

# Costs of Cash and Card Payments from a Consumer Perspective



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# Content

|                                                                         |    |
|-------------------------------------------------------------------------|----|
| Summary .....                                                           | 4  |
| Foreword .....                                                          | 6  |
| 1. Introduction .....                                                   | 9  |
| 2. Principles and literature .....                                      | 12 |
| 2.1. Definitions and cost concept .....                                 | 13 |
| 2.2. International comparison of the costs of payment instruments ..... | 15 |
| 3. Empirical Study for Germany .....                                    | 20 |
| 3.1. Motivation and study design .....                                  | 21 |
| 3.2. Data analysis and cost calculation .....                           | 22 |
| 3.2.1. Fees .....                                                       | 22 |
| 3.2.2. Financial loss .....                                             | 25 |
| 3.2.3. Time spent .....                                                 | 27 |
| 3.2.4. Data disclosure .....                                            | 31 |
| 3.3. Overall costs .....                                                | 34 |
| 3.4. Selected benefit aspects .....                                     | 37 |
| 4. Conclusion .....                                                     | 40 |
| Bibliography .....                                                      | 42 |

# SUMMARY

The costs of payment methods for consumers are difficult to determine, not recorded in a harmonised manner on an international level and consequently vary significantly from country to country. For this reason, a separate study is necessary for Germany. As part of a representative survey conducted in 2023, households were asked about the costs they incurred when using various means of payment. Financial costs were recorded, including fees for account management, ATM cash withdrawals or for payment cards, as well as the financial impact in the case of loss or fraud. Non-monetary costs in the form of the time required and the costs of data disclosure were also included. A comparison of the costs incurred for cash, debit cards and credit cards from the consumer perspective reveals a mixed picture. Cash incurs the lowest cost per transaction. However, looking at costs in relation to the transaction amount, debit card payments are cheaper than cash. Cards differ considerably: debit cards are significantly more cost-effective for consumers than credit cards in every respect. The findings indicate that from the consumer perspective in Germany, the costs of cash and that of the most cost-effective cashless alternative are similar. This means people in Germany can choose between paying in cash or by card depending on their preferences. The results of the survey also show that cash is the most popular means of payment and that the majority of consumers would not be prepared to stop withdrawing and using cash even if they were paid to do so. The study also provides an overview of the literature on cost studies at the consumer level. Specifically, the findings of existing work are compared and the main cost drivers identified.

# FOREWORD



Dear reader,

“Not everything that can be counted counts, and not everything that counts can be counted” is a well-known quote attributed to Albert Einstein.

Of course, each person has different ideas about what “counts” for them; in other words, what is important to them. The Bundesbank’s priorities are quite clear: as the guardian of the monetary system, it stands resolutely for a stable euro which people can also use to make convenient and affordable payments. Nowadays, people have a wide range of means of payment at their disposal: cash, cards or mobile payments via smartphone – to name but a few. Whilst each of these options can satisfy specific user needs, there is a cost involved.

But how high are these costs in each individual case? In order to answer this question, it is indeed necessary to “count”, i.e. to attempt to record, measure and quantify the various types of costs associated with each payment instrument. This is precisely what the present study sets out to do. It is the third and final module in the “Costs and Benefits of Cash and Cashless Payment Instruments” study series. Having addressed the overall economic costs of payment methods in the first module (Krüger and Seitz, 2014), and their benefits in the second module (Krüger and Seitz, 2017), the focus now turns to the cost of payments for consumers.

In this context, it is clear that determining the costs – and benefits – of individual payment instruments is anything but easy. Not all types of costs can be quantified as transparently



and unambiguously as the fees charged for cash withdrawals at ATMs. In the case of less apparent or hidden costs, it is difficult to differentiate and quantify them, for instance in the case of account management fees or the time spent dealing with means of payment. It becomes even more complicated when the costs of data disclosure are taken into account, for example, when making payments via online payment services. All of these factors make the object of the study demanding and challenging in terms of methodology. Nevertheless, I believe that the authors have successfully and convincingly navigated these challenges and produced a comprehensive and fitting picture of the costs of making payments – one which includes a number of eye-opening insights.

One of the reasons this study is so interesting is that it is based on figures collected after the COVID-19 pandemic. The payment behaviour of people in Germany underwent a significant change during the pandemic, shifting away from cash in favour of electronic and digital payment methods (Deutsche Bundesbank, 2024a). However, this study clearly illustrates that, in terms of overall costs, cash can certainly hold its own in relation to digital means of payment. In addition, there is strong support for cash among consumers in Germany. For a 47% majority of people in Germany, cash is their preferred way to pay.

The three authors of the study present their findings under their own names. The statements made do not necessarily reflect the position of the Bundesbank. We do, however, view the study as a valuable discussion contribution and I would like to take this opportunity to extend a warm thank you to the authors for their input. Despite the best efforts to be objective in the study, it is clear that the perceived costs and benefits of paying are individual and vary from person to person. Different aspects “count” for each and every one of us. In the Bundesbank and in the Eurosystem we are therefore explicitly committed to carrying on ensuring that there is freedom of choice when it comes to making payments so that everybody can pick for themselves exactly how they want to pay.

Frankfurt am Main, December 2024



**Burkhard Balz**

Member of the Executive Board of the Deutsche Bundesbank



# 1. INTRODUCTION

When it comes to the cost of payment instruments for consumers, many may initially think of fees, e.g. for bank accounts, cash withdrawals or payment cards. However, these are not the only costs incurred by households when using means of payment. For example, losses resulting from lost cash or payment card fraud also constitute costs. In addition, there are costs that cannot be converted into monetary units directly, such as the time spent going to an ATM, paying at the point of sale or verifying bank statements. While fees and time spent are usually already taken into account in the literature, there is another less frequently considered type of cost associated with payment transactions that is becoming increasingly relevant: costs for consumers in the form of data disclosure.

With tech companies, especially big techs, entering the payments space, business models based on the commercial use of customer data could become more prevalent. Tech companies often provide their services free of charge and make use of their customers' data, for example for personalised advertising. From the customer's point of view, these services are fee-free, but they also come with a cost: they are paying with their data. These costs have only rarely been considered to date, but are gaining in importance with advancing digitalisation. This study, in which people were asked about the fees incurred,<sup>1</sup> financial losses, time spent and data disclosure, thus provides a comprehensive picture of the costs of payment transactions from the consumer's perspective.

The results of cost studies are of interest to central banks for use as a basis for developing payment transaction strategies and to identify ways of increasing efficiency in payment transactions (Schmiedel et al., 2012). There are now a number of studies analysing the costs of payment instruments for individual sectors, the overall economy in Germany and other countries. To date, however, only a few studies have focused on the costs that consumers incur when using payment instruments. In addition, existing international findings can only be applied to Germany to a limited extent, given that national developments within the payment methods environment vary greatly (Krüger and Seitz, 2014). These disparities would suggest that national analyses of the costs of payment instruments are needed. Against this background, this third and final module in the "Costs and Benefits of Cash and Cashless Payment Instruments" series focuses on the costs incurred by households in Germany when using means of payment and analyses them within the scope of a separate survey for Germany.

In addition to costs, selected benefit aspects are also analysed. In particular, the study examines the value that people place on the use of cash. Innovative elements in the questionnaire are used to determine people's willingness to pay for payment transactions: for example, the amount of money consumers are prepared to pay in order to use cash. Taking benefit aspects into account helps to round out the findings on the costs of payment instruments.

