committee of the Research Project on 10 December 2018 and presented at the meeting of the Payment System Council on 17 December 2018.

[109] Dr hab. Michał Polasik, Professor at the Nicolaus Copernicus University in Toruń, who at a later stage of the work became the co-author of this research report.

Annex No. 2 Consumer costs based on the results of the questionnaire survey conducted by NBP in 2016

1. Justification for the method chosen, consumers' main payment methods and data sources

In its 2012 publication summarising the survey on costs of retail payment instruments, the ECB identified *consumer survey* and *cash register statistics* as the preferred future methods for estimating the number of cash payments (out of 7 methods presented)[110], while the ECB indicated cash payment value estimates using data on cash withdrawals or an approach based on statistics on cash deposits from traders' merchandise as preferable methods. However, the central banks participating in the survey on costs of payment instruments applied different methods for estimating cash volumes: six central banks used the residual consumption method, five central banks used the questionnaire survey addressed to consumers, four central banks used the traders' survey, three central banks used the cash withdrawal data approach, one central bank used the method based on cash deposits from traders' merchandise and one central bank selected another method.[111] The approach to estimating the number of cash payments presented in this Annex is compliant both with the ECB's preferred approach and the proceedings of five central banks that conducted a consumer survey in the framework of the survey on costs of retail payment instruments and used the survey's results for final estimates.

No comprehensive survey on payment costs incurred by consumers has been carried out in Poland so far. On the other hand, the monthly costs of maintaining savings and settlement accounts and payment cards according to different groups of Poles were analysed.[112] [113] In recent years, the structure of payments by Poles in retail and service outlets, based on a consumer survey, was presented in the surveys by Polasik, Marzec, Fiszeder, Górka 2012[114], Koźliński 2013[115], Koźliński 2017[116] and Manikowski 2017[117]. The structure of Poles' payments for monthly bills such as energy, gas, rent, telephone, etc. can be found in the studies by Koźliński 2010 and Koźliński 2017.

[110] Schmiedel H., Kostova G.L., and Ruttenberg W., *The social and private costs of retail payment instruments: a European perspective*…, op. cit., p. 44.
[111] Cf. Table 4.
[112] Koźliński T., *Zwyczaje płatnicze Polaków* [Poles' payment habits], Narodowy Bank Polski, Warsaw 2013, pp. 211–220, https://www.nbp.pl/systemplatniczy/zwyczaje_platnicze/zwyczaje_platnicze_Polakow.pdf.
[113] Koźliński T., *Wybrane wyniki badania Polaków nt. korzystania z usług bankowych i płatności 2016*…, [Selected results of the survey of Poles concerning the use of banking services and payments 2016]; op. cit., pp. 7–10.
[114] Polasik M. et al., *Modelowanie wykorzystania metod płatności detalicznych na rynku polskim*, [Modelling of the use of retail payment methods on the Polish market]; „Materiały i Studia NBP", 2012, no. 265.
[115] Koźliński T., *Zwyczaje płatnicze Polaków*…, op. cit., p. 122.
[116] Koźliński T., *Wybrane wyniki badania Polaków nt. korzystania z usług bankowych i płatności 2016*…, op. cit., p. 48.
[117] Manikowski A., *Raport z badania czynników oddziałujących na wielkość obrotu gotówkowego w Polsce*…, op. cit., p. 58.

In 2015, most consumer payments were made at various types of fixed retail and service outlets. The second area, in terms of frequency of payments, comprised cyclical charges for electricity, gas, mobile phone, rent, insurance, kindergarten fees, etc. The number of periodic payments for bills is several times lower than payments in shops. The third area of the transaction includes cash deposits and withdrawals as well as transfers made in bank branches and cash withdrawals at ATMs. Cash withdrawals from ATMs are still popular in Poland and their scale is several times greater than the number of transfers, deposits or withdrawals performed at bank branches in Poland. Payments between Poles (P2P) were not included in the consumer survey as their scale is small and data are lacking. In the nationwide survey of Poles with the use of payment diaries, the share of payments between individuals and other payments was 4%.[118]

The cost of payments borne by consumers was estimated on the basis of the following research results and statistical data:

1. the NBP survey on a 970-person nationwide representative sample of adult Poles was conducted in September 2016, using the CAPI method.[119] The results of the 2016 survey were applied to 2015, assuming that the change in the average level of fees for the execution of payments and the time to arrive at the place of payment did not change significantly in one year.
2. statistical data on payment cards, credit transfers and direct debits collected by NBP.
3. GUS Statistical Yearbooks and preparation of the survey on *Income and living conditions of the population of Poland,* GUS (2017).
4. the time limits of execution of consumer payments at retail and service outlets were derived from the 2013 survey by Michał Polasik, Jakub Górka, Gracjan Wilczewski, Janusz Kunkowski, Karolina Przenajkowska and Natalia Tetkowska.[120]
5. the survey on *Poles' Payment Habits* conducted by NBP on a 1,000-person nationwide representative sample of Poles using payment[121] diaries.
6. for comparative purposes, the results of consumer surveys mentioned at the beginning of this subchapter and the results of the survey on the time of cash withdrawals from ATMs and cash deposits and withdrawals at cash desks of bank branches conducted by Jakub Górka[122] were used.

2. Estimate of the equivalent time of making payment made by consumers

The most important variable in the survey is the valuation of time spent by consumers on making payments. The concept of costs of resources assumes that consumer time is a cost and estimates – theoretically – the equivalent value of time spent on the execution

[118] Koźliński T., *Zwyczaje płatnicze Polaków…*, op. cit., p. 165. In the survey referred to above, 1% of payments were made to another person in the category with the name of payment.
[119] Koźliński T., *Wybrane wyniki badania Polaków nt. korzystania z usług bankowych i płatności 2016…*, op. cit. The survey was conducted in cooperation with the Public Relations and Marketing Department of NBP. The primary data were collected by PBS. The survey concept and questionnaire survey were prepared by Tomasz Koźliński from the Payment Systems Department of NBP.
[120] Polasik M. et al., "Time efficiency of Point-of-Sale payment methods: Empirical results for cash, cards and mobile payments", op. cit.
[121] Koźliński T., *Zwyczaje płatnicze Polaków…*, op. cit.
[122] Górka J., *Rozwój sieci bankomatów w Polsce a opłaty interchange i surcharge…*, op. cit.

of payment. Hence the difficulty in estimating the value of time and the lack of a uniform approach. In the majority of consumer surveys mentioned in the previous section, the value of average remuneration after tax or half of this value was used for calculations. The average salary indicator does not include, among others, the income from economic activity and income from an individual farm in agriculture, received by a large part of society in Poland. Another issue that should be taken into account is tax differentiation in Poland depending on the level of income and the possibility of filling of a joint income tax return with the spouse. For the reasons mentioned above, it is assumed that the value of time will be theoretically calculated on the basis of the *average yearly per capita net disposable income in households before social transfers including old-age and survivors' benefits*[123], as reported by Statistics Poland. In 2015, the average annual net disposable income per person in households amounted to PLN 12.9 thousand, according to the survey on *Income and living conditions of the population of Poland* of Statistics Poland in 2017, which constituted PLN 6.4 net per one theoretical working hour, taking into account full-time work.

3. Number of retail payments by Poles in retail and service outlets, cyclical payments for bills and cash transactions at a bank branch in 2015, estimated based on extrapolation of consumer survey and statistical data

The structure and number of domestic retail payments of individuals in traditional and online retail and service outlets in Poland in 2015 was estimated based on the results of: a nationwide representative survey of *Poles' payment habits*[124] using payment diaries, a nationwide representative survey on Poles' use of banking services and payments[125], and statistical data collected by the Payment Systems Department of NBP. The calculations took into account the annual dynamics of changes in the number of payments in Poland by payment cards issued by domestic issuers and the annual dynamics of changes in the number of transfers settled by the KIR., According to the survey performed with the use of payment diaries, at the turn of 2011/2012 Poles made retail cash payments in various stores and service outlets – 81.8%, card payments – 16.5%, and credit transfers – 1.6%.[126] In 2016, based on the nationwide representative survey, the structure of payments by Poles for purchases in shops and services, including online purchases, amounted to 63.4% for cash, 32.5% for payment cards and 4.1% for credit transfers.[127] In 2015, 68.1% of payments were made in cash, 28.5% with various types of cards, and 3.4% in fixed and online shops – by credit transfer, without taking into account cyclical payments for bills. The number of proximity card payments, proximity card payments with PIN code and CNP

[123] Exclusion of social benefits, including age-related benefits, e.g. old-age benefits and disability pensions, from the calculation results in a low net income in the households of pensioners. As a rule, social benefits are paid to entitled persons, regardless of whether the beneficiary performs any work. Some pensioners do not treat the few minutes spent in line as a cost. For the reasons presented above, the alternative cost of free time in pensioners' households is low, which is reflected in the indicator adopted for calculations and published by the GUS.

[124] Koźliński T., *Zwyczaje płatnicze Polaków…*, op. cit.

[125] Koźliński T., *Wybrane wyniki badania Polaków nt. korzystania z usług bankowych i płatności 2016…*, op. cit.

[126] Koźliński T., *Zwyczaje płatnicze Polaków…*, op. cit., p. 122. The payment structure in the survey does not include payments for monthly bills for electricity, gas, rent, mobile phone, internet, etc.

[127] Koźliński T., *Wybrane wyniki badania Polaków nt. korzystania z usług bankowych i płatności 2016…*, op. cit. The payment structure in the survey does not include payments for monthly bills for electricity, gas, rent, mobile phone, internet, etc.

card payments performed by individual customers in Poland was estimated on the basis of statistical data collected by NBP.[128] The number of *pay-by-link* payments was estimated on the basis of statistical data collected by NBP and annual data from the three largest national payment institutions.[129] The number of domestic retail cash payments made by Poles in 2015 was estimated at 5,764 billion transactions, proximity payments by card in shops and for services – at 1,319 billion and proximity payments with PIN – at 1,069 billion. The estimated number of cash payments in 2015 was comparable to the estimated number of cash payments for 2012.[130] The approximate number of one-off transfers for purchases amounted to 166 million and included mainly electronic transfers for online purchases.[131] Electronic transfers for online purchases in Poland are mostly confirmed with a single code sent via a short text message. The number of *pay-by-link* transfers for the purchases amounted to 121 million.

Table 1. Estimated number of domestic retail payments of Poles in retail and service outlets in 2015, in million

Payment method	Number of Poles' payments
Cash payments (in retail and service outlets)	5,764
Payment by proximity card (in retail and service outlets)	1,319
Contact payment with a card with PIN (in retail and service outlets)	1,069
CNP payment cards	18
One-off transfer for purchases	166
Pay-by-link transfer + sms for shopping	121
Total	**8,456**

Source: Estimates by T. Koźliński, NBP based on surveys on *Poles' Payment Habits* and *Selected results of the survey of Poles on using banking services and payments 2016…*, op. cit. and statistical data collected by the Payment Systems Department of Narodowy Bank Polski.

The number of mass payments was estimated on the basis of a survey on the use of banking services and payments by Poles[132] and GUS statistical data. According to the survey, each month the household paid an average of 6.5 bills, which constituted almost 78 bills per year.[133] The structure of payment methods for all bills was estimated on the basis of

[128] Lack of statistical data with the relevant detailed breakdowns for 2015 Q1. Data for the first quarter were estimated using proportions for card payments in Q2-Q4 for payments by cards issued to private and business customers and broken down by POS and CNP payments.

[129] Lack of statistical data for 2015 Q1 for some payment institutions. For the missing data, detailed statistics for 2015 Q2 were adopted for 2015 Q1. Annual data were collected by Wojciech Krawczyk from the DSP NBP as part of a survey on the costs of payment infrastructure providers.

[130] Koźliński T., *Zwyczaje płatnicze Polaków…*, op. cit., p. 250.

[131] The indicated category also comprises transfers at bank branches for online or traditional purchases as well as potential online transfers for traditional purchases. This category includes transfers ordered in mobile banking.

[132] Koźliński T., *Wybrane wyniki badania Polaków nt. korzystania z usług bankowych i płatności 2016…*, op. cit.

[133] In the survey respondents provided the total number of household bills paid separately in the last month for: energy, gas, rent for apartment, mobile phones, landline phone, water, cable TV, digital/satellite TV, RTV subscription, heating, garage rent, waste collection, loan repayment, insurance, school/kindergarten fees, etc. If the respondent had an additional apartment or plot of land, he/she was obliged to include it in the calculations. If the household paid for e.g. four separate mobile phone bills, the respondent was asked to take them into account.

a detailed structure of payment methods for three, some of most frequently paid, types of bills: mobile phone, electricity and rent.[134] In 2015, according to Statistics Poland, there were 14,131 million households in Poland. Based on the above data, an annual number of payments for various types of cyclical household bills was estimated and it was adjusted, in the case of direct debit and cash payments in a shop/point accepting payments for bills, for statistical data collected by NBP. Poles usually made payments for cyclical bills by bank transfer defined in internet banking. In 2015, almost 710 million such payments were made, i.e. 64% of all mass payments. It was assumed that the defined transfers are confirmed, for security reasons, by an SMS code. The second most common way of paying for bills was the payment of cash into the bank account at the Polish Post Office, the number of which was estimated at almost 140 million. It should be noted that the number of non-cash payments made using other payment methods was low, which may be due to the relatively early stage of development of mobile banking or e-invoicing and payments.

Table 2. Estimated number of domestic payments of Poles for cyclical bills in retail and service outlets in 2015, in million

Payment method	Number of Poles' payments
Transfer defined in internet banking + sms	709
Transfer defined in mobile banking/application + mPIN	8
Standing order, cyclical transfer	13
Direct debit	25
E-invoice & Payment (EBPP)/Invoobill	5
CNP card (payment of bills)	4
Transfer for bills in the bank's branch	33
Cash for bills in the bank's branch	41
Cash for postal bills	139
Cash at hand/point of the service provider	51
Cash at the shop/point accepting payments	83
Total	**1,111**

Source: Estimates of T. Koźliński NBP based on the results of the survey *Selected results of the survey of Poles on the use of banking services and payments 2016…*, op. cit., statistical data collected by the Payment Systems Department of Narodowy Bank Polski and GUS data. Statistical data collected by NBP relate to direct debit and cash payments in a shop/point accepting payments for bills.