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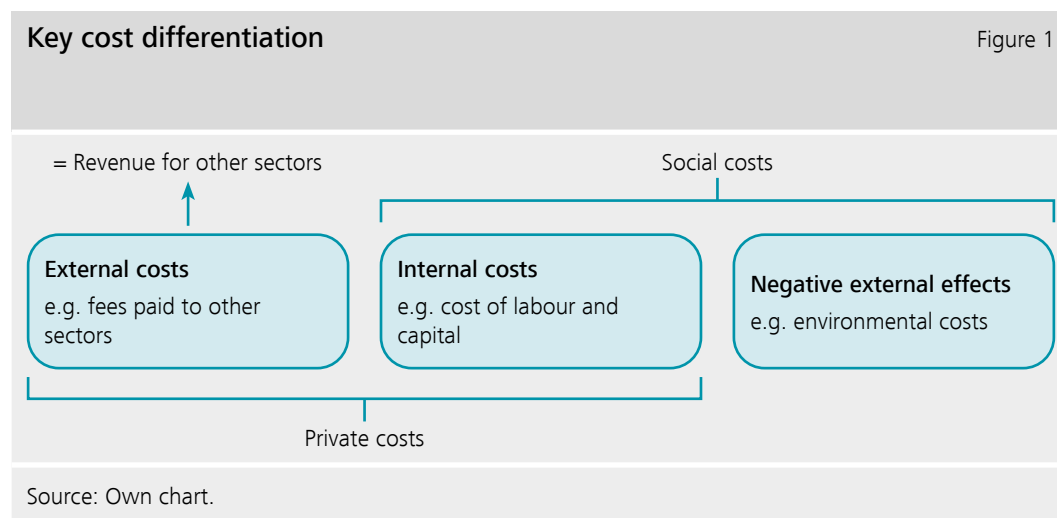
<sup>1</sup> The term "fees" is used here and in the following to refer to general charges for services and not legal fees as defined under public law.

The study is structured as follows: Chapter 2 presents the cost concept used, provides an overview of previous international and national studies on the costs of payment methods from a consumer perspective and discusses the challenges involved in determining consumer costs. Chapter 3 sets out the results of our own representative consumer survey. Chapter 4 summarises and concludes.

## 2. PRINCIPLES AND LITERATURE

## 2.1. Definitions and cost concept

There are various types of costs in payment transactions that can be distinguished from one another (see Figure 1). Social costs are made up of the internal costs of individual sectors (e.g. commercial banks, retail industry or households) and negative external effects. Internal costs – also referred to as resource costs – typically include the costs of labour and capital, while negative external effects include, for example, the impact that means of payment have on the environment. At the sector level, there are both internal and external costs, which comprise payments made to other sectors (e.g. fees). While they can be significant for individual sectors, they constitute revenue for other sectors and are therefore excluded from an overall economic perspective. External and internal costs together make up private costs. Since the present study focuses on directly attributable individual consumer costs, only private costs are considered in the following.



When looking at expenses related to means of payment, a distinction is made between monetary and non-monetary costs. Monetary costs comprise regular and special-purpose fees, such as bank charges, withdrawal fees and card fees. Any financial impact arising from the loss of a means of payment or fraud also constitutes a monetary cost. Non-monetary costs comprise, for example, time spent on obtaining cash from ATMs or verifying account statements. Table 1 provides an overview of the costs relevant to consumers when using cash, debit cards<sup>2</sup> and credit cards. These costs form the basis for our own empirical survey. However, Table 1 does not provide an exhaustive list of every conceivable cost from a consumer perspective. For instance, other monetary or non-monetary cost factors could emerge or become more relevant in the future.

<sup>2</sup> Debit cards are payment cards where an associated current account is debited immediately after payment (Deutsche Bundesbank, 2024a). The Girocard (previously known as the EC card), which is commonly used in Germany, is a debit card. For the purposes of this study, debit cards also include debit cards issued by other payment schemes, such as Visa Debit or Mastercard Debit.

**Costs of payments transactions from a consumer perspective**

Table 1

|                    |                                         | Cash           | Debit card     | Credit card    |
|--------------------|-----------------------------------------|----------------|----------------|----------------|
| Monetary costs     | Account fees                            | x <sup>1</sup> | x <sup>1</sup> | x <sup>1</sup> |
|                    | Card fees                               | x <sup>2</sup> | x              | x              |
|                    | ATM fees                                | x              |                |                |
|                    | Surcharge                               | x <sup>3</sup> | x <sup>3</sup> | x <sup>3</sup> |
|                    | Safety deposit box fees                 | x              |                |                |
|                    | Interest loss/opportunity cost          | x              | x              |                |
|                    | Theft/fraud                             | x              | x              | x              |
| Non-monetary costs | Payment duration                        | x              | x              | x              |
|                    | Time spent obtaining cash               | x              |                |                |
|                    | Checking statements                     |                | x              | x              |
|                    | Data disclosure/relinquishing anonymity |                | x              | x              |

**1** Nowadays, a current account is generally required in order to use a card and to withdraw cash. In this respect, it makes sense to allocate a share of the account fees to cash and card payments.

**2** Most cash users withdraw cash using a card (usually a debit card, and often a credit card when abroad).

**3** Surcharges on card payments subject to Regulation EU (2015/751) on interchange fees have been prohibited in the EU since 2018 under the provisions of the revised Payment Services Directive (PSD2). The recommendation of the European Commission (2010, p. 70, no. 4) stipulates that no surcharges should be applied to payments made with euro banknotes and coins. However, discounts on the basis of payment instrument are permitted.

In addition to the usual monetary and non-monetary costs – fees, financial loss and time spent – Table 1 includes another type of non-monetary cost not usually considered in the literature: the costs consumers incur by disclosing their personal data.<sup>3</sup> Amongst other things, costs such as these are incurred when companies collect customer data and use it for commercial purposes, for example for personalised advertising. This enables companies to offer their services at a reduced price or, in some cases, completely free of charge. In such cases, consumers “pay” through the disclosure of their personal data.<sup>4</sup> The increasing commercial use of customer data and the proliferation of related business models indicate that consumer data is now a key economic asset.

<sup>3</sup> According to a representative survey by the Bundesbank, 72 percent of respondents viewed payment data as one of the most sensitive data, with 29 percent considering it the most important data to protect from access by unknown persons, ranking it in first place (Deutsche Bundesbank, 2025).

<sup>4</sup> With the transposition of the EU Directive on digital content and services into German law (Sections 312(1a) and 32 (3) of the German Civil Code), this type of payment has been treated as equivalent to a monetary payment since 2022.

Within the differentiated cost concepts, a further distinction can be made between direct costs (directly attributable to a payment instrument) and indirect costs (not exclusively attributable to a payment instrument) (see, for example, Turján et al., 2011; Kosse et al., 2017; and Norges Bank, 2022). The former include, for example, the time spent on obtaining cash or fees charged when withdrawing cash. Debit card fees, by contrast, constitute indirect costs because they allow users to withdraw cash and also to make cashless payments. In the literature, indirect costs are usually allocated to the payment instruments under consideration by means of suitable allocation keys. Finally, the overall costs of the various payment instruments are compared using, e.g. costs per transaction and turnover unit (see Krüger and Seitz, 2014; Kosse et al., 2017).<sup>5</sup>

## 2.2. International comparison of the costs of payment instruments

There are now a considerable number of overall economic cost studies that examine multiple or all parties involved in the payment process.<sup>6</sup> In addition, there are analyses that focus only on individual stakeholders, primarily retailers and/or banks (e.g. Banco de Portugal, 2007; Guibourg and Segendorf, 2007; Cabinakova et al., 2019; Deichner et al., 2019), or that examine costs without netting them (e.g. Takala and Virén, 2008). Consumer costs, by contrast, have rarely been considered in the literature to date. Table 2 lists studies that do take these costs into account.

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<sup>5</sup> Krüger and Seitz (2014) contains a detailed discussion and critical classification of the indicators.