According to statistical data collected by NBP, in 2015 Poles withdrew cash from ATMs installed in Poland 676 million times. The number of cash transactions ordered by retail customers to employees in bank branches was estimated based on a nationwide representative survey conducted in 2016 (Koźliński 2017). The approximate number of cash withdrawals

[134] Koźliński T., *Wybrane wyniki badania Polaków nt. korzystania z usług bankowych i płatności 2016…*, op. cit.; T. Koźliński, *Porównanie wyników badań ubankowienia Polaków przeprowadzonych przez NBP w 2006 i 2009 r.*, [Comparison of results on surveys of Poles' use of banking services conducted by NBP in 2006 and 2009]; Narodowy Bank Polski, Warsaw 2009, http://www.nbp.pl/systemplatniczy/obrot_bezgotowkowy/ubankowienie_polakow.pdf.

from own bank accounts at bank branches was approximately 40 million. The number of cash deposits to own bank account has also been estimated at approximately 22 million.

Table 3. Estimated number of cash transactions by Poles at cash desks of bank branches and in ATMs in 2015, in million

Payment method	Number of Poles' payments
Cash withdrawal from a bank account*	40
Cash deposit to own bank account*	22
Cash deposit to another person's or company's account* **	7
Transfer to another person's/company's account* **	13
Cash withdrawal from ATMs	676
Total	**758**

*transactions with an employee at a bank's branch, **no deposits/transfers for bills.

Source: Estimates of T. Koźliński NBP based on the results of the survey *Selected results of the survey of Poles on the use of banking services and payments 2016…*, op. cit., statistical data collected by the Payment Systems Department of Narodowy Bank Polski.

4. Time and amount of fees for making payments in traditional and online retail and service outlets (estimated by the NBP expert)

The time taken to make payments in retail and service outlets is important in calculating costs borne by natural persons. In Poland, in 2009, Michał Polasik, Jakub Górka, Gracjan Wilczewski, Janusz Kunkowski, Karolina Przenajkowska and Natalia Tetkowska in cooperation with a group of students carried out a survey on the execution time of, among others, cash and card payments in several *convenience* stores.[135] It is the most comprehensive and detailed survey on the Polish market and the only one conducted using the chronometric method, therefore the results of this survey will be used in calculations. The time of so-called pure payment process was used for calculations, which is calculated from the moment the customer reaches for a wallet (or alternative location) in order to take out cash or a payment card until the moment printing and handing over the receipt to the customer or, in the case of card payments – confirmation from the terminal. Payment time for cash was 28.86 seconds, for payment card with PIN – 48.04 seconds, proximity

[135] Data on payment execution time were obtained in 2009, i.e. at the initial stage of development of the proximity payment market in Poland. From 2009 to 2015, a significant progress was made in the development of EMV and proximity technology, software, processor speed in POS terminals, server and internet connection speed. The developments could significantly reduce the time of payment by card, including proximity cards. It can be assumed that the cash payment time between 2009 and 2015 remained at a similar level.

payment with online card without PIN – 37.08 seconds.[136] In this context, it should be noted that following the recommendation of the Payment System Council of 2013, almost all proximity payments in Poland in 2015 were performed online. To simplify the calculations, it was assumed that all proximity payments with an online card in 2015 were made without entering a PIN.

The average time of making a one-off transfer, confirmed by an SMS code, was estimated by experts[137] at 150 seconds. The time was counted from the moment of entering the bank's internet address to the moment of logging out from the internet banking. Most of the time is needed to enter the 26-digit bank account number and the address of the recipient of payment. Of course, people less able to type on the keyboard can perform a bank transfer longer. One-off transfers can be used to pay for purchases in online shops, but they can also be used to pay for the purchase of third party insurance, car insurance, tourist trips, renovation of apartment, etc. Usually one-off Elixir transfers ordered by natural persons in internet banking are free of charge.

The average time of making an online transfer, *pay-by-link*, confirmed by an SMS code, was estimated by experts[138] at 60 seconds. *Pay-by-link* transfers are very popular in Poland to pay for online shopping. The payment time was counted from the moment the pay button was pressed, through loading the website of the payment institution, bank selection, logging into internet banking (it is assumed that the customer remembers the login and password that can be entered quickly), payment confirmation for a specified amount of money with received SMS code, to the stage of logging out of internet banking. *Pay-by-link* transfers are free of charge for shoppers.

The time of execution of a payment by CNP payment card for online purchases was estimated by experts[139] at 40 seconds. It is assumed that the customer has a payment card prepared, uses the intermediation of an acquirer and enters the payment card number, expiry date and a three-digit CVV2/CVC2 code quickly. It is a free payment method for customers.

[136] Polasik M. et al., "Time efficiency of Point-of-Sale payment methods: Empirical results for cash, cards and mobile payments", op. cit.; The comprehensive survey of payment times carried out by the Bank of Canada in 2014 is worth attention (A. Kosse et al., *The Costs of Point-of-Sale Payments in Canada*…, op. cit.). This is most reliable, since it is estimated on the basis of a large sample of n=5891, the measurement of payment times with cash, credit cards and using the proximity method in shops. Proximity payments are very popular in Canada, therefore the results of the survey are highly reliable. Data were collected in 29 shops of different sizes and types, including small grocery stores, petrol stations, cafés, pharmacies, supermarkets, construction stores. The measurements were performed on each day of the week at different times of a day and in three different regions of Canada. In the Bank of Canada survey, a natural person's cash payment lasted on average 11.6 seconds, a proximity payment with a payment card – 15.7 seconds and the contact payment with a payment card with a PIN (chip and PIN) – 25.7 seconds (Ibid.); in 2011, Danmarks Nationalbank carried out a study on the duration of payment in 14 different types and sizes of retail stores. The average cash payment lasted 14.3 seconds (n=405) and the card payment with the PIN code – 14.9 seconds (n=548) (n=548) Danmarks Nationalbank, *Costs of payments in Denmark*…, op. cit., p. 50.); in 2013, Norges Bank estimated the POS cash payment time at points of sale at 14 seconds (16 seconds in 2007), PIN card payments in the national payment system BankAxept – also at 14 seconds (17 seconds in 2007) and international payment card payments – at 25 seconds (57 seconds in 2007 but most payments were confirmed by the signature of a cardholder) (Norges Bank, *Costs in the Norwegian payment system*…, op. cit., p. 24.).

[137] Estimate made by NBP based on n=40 payments.

[138] Estimate made by NBP based on n=40 payments.

[139] Estimate made by NBP based on n=30 payments.

5. Time and amount of fees for cyclical payments for bills (estimated by NBP experts and based on previous research)

The queuing and payment times and the time to get to or from the place of payment of cyclical bills were estimated based on the survey[140] of a representative nationwide sample of Poles in 2016 or estimated by NBP experts. The amount of the bill payment fee was determined based on an example of an electricity bill, which is probably the most frequently paid household bill, in addition to a monthly mobile phone subscription payment.

The average time of making a defined online transfer, confirmed by an SMS code, was estimated by experts at 75 seconds.[141] An order for such a transfer takes a little longer than a *pay-by-link* transfer. The time was counted from the moment of entering the bank's internet address, through logging into internet banking, appropriate selection of a predefined payment template, entering the payment amount and confirming it with a received sms code, to the stage of logging out.[142] In almost all banks in Poland, consumers can make transfers free of charge in internet banking, while in 2015 few cooperative banks still offered a type of personal account in which an internet banking transfer could cost about PLN 1. Some people could also pay their accounts by instant transfer, so that money could be credited to the creditor's bank account on time and they could pay a fee of PLN 1 to even PLN 20. In the survey conducted on a representative nationwide sample of Poles in 2016, the average value of the fee for an electricity bill, by transfer defined in the internet banking system, was estimated at PLN 0.06. Estimates have been generalised to all cyclical bills paid in households.

The time of execution of a defined transfer in the mobile banking application, confirmed with a mobile PIN, was estimated by experts at 55 seconds.[143] It was assumed that logging in to mobile banking is performed via a mobile mPIN and the mobile application runs smoothly on the mobile phone. Payment is confirmed by mPIN, instead of SMS, which significantly shortens the time of payment.

The execution time for standing orders and direct debits is defined at 0 seconds as these types of payments are automatic and usually free of charge for consumers.

In Poland, in 2015 there were several methods of payment for electronic invoices (EBPP). One of the most popular was the Invoobill service provided by KIR, which consists in the client logging into the internet banking service and confirming payment for a specific electronic invoice.[144] It is a very easy and fast way of payment in Internet banking, which in terms of the execution method is similar to a trusted defined transfer (without sms confirmation). Payment time was estimated by experts at 25 seconds[145], using the example of a defined

[140] Koźliński T., *Wybrane wyniki badania Polaków nt. korzystania z usług bankowych i płatności 2016*..., op. cit.
[141] Estimate made by NBP based on n=40 payments.
[142] Cyclical payments for bills can be saved as a payment template, in which the account number and address of the beneficiary are filled in. The customer enters only the current value of payment and confirms it with an sms. The template can also be saved as a trusted transfer and then the payment does not need to be confirmed by SMS.
[143] Estimate made by NBP based on n=40 payments.
[144] http://www.invoobill.pl/jak-dziala-invoobill https://www.pkobp.pl/bankowosc-elektroniczna/ipko/uslugi-ipko/transakcje-na-rachunkach/invoobill/
[145] Estimate made by NBP based on n=30 payments.

trusted transfer. In 2015, payment of Invoobill bills was usually free of charge. Another method of EBPP payment consists in logging in to the internet service aggregating bills or customer service of the service provider and paying for the invoice by *pay-by-link* transfer or payment card in the CNP mode. In 2015, *pay-by-link* payments were free of charge due to promotions.[146] In 2015, it was possible to receive up to 5% of the refund for each bill paid to PGE (the largest energy supplier in Poland) in a large service aggregating bills.[147]

Payment cards can be also used to pay bills online through providers of such services, including bill aggregators (EBPP). The consumer may order a one-off payment with a CNP card or launch a cyclical payment with a card, which consists in automatic charging of fees for issued bills from the card on the payment date. Cyclical card payments in recent years have been free for most customers. In 2015, online invoice aggregators and card organisations reimbursed up to 5% of the value of a bill automatically paid by credit card. The time taken to pay with a CNP card for bills was estimated by experts at 30 seconds, i.e. less than with a CNP card for online purchases, since CNP card payments for bills can be also made automatically.

The average time of making a cash payment or a transfer for bills and the time of standing in line at a bank branch was estimated by experts at about 6 minutes.[148] This is twice as long as the time assumed in the 2014 Norges Bank survey. The time of making a bank transfer or cash deposit in 2015 in Poland at a bank branch was estimated by experts at about 3 minutes.[149] This is a time similar to the results of the 2011 study by Jakub Górka, who estimated the time of depositing cash at the cash desk of a bank branch as 2 minutes and 2 seconds.[150] In the 2007 Banco de Portugal survey, the cash deposit time at the banking branch was 2 minutes and 38 seconds.[151] The waiting time for customers in the queue was estimated by experts[152] at approximately 3 minutes, 1 minute more than Norges Bank. The situation may vary from bank to bank as banks have different numbers of branches and the customer service process is different. When depositing and withdrawing a large amount of money, the time taken to perform an operation may be longer than the time taken to make a small amount payment. In accordance with the results of the survey on a nationwide representative sample of Poles, the average time of arriving or commuting of individual customers to a bank branch was 13 minutes. If the respondent visited a bank branch on the way, e.g. from work or from a shop, he/she only provided an extra time to get to or from the branch. The nationwide survey of Poles conducted in 2016 shows that the average fee for paying a cash bill at a bank branch paid by Poles was PLN 1.87 while the fee for a bank transfer ordered at a branch was PLN 1.48. The level of charges relates to the payment of electricity bills which have been generalised to other cyclical household bills. Some banks offered bank accounts that allowed individuals to pay their bills at the bank branch free of charge. In 2015, such accounts were very popular among the elderly. Some household service providers also had contracts signed with selected banks under which customers could pay the bills of a given service provider free of charge at the specific bank. For the reasons mentioned above, the average fees from the survey were lower than the prices shown in the table of bank fees and commissions.

[146] https://bm.pl/aktualnosci/promocja-platnosci-za-rachunki-za-0-pln
[147] https://bm.pl/aktualnosci/kliencie-pge-przejdz-na-efakture-oszczedz-kolejne-drzewa-i-odbierz-100-zl-premii
[148] Estimates performed by NBP.
[149] Estimates performed by NBP.
[150] Górka J., *Rozwój sieci bankomatów w Polsce a opłaty interchange i surcharge*…, op. cit.
[151] Banco de Portugal, *Retail Payment Instruments in Portugal: Costs and Benefits*, Lisbon 2007, 101.
[152] Estimates performed by NBP.

The average time of standing in line and paying cash for a bill at the Polish Post Office was estimated at 9 minutes on the basis of the nationwide representative survey of 2016. Paying bills at the Polish Post Office is much more popular among Poles than paying bills at banks, which is confirmed by the estimates presented earlier. The time of reaching the branch of the Polish Post Office was estimated by Poles at 12 minutes.[153] If the respondent was driving to the post office on the way, e.g. from work or from the shop, he/she was asked to give only the additional time of access to the post office. If the respondent usually sent or received parcels at the post office at the same time, he/she had to provide 0 minutes of time to get there. The access time is similar to that estimated for bank branches. The survey on a nationwide representative sample of Poles shows that the average amount of commission for natural persons for paying a bill at the post office was PLN 2.31.[154] Some household service providers signed contracts with Poczta Polska for preferential rates for customers for paying bills.

The average time of accessing or driving to/from the household service provider's cash register to pay for a bill in cash was estimated by experts at around 15 minutes.[155] It is only slightly longer than the time taken to reach a bank branch or a post office, although in some cases the access time can be considerably longer. Electricity, gas, water or cable TV providers have generally limited the number of their own points at which it is possible to pay their bills in cash. Even in big cities there is often only one customer service outlet where it is possible to pay bills in cash. In the above mentioned outlets there are sometimes long queues, so the waiting time in the queue and customer service was assumed to be the same as calculated from the nationwide survey of Poles in the case of payments at the post office, i.e. 9 minutes. Payments with the service provider are usually free of charge but some outlets may charge a fee. The average value of the electricity bill fee was estimated at PLN 0.17 in the 2016 nationwide representative survey of Poles.