<sup>6</sup> For a representative view, see Humphrey et al. (2003), Banque Nationale de Belgique (2005), Brits and Winder (2005), PaySys (2006), Simes et al. (2006), Bergman et al. (2007), Carbo-Valverde et al. (2008), Schwartz et al. (2008), Gresvik and Haare (2009), Retail Banking Research (2010), Turján et al. (2011), Danmarks Nationalbank (2012), Segendorf and Jansson (2012), Ardizzi and Giucca (2012), Jonker (2013), Schmiedel et al. (2013), Norges Bank (2014), Stewart et al. (2014), Abele and Schäfer (2016), Kosse et al. (2017), Danish Payments Council (2018), Carbo-Valverde and Rodriguez-Fernandez (2019), Deák et al. (2022), Norges Bank (2022), Sveriges Riksbank (2023), and Trütsch et al. (2024). Summaries and evaluations of this extensive literature can be found in Koivuniemi and Kemppainen (2007), Shampine (2007, 2009), Hayashi and Keeton (2012), Krüger and Seitz (2014), Junius et al. (2022), and Sintonen and Takala (2022), amongst others.

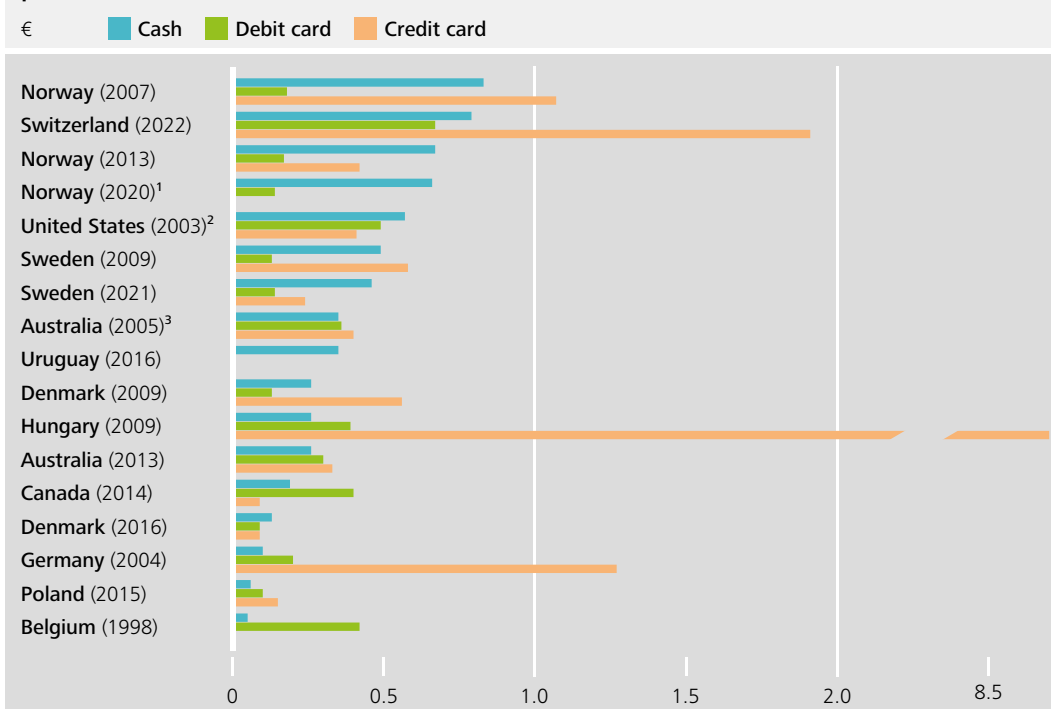


| Cost studies covering payment costs from a consumer perspective |                     |                                               | Table 2 |
|-----------------------------------------------------------------|---------------------|-----------------------------------------------|---------|
| Country                                                         | Study year          | Study                                         |         |
| Australia                                                       | 2013                | Stewart et al. (2014)                         |         |
| Australia                                                       | 2007                | Schwartz et al. (2008)                        |         |
| Australia                                                       | 2005                | Simes et al. (2006)                           |         |
| Belgium                                                         | 1998                | De Grauwe et al. (2000a, b)                   |         |
| Canada                                                          | 2014                | Kosse et al. (2017)                           |         |
| Denmark                                                         | 2016                | Danish Payments Council (2018)                |         |
| Denmark                                                         | 2009                | Danmarks Nationalbank (2012)                  |         |
| Germany                                                         | 2004                | PaySys (2006)                                 |         |
| Hungary                                                         | 2019                | Deák et al. (2022)                            |         |
| Hungary                                                         | 2009                | Turján et al. (2011)                          |         |
| Multi-country study                                             | 2017 (52 countries) | Carbo-Valverde and Rodriguez-Fernandez (2019) |         |
| Norway                                                          | 2020                | Norges Bank (2022)                            |         |
| Norway                                                          | 2013                | Norges Bank (2014)                            |         |
| Norway                                                          | 2007                | Gresvik and Haare (2009)                      |         |
| Poland                                                          | 2015                | Przenajkowska et al. (2019)                   |         |
| Sweden                                                          | 2021                | Sveriges Riksbank (2023)                      |         |
| Sweden                                                          | 2009                | Segendorf and Jansson (2012)                  |         |
| Switzerland                                                     | 2022                | Trütsch et al. (2024)                         |         |
| Uruguay                                                         | 2016                | Álvez et al. (2020)                           |         |
| United States                                                   | 2013                | Chakravorti and Mazzotta (2013)               |         |
| United States                                                   | 2003                | Garcia Swartz et al. (2004a, b)               |         |
| Source: Own compilation.                                        |                     |                                               |         |

Figure 2 shows the cost per transaction of different means of payment for consumers. There are marked differences between all of the payment instruments considered. Cash costs range from €0.05 to €0.83, debit card costs from €0.13 to €0.67, and credit card costs from €0.09 to just under €9. Also, no uniform picture can be drawn with regard to the relative costs of the three payment instruments. In some studies, cash is associated with the highest costs for consumers, whilst in others the three means of payment are roughly level pegging (e.g. Australia). Finally, there are also countries where cash is the cheapest option for households (e.g. Hungary and Poland).

## Comparing study results on the cost of payment instruments per transaction

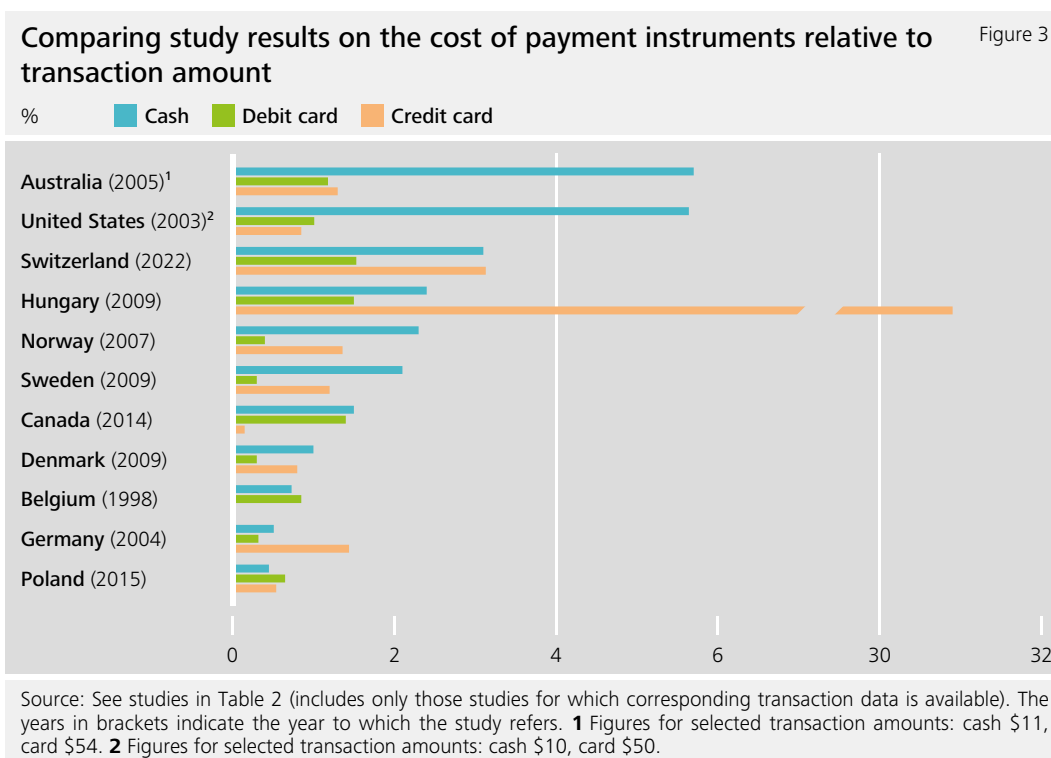
Figure 2



Source: See studies in Table 2 (includes only those studies for which corresponding transaction data is available). The years in brackets indicate the year to which the study refers. Conversion to € using the average exchange rate for the year studied. <sup>1</sup> Debit card value refers to cards overall. <sup>2</sup> Figures for selected transaction amounts: cash \$10, card \$50. <sup>3</sup> Figures for selected transaction amounts: cash \$11, card \$54.