The average time of making payment in cash and standing in the queue in a shop or an outlet accepting payments to bank accounts (national payment institution or payment services office) has been determined by experts[156] at 6 minutes, similarly to the time at a bank branch. In the case of payment at a supermarket, queues may be longer. The payment process is highly optimised as the payment data are read from the barcode. The time of arriving to outlet accepting payments for bills or accessing it was estimated at 8 minutes in a survey on a nationwide representative sample. Respondents were supposed to give only an additional time they needed to get to the payment service office. If the cash desk is located in a shop or directly next to the shop where respondents do their shopping, they were to report 0 minutes of access time. The average value of the fee in the nationwide representative survey of Poles was estimated at PLN 1.87. Some service providers have signed contracts with payment institutions for preferential rates of bill fees.

[153] Koźliński T., *Wybrane wyniki badania Polaków nt. korzystania z usług bankowych i płatności 2016*…, op. cit., pp. 33–34. Koźliński T., *Wybrane wyniki badań Polaków w sprawie korzystania usług bankowych i płatności 2016 [Selected results of a survey of Poles on the use of banking services and payments in 2016*], Narodowy Bank Polski, Payment Systems Department 2017, pp. 33–34.
[154] Ibid., p. 35.
[155] Estimates performed by NBP.
[156] Estimates performed by NBP.

6. Time and amount of fees for executing transactions at bank branches and at ATMs (estimated by NBP experts and based on previous research)

The time of customer service at bank branches is usually longer than the time of execution of the same transaction on the internet or in the mobile banking system. In addition, it is necessary to walk or drive to the bank branch which takes, according to a nationwide representative survey of Poles, about 13 minutes. In rural areas, the time of access to a bank branch can even reach half an hour, while in large cities the network of bank branches and outlets in 2015 was much more extensive, so the time of access could only take 5 minutes. The survey respondents were asked to provide only additional time to reach a bank branch on the way, e.g. from work or a shop.

It has been assumed[157] that the time of making cash payments and withdrawals at an employee's bank branch or ordering a transfer to the account of another person/company will amount to approximately 6 minutes, including the short queuing time. The applied time of execution of cash transactions and transfers in branches in Poland is twice as long as the corresponding time adopted in the Norges Bank study[158], which also takes into account the queuing time. In 2015, performing cash operations and transfers at bank branches in Poland was relatively popular among the elderly.

The average fee paid by consumers for cash deposits to the bank account of another person/company (excluding payments for cyclical bills) at a bank branch was about PLN 4.7. The fee for a transfer order to a bank account of another person/company also at a bank branch was about PLN 3.7. The fees were estimated in a nationwide representative survey of Poles conducted in 2016 and applied to the 2015 survey. Cash deposits and withdrawals to or from one's own bank account at a bank branch are usually free of charge for retail customers in Poland if they do not exceed PLN 20 thousand.

The average time taken by Poles to reach an ATM was estimated at 8 minutes in a representative survey of Poles. The network of ATMs in Poland, like in other countries, is not evenly distributed. The density of ATMs is the highest in city centres and large shopping centres. The average time of cash withdrawal from an ATM, including printing of the confirmation of transaction execution and taking into account a very short waiting time in the queue, was estimated by experts[159] at 65 seconds. In 2011, Jakub Górka estimated the average time of cash withdrawal from an ATM at 43 seconds, however without taking into account the queuing time.[160] The 2009 Gresvik and Haare study assumed that the time of queuing and withdrawing cash from an ATM was 110 seconds. In the Norges Bank survey published in 2014[161], it was assumed that the corresponding time for withdrawing cash from an ATM and queuing was 100 seconds. In Poland there are usually no queues to ATMs. The average fee for cash withdrawal from an ATM was estimated at PLN 0.3 in a nationwide survey of Poles in 2016. The low value results from the fact that most cash withdrawals from ATMs in Poland by individual customers are free of charge.

[157] Ibid.
[158] Norges Bank, *Costs in the Norwegian payment system*…, op. cit.
[159] Estimate performed by NBP based on n=30 payments. Payments were made in various locations in Warsaw. Queues to ATMs were observed in large shopping centres in the afternoon.
[160] Górka J., *Rozwój sieci bankomatów w Polsce a opłaty interchange i surcharge*…, op. cit., p. 103.
[161] Norges Bank, *Costs in the Norwegian payment system*…, op. cit., s. 24.

7. Annual customer fees for savings and settlement accounts and payment cards

Consumers may pay monthly fees for maintaining a savings and settlement account (ROR) and for payment cards. In Poland, if certain conditions are met, such as regular inflow of remuneration, annuities, pensions or scholarships to a bank account, the owner is exempt from the monthly fee for a personal account. It was estimated on the basis of a nationwide survey that 52% of Poles had a free personal account in 2016 or did not pay a monthly fee for it.[162] The ROR owner paid to the bank an average monthly fee of PLN 3.1, which amounted to PLN 37.2 per year. According to the statistical data published by NBP, the total number of current settlement deposits of residents held in Polish zlotys by commercial banks amounted to 36.303 million at the end of December 2015.[163] Based on the above data, it can be estimated that throughout 2015 Poles paid a total of approximately PLN 1.35 billion in fees for maintaining current account deposits denominated in PLN. These charges were settled for payments, deposits and withdrawals from a personal account, according to the time taken by consumers to perform the transaction, including standing in a queue. Fees were assigned to only those transactions that were carried out with the use of consumer's savings and settlement account.

The second most important cost is related to monthly fees for holding a payment card. Such a fee was charged in 2015 for almost every debit card and in many banks for credit cards, but persons making several payments with cards or payments of a certain value in a month could expect an exemption from the monthly fee for a payment card. Some consumers do not notice any differences between a debit card and a credit card or do not know exactly what type of payment card they hold, therefore, in a nationwide survey of Poles, they were asked how much the bank usually charged them monthly for a payment card, without distinguishing the type of card. If the respondent had several payment cards, he/she was asked to specify the monthly costs of the most frequently used payment card. Most Poles have one payment card and it is usually a debit card. The nationwide survey of Poles in 2016 estimated the average monthly fee for a payment card at approximately PLN 1.8, which made the total of PLN 21.6 per year. According to the statistical data collected by NBP, the number of individual customers' payment cards, excluding prepaid cards[164], amounted to 31.078 million at the end of December 2015. Based on the above data, it can be estimated that in 2015 Poles paid approximately PLN 671 million fees for payment cards.[165] These charges were settled for all card payments and cash withdrawals from the ATM, according to the time spent by consumers to perform the transaction, including standing in a queue. Fees were assigned to only those transactions that were carried out with the use of payment cards.

In 2015, natural persons paid an estimated amount of PLN 2.021 billion in monthly fees for personal accounts and payment cards. These fees were settled into three groups of transactions:

- cash payments and cash transactions – PLN 535 million,

[162] Koźliński T., *Wybrane wyniki badania Polaków nt. korzystania z usług bankowych i płatności 2016…*, op. cit., p. 7. The customer could be exempted from the monthly personal account fee if certain conditions were met, e.g. regular transfer of remuneration to a bank account.

[163] Narodowy Bank Polski, *Biuletyn Informacyjny nr 12/2015…*, op. cit., p. 41.