Even if the costs are viewed in relation to the transaction amount, significant differences arise between countries and means of payment (see Figure 3). Costs range from 0.2% to 5.7% for cash, 0.3% to 1.5% for debit cards, and 0.2% to 30.9% for credit cards. The high figure of 30.9% for Hungary is, however, an outlier. The second-highest figure is just 3.1%. Besides level differences, this indicator exhibits differences in terms of the ranking of payment instruments as well. Cards are cheaper than cash in most countries. However, there are also some cases where cash is the least expensive means of payment (see Poland). The most significant differences are in the United States (2003), Australia (2005) and Norway (2007). The differences can be attributed, amongst other things, to the fixed cost element, which, when analysed on the basis of “costs as a percentage of the transaction value”, has a greater impact the lower the transaction values are. In particular, a lot of smaller amounts are paid in cash.<sup>7</sup>

<sup>7</sup> To exclude the effects of different transaction values, Garcia-Swartz et al. (2006a, 2006b) and Simes et al. (2006) apply predefined standard amounts.



To summarise, the results for both indicators differ significantly from study to study and country to country.<sup>8</sup> The varying results can be explained by, amongst other things, different national conditions. For example, the intensity with which means of payment are used has a major bearing on their cost in relation to the number and value of transactions. In addition, differences arise as a result of statutory provisions (such as with respect to surcharges or interchange fees) and competition on the payment markets. This means that making comparative statements at an international level is beset with considerable obstacles. Against this background, transferring the results of one study to other countries or extrapolating the results to a larger group of countries is not advisable (see also Hayashi and Keeton, 2012).

Differences with regard to the methodology applied in the studies are also likely to play an important role. For instance, the types of non-monetary costs taken into account are not standardised across countries. In addition, assigning a monetary value to time spent poses a key challenge when determining costs for consumers. For example, the study for Sweden by Segendorf and Jansson (2012) uses an inventory model approach to calculate the time cost of using cash for households. By applying a deposit interest rate of 0.27%, which was unusually low for the period, the time cost was just under SEK 20 million in 2009 (approx. €1.9 million). By contrast, in the study by Danmarks Nationalbank (2012), time costs are the key driver of costs for consumers. They amount to DKK 1.352 billion (approx. €182 million; 0.08% of GDP). These values were calculated by multiplying the

<sup>8</sup> Studies that also include the costs of other sectors come to a similar conclusion, see Krüger and Seitz (2014).

time spent on withdrawing money and waiting times at points of sale as reported by households in a survey by the average net hourly wage rate. In the Danish study, around 85% of the total costs incurred by households for cash and cashless payments are attributable to time costs. The monetary valuation of time spent can evidently have a major effect on the results. Given the importance of time cost, some estimates for consumers focus specifically on this cost (see e.g. Vallée, 2018; Visa, 2018).

Only two studies on costs which include consumers' payment costs have been carried out for Germany. A study by PaySys (2006) estimates the costs of cash and card payments (split into debit and credit cards) for the retail, commercial bank, central bank and household sectors on the basis of data compiled in 2004. The work focuses on costs in the form of time spent. On the consumer side, €0.07 is reckoned per transaction for cash and €0.19 per transaction for debit and credit cards. The second study containing estimates of the costs of cash and debit cards for consumers in Germany was conducted by Carbo-Valverde and Rodriguez-Fernandez (2019). This multi-country study determines the costs for retailers and households. Consumers incur costs of €0.25 per transaction for cash and €0.48 per transaction for debit cards.

The results of the two studies differ considerably. The disparities are partly based on the fact that different types of costs are analysed, indirect costs are allocated in different ways or different methods are applied to estimate fees and time spent. In the case of cash, it should also be noted that the indicators used by Carbo-Valverde and Rodriguez-Fernandez (2019) refer to an average ATM transaction, while PaySys calculates costs per transaction (including transactions between private individuals) and focuses on time spent. These disparities serve to highlight the fact that estimating costs is subject to a particularly high degree of uncertainty, especially when it comes to consumers.

# 3. EMPIRICAL STUDY FOR GERMANY

## 3.1. Motivation and study design

The market research institute Forsa was commissioned by the Bundesbank to carry out a representative survey to determine the costs incurred by consumers when using different means of payment. The survey encompassed a total of 2,001 German-speaking people aged 18 and over who had a current account. The survey was completed between 3 and 27 January 2023 using computer-assisted telephone interviews (CATIs). This means that the survey was carried out after the coronavirus pandemic. The respondents were selected on the basis of a combination of landline and mobile phone samples, with mobile phone connections accounting for 30% of the total. This implied that the sample also included households that could no longer be (primarily) contacted via a landline. The random selection of respondents in both sub-samples together with a design weighting, which adjusts for different selection probabilities and combines both samples, ensures that the overall sample is representative of the population. The calculations presented in the following are based on the weighted data.

The initial part of the survey covered general questions on the subject of payment transactions, such as the type of bank where respondents held their primary current account. These questions were intended to introduce them gradually to the topic of payment instruments. The subsequent blocks on the costs incurred by consumers when using means of payment made up the core of the survey. Each block covered a different cost category. The first blocks included questions on monetary costs such as account management fees and financial losses (for example, the theft of cash). This was followed by questions on the time spent on dealing with means of payment, such as checking account statements. The final block on costs addressed the topic of data disclosure and data protection. Finally, the respondents were asked to provide socio-economic information on themselves, such as their age, gender and income.

A number of questions also touched on the benefits of payment instruments or participants' willingness to pay for specific payment transaction services (such as for a notional current account with no possibility of withdrawing cash), and/or to accept amended conditions when using a given means of payment in return for remuneration (such as using a different instrument to the one preferred in exchange for payment). The questions on willingness to pay can be used to assess the advantages or disadvantages of a particular means of payment as compared to others. For example, "anonymity" is often cited as one of the advantages of paying in cash. However, as a rule, the value of this advantage is not known. The questions can also be used to analyse consumer sensitivity to changes in costs or financial incentives to use different means of payment.

The costs of three means of payment – cash, debit card and credit card – were calculated on the basis of the data from the survey and other selected surveys. First, these are the payment instruments most commonly used in stationary retail transactions in Germany. Second, cash, debit and credit card payments are also typically analysed in the literature. Mobile payment methods, which are becoming increasingly popular, usually involve an underlying payment card on file, meaning that they can be classed as debit or credit card payments and are part of the costs shown. Where payment cards are used for online payments, the corresponding costs are also taken into account. However, not all costs can be clearly allocated to a particular means of payment. Indirect costs like these are allocated using an allocation key. Given that costs are generally driven by both transactions and turnover, the mean value of a payment instrument's shares in terms of transactions and turnover is applied. The shares for 2023 used in this study are taken from the most recent Deutsche Bundesbank (2024a) survey on payment behaviour.

To enable a better comparison of the different means of payment, the costs calculated for cash, debit and credit cards are shown in relation to the number of transactions and the turnover. While the number and turnover of cashless payments are recorded officially (in payment transaction statistics or PaySys card market statistics, for example), this is not the case for cash payments. This means that the latter have to be estimated. Various methods can be applied for this purpose, each of which has its own advantages and disadvantages (see Schmiedel et al., 2013; Krüger and Seitz, 2014). As part of the study, the number of transactions and the turnover are extrapolated on the basis of data taken from the above mentioned Bundesbank survey of payment behaviour (Deutsche Bundesbank, 2024a).<sup>9</sup>

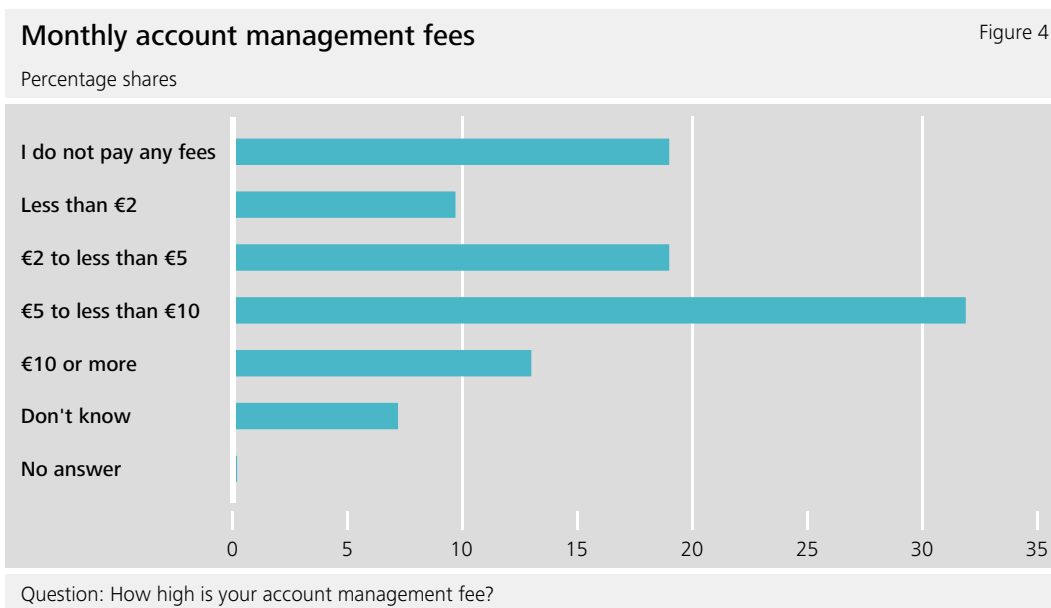
## **3.2. Data analysis and cost calculation**

### **3.2.1. Fees**

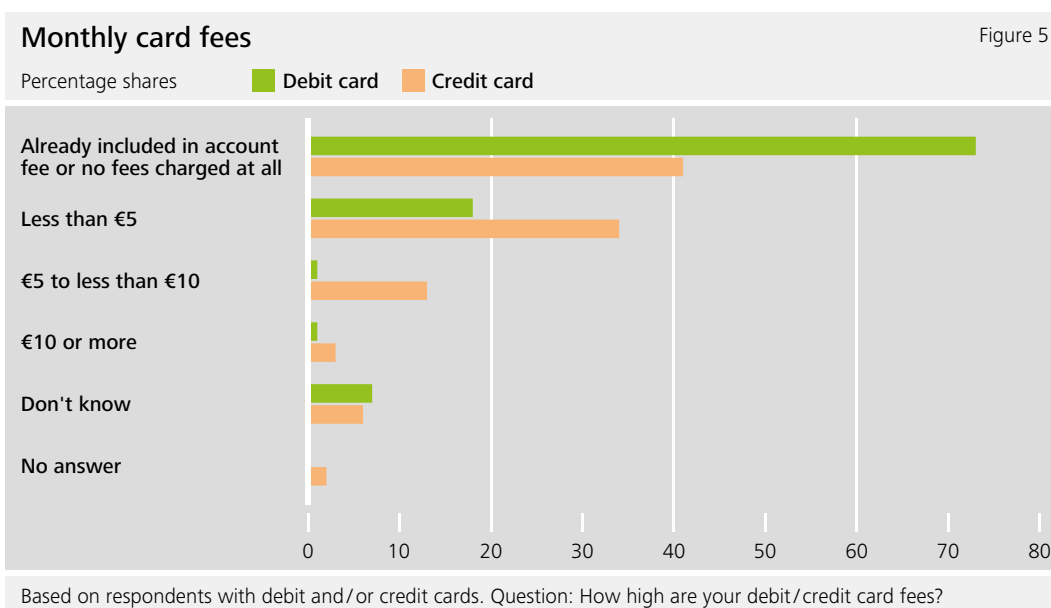
Fees are mainly incurred as account management fees, debit and credit card fees, withdrawal fees and safety deposit box fees. The basis for many of these costs in Germany is a current account. Around one-fifth of the respondents have a free current account, while four out of five pay account management fees. These are charged monthly in 60% of cases, quarterly in 30% and annually in 10%. To enable a comparison of account management fee levels, the figures for respondents who pay account fees quarterly and annually have been converted to monthly intervals. This results in the following rounded figures for all respondents: in a month, 20% of all respondents pay no fees, 10% less than €2, 20% between €2 and €5, 30% between €5 and €10, and 15% pay more than €10 (see Figure 4). The average monthly account management fee is €5.

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<sup>9</sup> Due to a lack of reliable data, the share of transactions and turnover accounted for by mobile payment methods is divided equally between debit and credit cards.



In addition to account fees, financial service providers sometimes also charge fees for payment cards. As a rule, all consumers have a debit card, and around half of them also have a credit card. Three out of four respondents stated that the fees for their debit card were already included in the account charges or that they did not pay any debit card fees at all (see Figure 5). This share is lower for credit cards: 40% of credit card users stated that their credit card fee was already included in their account fees. Where separate fees are incurred for a debit card, these average €2 per month. For respondents who pay additional fees for their credit card, these average just under €4.50 per month, which is more than twice as much as for debit cards.





Account management and card fees need to be allocated proportionately to cash, debit and credit cards within the cost calculation. For some of the respondents, the fees for debit and credit cards are “hidden” in their account management fees. The amount of these hidden fees is determined via the amounts stated by respondents for whom debit and credit cards are not included in the account management fees. In the case of debit card fees (both the separate fee and the share hidden in the account fees), it not only makes sense to allocate them to the debit card, but also proportionally to cash, because cash can often only be withdrawn using a card and in Germany a debit card is generally used for this purpose, if only because they are much more widespread.<sup>10</sup> In contrast to debit cards, credit cards offer additional features that are not directly related to cash payments (e.g. the granting of credit, widespread acceptance as a means of payment on the internet). Therefore, credit card fees are allocated solely to the credit card.

It does not make sense to include the remaining account fees in full. Current accounts provide access to other payment instruments such as credit transfers and direct debits as well as banking services such as loans or investment products. Only the part of the account fees that is directly attributable to cash, debit and, where applicable, credit card should be taken into account. Given that the exact amount of this share is unknown, 50% of the account fees that remain after the deduction of hidden card fees are assigned to cash, debit and credit cards on a proportional basis.<sup>11</sup>

Overall, the average costs in terms of account fees are €0.03 per cash transaction (0.14% of the transaction amount) and €0.05 per debit and credit card transaction (0.09% of the transaction amount in each case). In addition, there are card fees of €0.05 per cash transaction (0.21% of transaction amount), €0.07 per debit card transaction (0.14% of transaction amount) and €0.65 per credit card transaction (1.08% of transaction amount).