[164] Prepaid cards are not included in the calculation because they do not normally function as a basic payment card for daily purchases, such as a debit or credit card.

[165] A nationwide survey of Poles in 2016 shows that as many as 63% of people who had a payment card did not pay a monthly fee for it. If all card users were to pay monthly fees for a card, such a cost would hypothetically amount to approximately PLN 1.8 billion annually.

- payments by card – PLN 973 million,
- credit transfer and direct debit – PLN 513 million.

8. Private costs of payment instruments borne by Poles (estimated on the basis of extrapolation of data obtained from consumer questionnaire surveys and statistical data)

Based on the results of the survey and the NBP statistical data on payment instruments, private costs and internal and external costs incurred by Poles in 2015 in connection with the execution of cash transactions were estimated. Consumers' external costs consist of fees directly related to the execution of payments (if any) and monthly fees paid by customers for holding a savings and settlement account or a payment card. In the concept of costs of resources, private costs include, among others, estimates of queuing and transaction execution times as well as the time of customer's access to/from the place of making a payment or a cash transaction. Costs related to the consumer transaction execution time are internal costs.

It can be estimated that in 2015, natural persons paid almost PLN 800 million in fees for performing various types of cash payments and transactions, of which the largest amount, i.e. about PLN 320 million, at the post office. Out of the fees for personal accounts and payment cards estimated at PLN 535 million which can be allocated to relevant cash payments and cash transactions, PLN 420 million is allocated to cash withdrawals from ATMs. The queuing time was theoretically estimated at PLN 680 million. The theoretical time of arrival at and return from the place of making a payment or executing a cash transaction was estimated at over PLN 2.1 billion, of which approximately 54% was related to cash withdrawals at ATMs. It can be seen that the highest private costs are borne by consumers in relation to ATM cash withdrawals.

The total private costs of natural persons related to cash transactions and cash payments incurred by individuals in Poland in 2015 were estimated at approximately PLN 4.1 billion.

Table 4. Estimated private costs of cash payments and cash transactions, broken down into internal and external costs, borne by Poles in 2015, in PLN million

Transaction types	External costs		Internal costs		Private costs
	Fees for execution of transactions by customers	Fees for RORs and payment cards	Queuing and transaction execution time	Customers' arrival and return times	Total fees and time equivalent
Cash payments (in retail and service outlets)	0	0	296	0	296
Cash withdrawal from ATM	203	423	78	1,154	1,858
Cash withdrawal from a bank account**	0	72	26	111	209
Cash deposit to own bank account**	0	40	14	61	115

Transaction types	External costs		Internal costs		Private costs
	Fees for execution of transactions by customers	Fees for RORs and payment cards	Queuing and transaction execution time	Customers' arrival and return times	Total fees and time equivalent
Cash deposit to another person's/company's account** ***	33	0	4	19	57
Cash for bills in the bank's branch*	77	0	26	114	217
Cash for bills at the post office*	321	0	133	356	810
Cash at hand/point of the service provider*	9	0	49	163	221
Cash at the shop/point where the deposit is accepted*	155	0	53	141	349
Total	**797**	**535**	**680**	**2,119**	**4,130**

*payments for bills, **transactions with employees at the bank branch, ***excluding payments/transfers for bills

Source: Calculations of T. Koźliński NBP, NBP estimates.

The estimated private costs of card payments borne by consumers in 2015 amounted to about PLN 1.15 billion and they were almost four times lower than the private costs of cash transactions. These costs were distributed more or less fifty-fifty between proximity payments and contact card payments. Monthly fees for payment cards and personal accounts accounted for around 85% of consumers' private costs. The internal costs of card payments by natural persons amounted to approximately PLN 180 million and resulted from the time of processing a payment at cash desks in retail and service outlets.

Table 5. Estimated private costs of card payments borne by Poles in 2015, in PLN million

Types of payments	External costs		Internal costs		Private costs
	Fees for execution of transactions by customers	Fees for RORs and payment cards	Queuing and transaction execution time	Customers' arrival and return time	Total fees and time equivalent
Payment by proximity card (in retail and service outlets)	0	471	87	0	558
Contact payment with a card with PIN (in retail and service outlets)	0	495	91	0	586
CNP payment cards	0	7	1	0	8
CNP card (payment for bills)*	0	1	0.2	0	1
Total	**0**	**973**	**180**	**0**	**1,153**

*payments for bills

Source: Calculations of T. Koźliński NBP, NBP estimates.

Estimated private costs of credit transfers and direct debits borne by consumers in 2015 amounted to approximately PLN 960 million. Internal costs amounted to approximately PLN 310 million, which results from the fact that electronic payments are either made automatically or require a very small amount of time.

Table 6. Estimated private costs of credit transfers and direct debits borne by consumers in 2015, in PLN million

Types of payments	External costs		Internal costs		Private costs
	Fees for execution of transactions by customers	Fees for RORs and payment cards	Queuing and transaction execution time	Customers' arrival and return time	Total fees and time equivalent
One-off transfer for purchases	0	125	44	0	169
Pay-by-link transfer + sms for shopping	0	36	13	0	49
Transfer defined in internet banking + sms*	43	266	95	0	403
Transfer defined in mobile banking/application + mPIN*	0	2	1	0	3
Standing order, cyclical transfer*	0	0	0	0	0
Direct debit*	0	0	0	0	0
E-invoice/e-invoice and payment/ Invoobill*	0	0.6	0.2	0	1
Transfer to another person's/ company's account** ***	48	23	8	36	116
Transfer for bills at the bank's branch*	49	59	21	92	221
Total	**139**	**513**	**182**	**128**	**961**

*payments for bills, **transactions with employees at the bank branch, ***excluding payments/transfers for bills

Source: Calculations of T. Koźliński NBP, NBP estimates.

9. Unit costs of payment instruments borne by Poles

It turns out that the traditional cash payment in retail and service outlets is the cheapest cash payment and its estimated unit cost is about PLN 0.05. This is due to the estimated time of handling the cash payments of consumers at the cash desk. The most expensive cash transaction is a cash deposit on the account of another person or company at a bank's branch (excluding payments or transfers for cyclical bills). Its estimated cost is over PLN 8, which comprises, to the greatest extent, the fee paid by the customer at the bank's cash desk.