While fees have always been customary for account management and cards, in recent years financial service providers have started to charge fees for other financial services, such as cash withdrawals (see Tagesschau [German news programme], 2023). In this survey, one in four respondents stated that they had paid fees for withdrawing cash at least once in the past year (see Figure 6). In around 90% of these cases, the fees for the last fee-incurring withdrawal were less than €10 (less than €2: 5%, €2 to less than €5: 44%, €5 to less than €10: 40%). 5% were charged fees of more than €10 or could no longer remember the exact amount. The average frequency across all respondents (0.75 times) and the average amount of withdrawal fees for the last fee-incurring cash withdrawal (€4.62) result in average annual fees of €3.47 for cash withdrawals. This corresponds to €0.01 per cash transaction and 0.07% of the cash transaction value.

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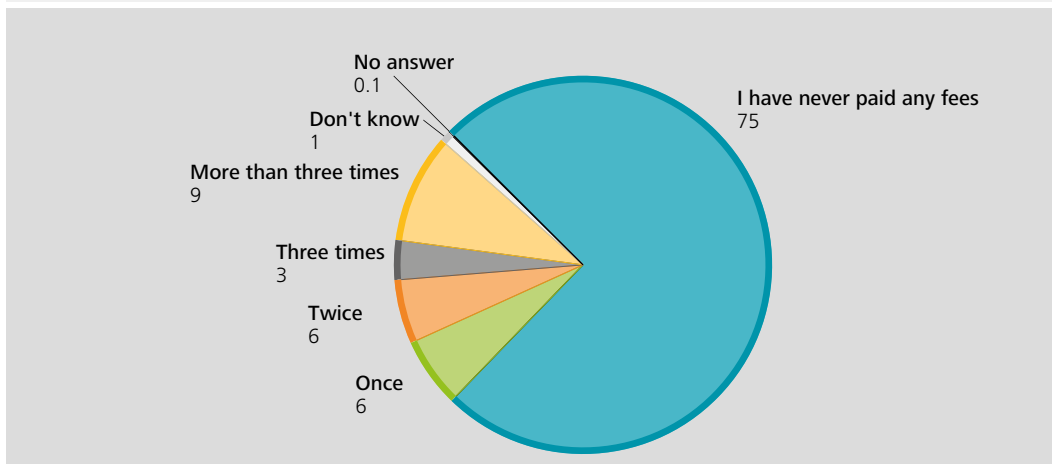
<sup>10</sup> Costs are allocated on the basis of the share of transactions and turnover at the point of sale. An alternative approach would be to determine cash's share of the costs based on the frequency or volume of withdrawals. In this approach, the cost of cash would be lower. However, for reasons of consistency and due to the focus on payments, the allocation is based on the proportion of total transactions and total turnover accounted for by the given means of payment.

<sup>11</sup> If, for example, 30% or 70% were applied, the total costs for payment cards would change by less than 5% in each case as compared to the 50% applied here.

## Frequency of charges for withdrawing cash

Figure 6

Percentage shares



Question: Thinking back to last year, how often did you actually pay fees when withdrawing cash in Germany?

Another fee relates to those for safety deposit boxes – for example, if they are rented from a bank to store large amounts of cash. On the whole, however, this applies to a small number of consumers only: 2% of respondents maintain a safety deposit box in which to mainly store cash. In around 80% of cases, the fee is less than €100 per year and amounts on average to around €60. Note, though, that safety deposit box fees constitute an expense relating purely to the storing of value. Given that this study focuses on the costs of using payment instruments to make payments, safety deposit box fees are not included in the calculation of total costs.

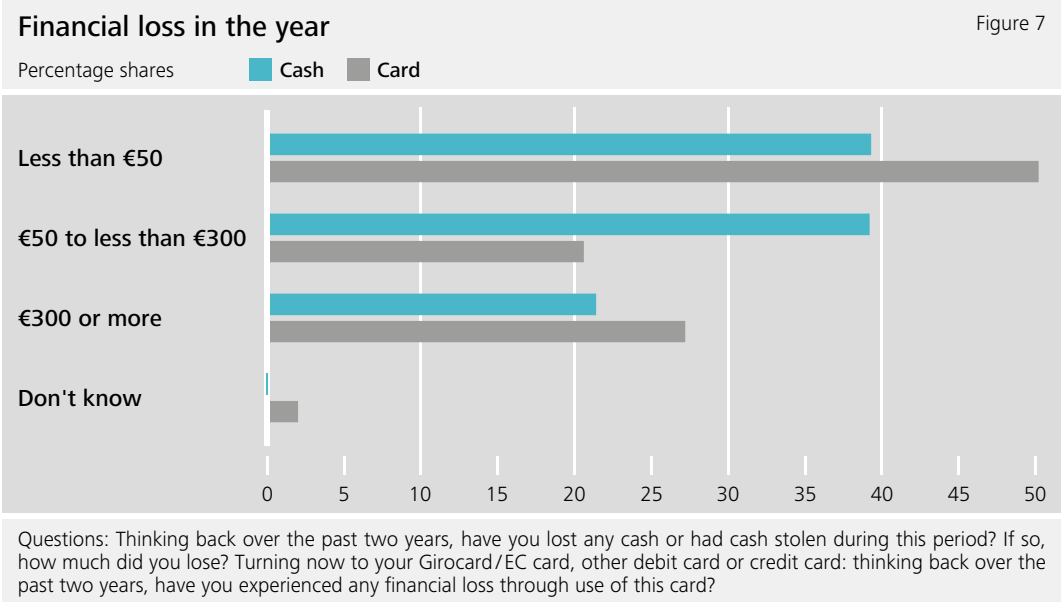
All in all, this results in fees of €0.09 per cash transaction, €0.12 per debit card transaction and €0.70 per credit card transaction. The costs as a percentage of the transaction amount are 0.42% for cash, 0.24% for debit cards and 1.17% for credit cards. While the fees for cash and debit cards are relatively close to each other, the fees for credit cards are noticeably higher. The relevance of fees is likely to have increased over time: two-thirds of respondents stated that fees have increased across all cash and cashless services in recent years. Approximately one-third stated that fees had remained the same and only 3% said that they had decreased. This suggests continuing to monitor the development of fees in the future.

### 3.2.2. Financial loss

Financial losses are another form of monetary costs that occur when dealing with payment instruments. These can be caused by theft or fraud, for example. 7% of respondents stated that they had lost cash or had cash stolen from them over the past two years. In the majority of cases, smaller amounts of less than €50 or moderate amounts of between €50 and €300 were involved (approx. 40% in each case, see Figure 7). The question intentionally covered the previous two years and not just the previous year, because although financial losses can be considerable, they usually do not occur very often. Calculated on

the basis of one year and all of the respondents, financial losses arising due to theft and the loss of cash averaged around €6.

The number of people who experienced financial losses when dealing with payment cards was also small: 8% had been victims of loss, theft and/or fraud in the last two years. In contrast to cash (banknotes and coins may, at best, be recovered), in the case of cashless payment instruments there is a chance that fraudulent payments, especially when made without authorisation, may be reimbursed by the card-issuing bank.<sup>12</sup> When asked about the amount they were not reimbursed, half of the respondents reported a financial loss of less than €50, and around one-quarter reported a loss of €300 or higher (again, see Figure 7).<sup>13</sup> For the sake of simplicity, no distinction was made at this point in the survey between debit and credit cards, which means that the losses apply to payment cards in general. The average financial loss for all respondents is €2.70 per year, which is less than half that for cash.



Whilst in most cases a loss of cash amounts to a financial loss, losing a card can involve a significant amount of stress and time. The card needs to be blocked, transactions have to be checked and, where necessary, a claim must be submitted. Therefore, it is not surprising that many card users who are affected by the loss of a card regard the time spent (25%) and their fears regarding the misuse of their personal data (29%) as a major nuisance (see Figure 8). Apart from the financial impact, which 45% of those affected considered to be the most annoying aspect, there are other costs that are difficult to quantify in monetary terms. For this reason, the following section looks at the financial impact only.

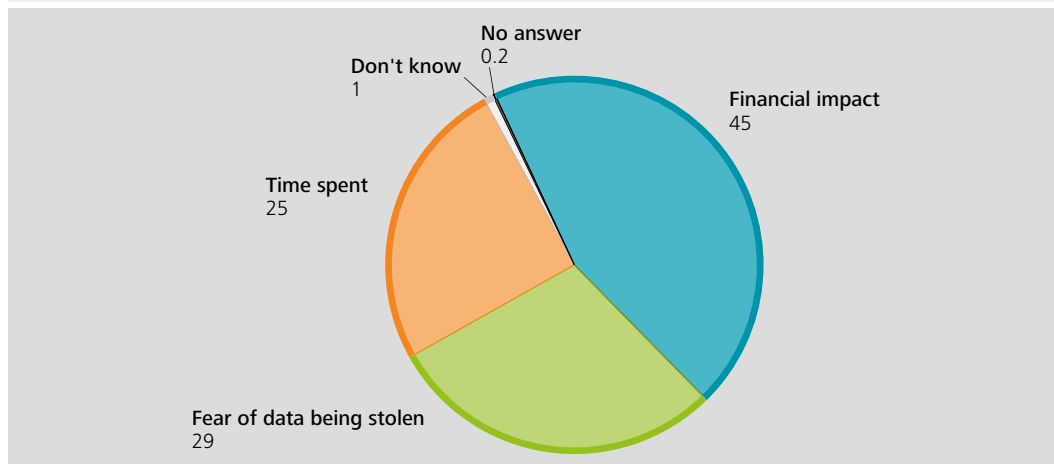
<sup>12</sup> The law offers consumers protection against unauthorised card payments: PSD2 limits the amount for which consumers are liable for losses incurred in payments if their card is lost, stolen or misappropriated to €50. However, there is an entire range of fraud that involves tricking people into authorising payments (see European Banking Authority, 2024). In cases such as these, there is no entitlement to a reimbursement.

<sup>13</sup> The respondents were not asked specifically about the cost of replacing payment cards in the event of loss or theft. Where respondents have not taken such costs into account, the costs incurred for payment cards as a result of loss/theft/fraud may be higher.

### Most annoying aspect of losing a card

Figure 8

Percentage shares



Question: What is or what would be the most annoying aspect for you if your payment card was lost or stolen?

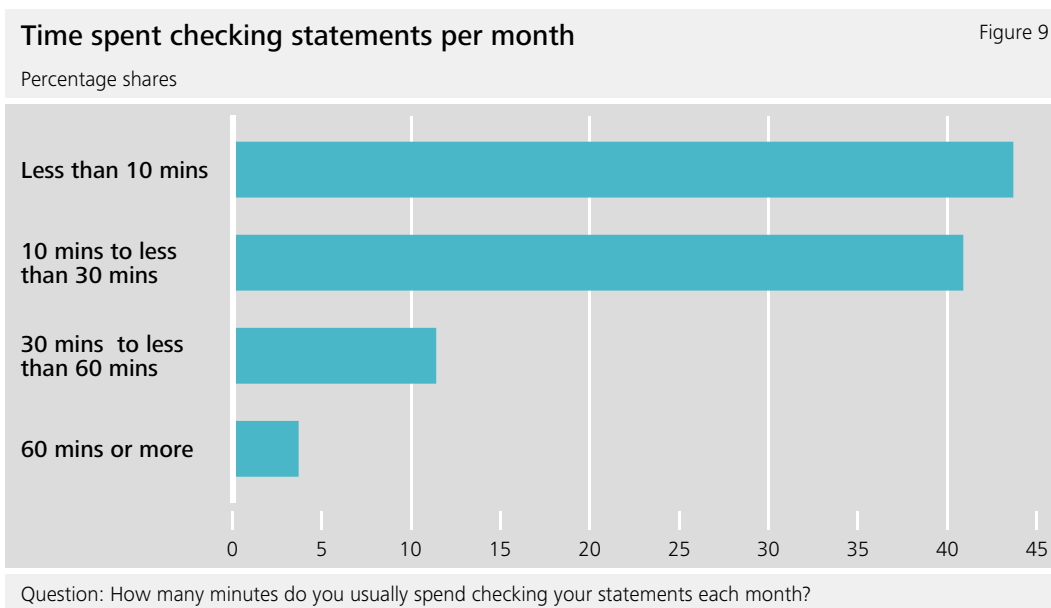
The loss recorded for payment cards is allocated to the debit and credit cards on the basis of transaction and turnover shares.<sup>14</sup> On the whole, the financial loss when using cash is €0.03, €0.01 for debit cards and an average of €0.02 per transaction for credit cards. The costs as a percentage of the transaction amount are 0.12% for cash and 0.03% each for debit and credit cards. Compared to the fees, this means that the financial impact is a relatively minor cost factor for both cash and payment cards.

#### 3.2.3. Time spent

Apart from fees and financial losses, the use of payment instruments also requires time to be spent on, for example, going to the ATM, paying at a point of sale or checking statements. By contrast to the two previous cost categories – fees and financial loss – time spent is a non-monetary cost.

One task that virtually all respondents complete is checking their bank account statements and, where applicable, credit card statements: 95% stated that they check their statements electronically and/or in print. Slightly more than 40% each spend less than 10 minutes or between 10 and 30 minutes on this every month, while 15% spend more than 30 minutes (see Figure 9). On the basis of the respective category midpoints and assuming that people who have selected the “60 minutes or more” category spend an average of 90 minutes on this task, people in Germany spend an average of around 20 minutes per month checking their statements.

<sup>14</sup> Internet fraud is presumed to account for a high percentage of all forms of card fraud. Therefore, it stands to reason that many cases of fraud are disproportionately related to credit cards. However, as the respondents were not explicitly asked if the loss was incurred through use of their debit or credit card, and due to the negligible overall share in the overall costs, credit cards are not given a higher weighting here.



In addition to cashless transactions, cash withdrawals and deposits are also recorded on account statements. Since the latter play a comparatively minor role in most cases, the time spent checking account statements is allocated to payment cards only. However, account statements do not only contain card transactions, but also credit transfers, direct debits and standing orders. Payment transaction statistics show that card payments account for slightly less than a third of cashless payments.<sup>15</sup> However, statistics also include transactions by companies, which is why the percentage of card payments shown on households' account statements is likely to be higher on average. In the absence of robust data, it is assumed that the total share of card transactions is 50%.<sup>16</sup> Since consumers are generally expected to check their statements for different payment cards at the same time – assuming they are available at all and listed separately – and the time spent checking transactions with a credit card is unlikely to differ significantly from those with a debit card, the question was not asked separately for debit and credit cards, and the same value was applied for both.

A further activity involving both payment cards and cash is paying at the checkout. The time required for this can be calculated using recent publications by the Bundesbank (Deutsche Bundesbank, 2023; Deutsche Bundesbank, 2024a). These show that a cash payment in stationary retail stores takes an average of 18.7 seconds and a card payment (including mobile payment methods) 20.1 seconds.<sup>17</sup> With a cash payment share of 51%

<sup>15</sup> In 2023, the number of card payments in Germany totalled 9.9 billion, while the number of credit transfers was 6.8 billion and direct debits 9.1 billion (Deutsche Bundesbank, 2024b).

<sup>16</sup> If, for example, 30% or 70% were applied, the total costs would change by less than 10% for payment cards compared to the 50% applied here.

<sup>17</sup> The fastest way for consumers to pay in German retail is via mobile payment methods (approx. 14 seconds). At around 15 seconds, card-based contactless payment is only especially fast when a PIN does not have to be entered. If an authentication via PIN or signature is required, the payment process takes noticeably longer (approx. 23 seconds), even in the case of contactless card payments. It takes a similar amount of time to pay by inserting a card (approx. 26 seconds). Contactless card payments now account for a much higher share than inserted card payments. Mobile payment methods are increasing markedly (Deutsche Bundesbank, 2024a). Consequently, the average payment time for cashless payment methods is on a downward trend.

and a card payment share (including mobile payment methods) of 39%, plus an average of 415 (cash and cashless) transactions per person per year, this works out at an annual time requirement of 1.2 hours for cash payments, 0.8 hours for debit card payments and 0.2 hours for credit card payments.<sup>18</sup> The comparatively higher time spent paying in cash per year stems from the fact that more transactions are carried out using cash than cards.