Table 7. Estimated unit private costs of cash payments and cash transactions borne by Poles in 2015, in PLN per 1 payment/transaction

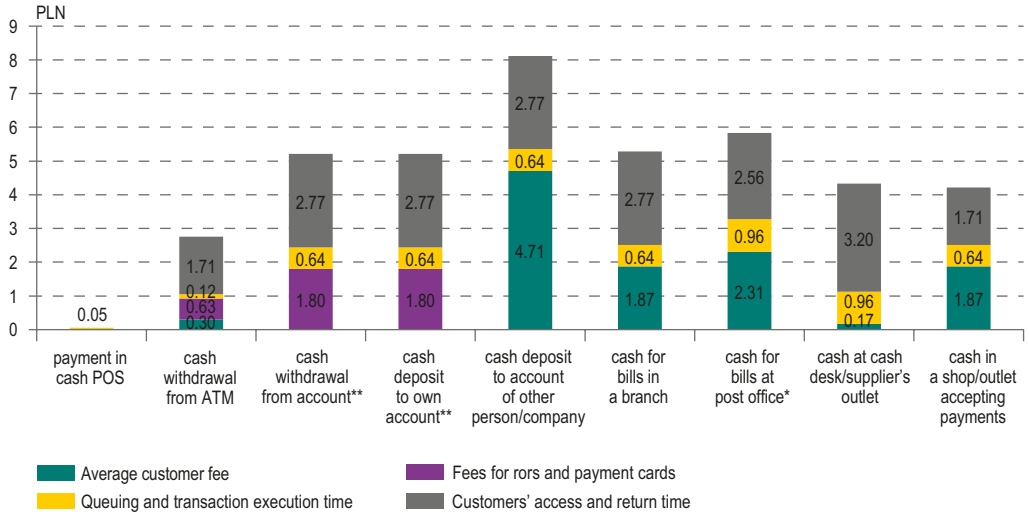
Types of payments	External costs		Internal costs		Private costs
	Average customer fee	Fees for RORs and payment cards	Queuing and transaction execution time	Customers' arrival and return times	Total fees and time equivalent
Cash payments (in retail and service outlets)	0.00	0.00	0.05	0.00	0.05
Cash withdrawal from ATM	0.30	0.63	0.12	1.71	2.75
Cash withdrawal from a bank account**	0.00	1.80	0.64	2.77	5.21
Cash deposit to own bank account**	0.00	1.80	0.64	2.77	5.21
Cash deposit to another person's/company's account** ***	4.71	0.00	0.64	2.77	8.12
Cash for bills in the bank's branch*	1.87	0.00	0.64	2.77	5.28
Cash for bills at the post office*	2.31	0.00	0.96	2.56	5.83
Cash at hand/point of the service provider*	0.17	0.00	0.96	3.20	4.33
Cash at the shop/point where the deposit is accepted*	1.87	0.00	0.64	1.71	4.22
Average	**0.12**	**0.08**	**0.10**	**0.31**	**0.61**

*payments for bills, **transactions with employees at the bank branch, ***excluding payments/transfers for bills

Source: Calculations of T. Koźliński NBP, NBP estimates.

The unit internal costs of card payments are minimal and amount to about several grosz. Of greater importance are monthly fees for payment cards and personal accounts borne by consumers, which have been settled by the payment method according to the time of payment execution. From the perspective of individual customers, it can be estimated that in 2015 the unit private cost of cash payment in the shop was on average about 8 times lower than that of payment by proximity payment by credit card.

Chart 1. Estimated unit private costs of cash payments and cash transactions incurred by Poles in 2015, in PLN per 1 payment/transaction



*payments for bills, **transactions with employees at the bank branch, ***excluding payments/transfers for bills
Source: Calculations of T. Koźliński NBP, NBP estimates.

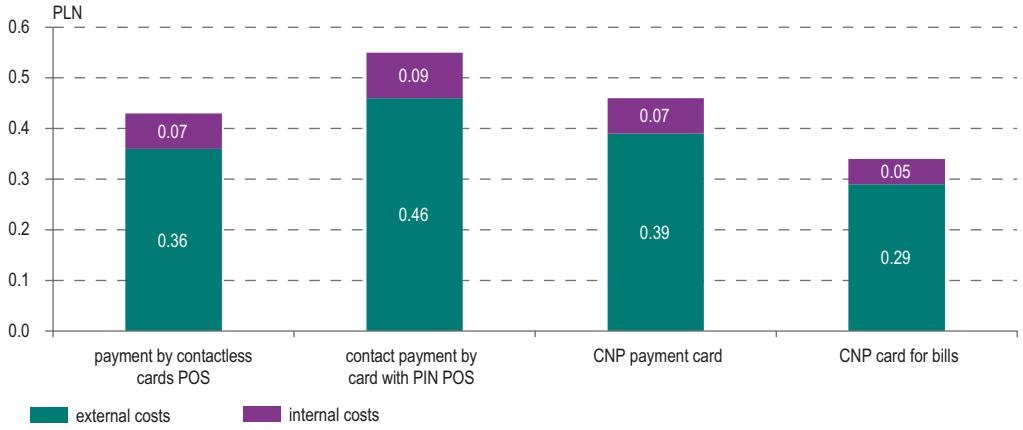
Table 8. Estimated unit private costs of payments by cards borne by Poles in 2015, in PLN per 1 payment/transaction

Types of payments	External costs		Internal costs		Private costs
	Average customer fee	Fees for RORs and payment cards	Queuing and transaction execution time	Customers' arrival and return time	Total fees and time equivalent
Payment by proximity card (in retail and service outlets)	0	0.36	0.07	0	0.42
Contact payment with a card with PIN (in retail and service outlets)	0	0.46	0.09	0	0.55
CNP payment cards	0	0.39	0.07	0	0.46
CNP card (payment for bills)*	0	0.29	0.05	0	0.34
Average	**0**	**0.40**	**0.07**	**0**	**0.48**

*payments for bills, including automatic cyclical payments by payment card
Source: Calculations of T. Koźliński NBP, NBP estimates.

From the perspective of natural persons, it can be estimated that the cheapest (cost-free) payments in the private cost concept are standing orders and direct debits. Apart from a one-off launch of these services, the customer does not have to do anything else, so internal cost is PLN 0. In 2015, most banks in Poland did not charge a fee for such payments. Payments using the Invoobill service, offered by KIR, or an electronic invoice were also very cheap for Poles. Payments of this type are greatly simplified and can be automated, so the unit private cost of one payment was approximately only PLN 0.17. The most expensive service for Poles was

Chart 2. Estimated unit private costs of payments by cards borne by Poles in 2015, in PLN per payment



*payments for bills, including automatic cyclical payments by payment card
Source: Calculations of T. Koźliński NBP, NBP estimates.

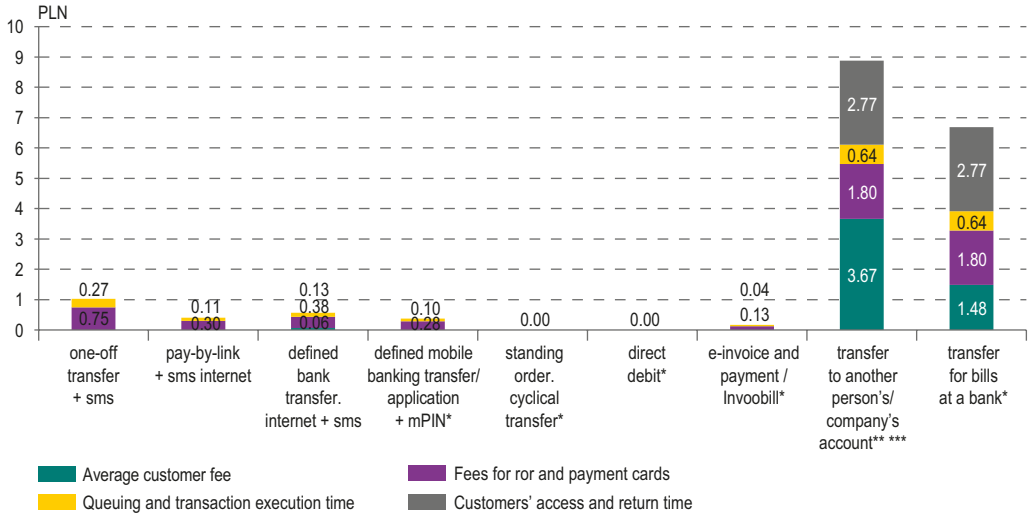
a transfer to the account of another person or company, excluding payments for bills, ordered in a cash desk service at a bank's branch, with an estimated private cost of almost PLN 9.

Table 9. Estimated unit private costs of credit transfers and direct debits borne by Poles in 2015, in PLN per payment

Types of payments	External costs		Internal costs		Private costs
	Average customer fee	Fees for RORs and payment cards	Queuing and transaction execution time	Customers' arrival and return time	Total fees and time equivalent
One-off transfer for purchases	0.00	0.75	0.27	0.00	1.02
Pay-by-link transfer + sms for shopping	0.00	0.30	0.11	0.00	0.41
Transfer defined in internet banking + sms*	0.06	0.38	0.13	0.00	0.57
Transfer defined in mobile banking/ application + mPIN*	0.00	0.28	0.10	0.00	0.37
Standing order, cyclical transfer*	0.00	0.00	0.00	0.00	0.00
Direct debit*	0.00	0.00	0.00	0.00	0.00
E-invoice and payment / Invoobill*	0.00	0.13	0.04	0.00	0.17
Transfer to another person's/company's account** ***	3.67	1.80	0.64	2.77	8.88
Transfer for bills at the bank's branch* **	1.48	1.80	0.64	2.77	6.69
Average	**0.13**	**0.47**	**0.17**	**0.12**	**0.88**

*payments for bills, **transactions with employees at the bank branch, ***excluding payments/transfers for bills Source: Calculations of T. Koźliński NBP, NBP estimates.

Chart 3. Estimated unit private costs of credit transfers and direct debits borne by Poles in 2015, in PLN per payment



*payments for bills, **transactions with employees at the bank branch, ***excluding payments/transfers for bills
Source: Calculations of T. Koźliński NBP, NBP estimates

10. Selected conclusions on the cost of payments incurred by consumers (estimated on the basis of consumer surveys and statistical data)

Summing up, from the consumers' perspective cash was the cheapest way of payment in physical retail and service outlets in 2015, with the estimated cost of payment time of only PLN 0.05.[166] Taking into account cash payments at retail and service outlets and cash deposits and withdrawals at bank branches, cash withdrawals at ATMs and cash payments for bills at the post office and other outlets, the average cost of such payments and cash transactions amounted to: 1) PLN 0.41 – internal costs taking into account the time of queuing and performing transactions as well as the time of arrival and return of customers, 2) PLN 0.61 – private costs taking into account the above mentioned internal costs and external costs (customer fees). The inclusion of the time of arrival (and return) of consumers at ATMs, bank branches and post offices has a noticeable impact on the increase in estimated costs.

In the case of cyclical payments for bills, standing orders and direct debits were unrivalled, with zero costs for consumers in terms of fees and time spent on making payments. The electronic invoice and payment for bills generated minimum costs (PLN 0.17). Defined transfers in mobile and internet banking were relatively cheap for consumers, practically free of charge for orders (PLN 0.37 and PLN 0.57, respectively).

People actively using payment cards usually do not pay a monthly fee for holding it, so the cost of paying in cash or by card can often be reduced to the duration of the payment.

[166] Similar to the surveys on the costs of payments conducted by Danmarks Nationalbank and Magyar Nemzeti Bank.

In many banks, the cost of cash transactions and transfers ordered with an employee at a bank branch is higher than the cost of transactions ordered in internet or mobile banking.

It can be noticed that in 2015 the so-called internal costs of consumers (approx. PLN 3.3 billion), coming down to the estimation of the cost of arriving at and returning from the place of payment, depositing or withdrawing cash (approx. PLN 2.2 billion) and the time associated with waiting in the queue and making a payment (approx. PLN 1 billion), were significant. The aforementioned time costs of consumers were comparable to the estimated total value of fees for making various types of payments (approx. PLN 0.9 billion) and monthly fees for payment cards and savings and settlement accounts (approx. PLN 2 billion).

A significant difference in the number of cash payments of Poles in physical retail and service outlets can be observed when the above presented method of estimating the costs of retail payment instruments with the residual consumption method presented in Subchapter 4.5. According to the method of questionnaire survey addressed to consumers, the estimated number of cash payments in 2015 in retail and service outlets amounted to about 5.8 billion, while in the residual consumption model, this number amounted to 10.6 billion. These differences have a significant impact on the unit cost of cash payments and transactions (including deposits and withdrawals from ATMs, at bank branches, post offices and other places), which according to the method of questionnaire survey addressed to consumers amounted to PLN 0.61, while in the residual consumption method – to PLN 0.24 (Subchapter 4.5.).

In the method involving questionnaire survey addressed to consumers, cost estimates also took into account the time of consumers' arrival at (and return from) ATMs, bank branches, post offices and other places of payment (about PLN 2.2 billion), which had a noticeable impact on the estimated unit costs. The average costs of card payments and credit transfers presented in Subchapter 4.5.1 and Annex 2 are comparable.

Index of Abbreviations

ABC	Activity Based Costing
B2B	Business-to-Business; type of transaction in which there are enterprises on both sides
C2B	Consumer-to-Business, type of transaction in which an individual customer purchases goods/services from an enterprise
CAPI	Computer Aided Personal Interview
CIT	Cash-In-Transit; cash transporting and handling companies
CNP	Card-Not-Present; payment card transactions executed without the physical presence of the card
CVV2/CVC2	Card Verification Value 2/ Card Verification Code 2; a 3-digit code recorded on a payment card to confirm transactions made without the physical presence of the card
DSP	NBP Payment Systems Department
ECB	European Central Bank
EBPP	Electronic Bill Presentment and Payment
GUS	Statistics Poland
HCE	Host Card Emulation; technology that enables secure storage of payment card data on the device, without the need of holding the so-called secure data storage element
IBAN	International Bank Account Number
MIPC	Market Infrastructure and Payments Committee; the Committee established within the European Central Bank
MPK	Cost Centre
NBP	Narodowy Bank Polski
NFC	Near Field Communications; short-range communication technology used, among others, to carry out card transactions built in a mobile phone using HCE or SIM-centric technology
P2P	Person-to-Person; type of transaction in which natural persons (consumers) are involved on both sides
PAD	Payment Accounts Directive; Directive 2014/92/EU of the European Parliament and of the Council of 23 July 2014 on the comparability of fees related to payment accounts, payment account switching and access to payment accounts with basic features
PIN	Personal Identification Number; a sequence of characters used to authenticate the action performed, e.g. a payment transaction

GDP	Gross Domestic Product
PSD2	Payment Services Directive 2; Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC
QR	Quick Response code; alphanumeric, two-dimensional, matrix, square graphic code
ROR	savings and settlement account
SIM-centric	technology for storing payment card data on a device, where card data are stored on a SIM card, which constitutes the so-called safe element
SORBNET2	a settlement system operated by NBP, used for interbank high value settlements
SWD	Statistical Data Warehouse; ECB Statistical Database
SWIFT	Society for Worldwide Interbank Financial Telecommunication
EU	European Union
ZRIF	Working Group on Interchange Fees; a group appointed by the NBP Payment System Council

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