A representative study by the Bundesbank (Deutsche Bundesbank, 2022b) can be drawn on to determine the effort involved in obtaining cash. Consumers were asked about the extra time they spend on the outward and return journey, including the withdrawal process itself, and how often they withdraw cash per year. The study found that the average additional time required is 9 minutes per withdrawal. With an average of 27 withdrawals per year (Deutsche Bundesbank, 2024a), this works out at an average annual time requirement of around 4 hours per person.

Overall, the time spent per person and year is 5.3 hours for cash (obtaining cash: 4.1 hours, making payments: 1.2 hours), 2.2 hours for debit cards (checking statements: 1.4 hours, making payments: 0.8 hours) and 0.6 hours for credit cards (checking statements: 0.4 hours, making payments: 0.2 hours). To be able to compare the time spent on the various activities with the other cost categories, they need to be priced in monetary terms. This adds another level of uncertainty to the calculations. In the literature, a commonly used method is the time cost approach (see Approach 1). In this case, the time spent is valued at an hourly rate. This approach can also be applied to assess the three activities identified here. There is another possible approach when it comes to obtaining cash (see Approach 2). Both models have advantages and disadvantages, which are discussed in more detail below.

### **Approach 1: calculation of the time spent**

The first possible method for determining time spent in monetary terms is the time cost approach mentioned above. The amount of time spent is valued on the basis of the average net hourly wage in Germany (2023: €23.50; Federal Statistical Office, 2024) and is therefore regarded as an opportunity cost. One of the uncertainties entailed by this is that the level of hourly wages varies greatly for different people. In addition, not everyone will perceive the time they spend dealing with means of payment (in their spare time) as a burden that is equivalent to gainful employment and comparable to their own hourly wage. The time cost approach therefore results in relatively high costs. To account for this factor, in keeping with other studies, only 50% of the hourly wage is assumed below.<sup>19</sup> This approach leads to costs of €0.20 per cash transaction and 0.92% of the transaction amount when applied to the effort involved in obtaining cash.<sup>20</sup>

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<sup>18</sup> Payment times were measured exclusively in stationary retail, while the payment instrument shares also include online retail. In the absence of figures for online retail, it is assumed for the sake of simplicity that the payment times in online and stationary retail are identical. However, online payment times are generally likely to be longer because of the authentication procedures required.

<sup>19</sup> Trütsch et al. (2024), Sveriges Riksbank (2023) and Goldszmidt et al. (2020) assume 75%; many other studies assume 50% (see Kosse et al., 2017) or 100% (see Deák et al., 2022).

<sup>20</sup> If, for example, 75% were applied, the total costs would increase by approx. 35% for cash and by up to approx. 10% for payment cards compared to the 50% applied here.

## Approach 2: application of a cash-management model

An alternative approach applies the Baumol-Tobin model as a standard model to explain transaction demand (Baumol, 1952; Tobin, 1956). In this model, the number of cash withdrawals is a function of income, the opportunity cost of holding cash and the (fixed) cost of a cash withdrawal, from which the total cost of cash withdrawals can be derived. Compared to the time cost approach, this estimation method generally results in lower costs.

One of the challenges in applying this approach is determining the opportunity cost of holding cash. The traditional method is to apply a deposit interest rate. In addition to this traditional approach, debit interest and the risk of loss of cash are also considered here. For example, some cash users may have overdrawn their current account or become overdrawn as a result of another cash withdrawal. In such cases, a credit or overdraft interest rate constitutes the relevant opportunity cost. Consequently, the respondents were asked to state if they withdrew smaller amounts more frequently in order to avoid incurring interest on overdrafts. Approximately 10% of the respondents replied “yes”. These survey results can be used to estimate an opportunity cost rate for holding cash. Assuming an interest rate for short-term deposits (<1 year) as a representative credit interest rate and an interest rate for short-term loans to households as a representative debit interest rate, this results in a weighted average opportunity cost rate of 3.5% for 2023.

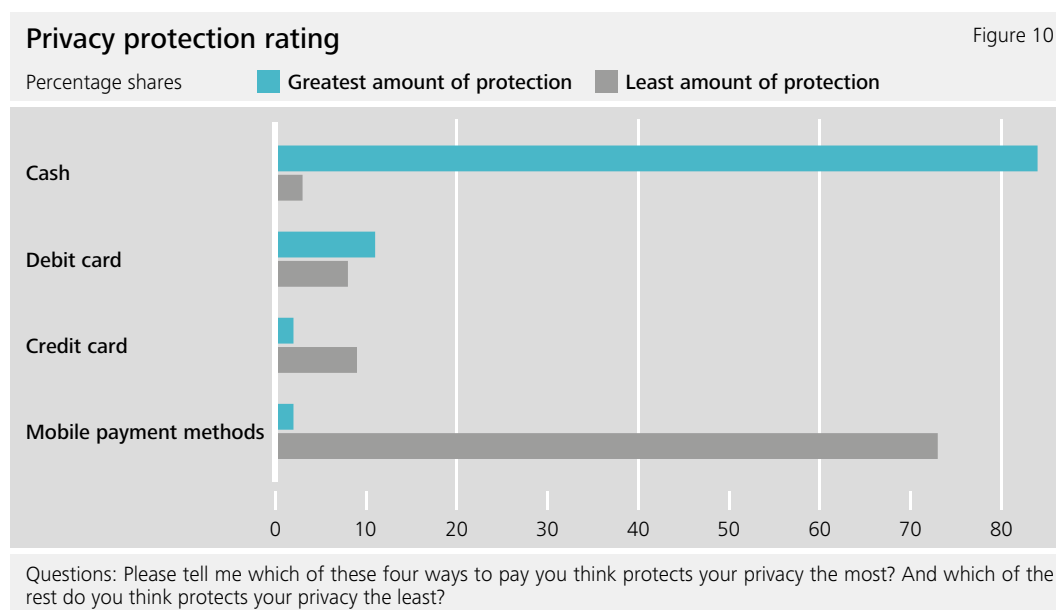
If a person holds cash, this not only entails a loss of interest when interest rates are positive, but also the risk of losing cash – be it through negligence or theft. When determining a suitable opportunity cost rate, this risk should be added to the amount of interest lost in the form of a risk premium. This risk premium will be determined as the ratio of lost cash to transaction balances. The responses to the question on cash losses over the previous two years show an average loss per person and year of around €6.10. The Bundesbank’s study on payment behaviour reveals that the average withdrawal amount is €253 and that consumers usually make their next withdrawal when they have around €44 left (Deutsche Bundesbank, 2024a). This results in average transaction balances of €170 and a loss rate of 3.6%. In total, this yields opportunity costs of 7.1%. The resulting estimated transaction cost of cash withdrawals is €0.33 per withdrawal or €9 per capita per year. This corresponds to around €0.04 per cash transaction and 0.17% of the transaction amount and – in line with expectations – substantially lower values than in Approach 1.

The question regarding the suitable conversion of time requirements into monetary units arises for all of the time requirements analysed here (checking statements, time spent on making payments and obtaining cash). Unlike the case of obtaining cash, no other estimation methods than the time cost approach are available for checking statements and for time spent on making payments; therefore, for the sake of consistency, only this method (Approach 1) is used in the following for the purposes of quantifying the time required in

monetary terms. This implies that the costs for the time spent are relatively high for all three means of payment. The resulting expenses are equivalent to €0.26 per transaction or 1.20% of the transaction amount for cash, €0.18 per transaction (0.36%) for debit cards and €0.19 (0.32%) for credit cards. This demonstrates that using cash is, on average, more time-consuming for consumers than using a card. However, applying the time cost approach does tend to overestimate the cost of cash.

### 3.2.4. Data disclosure

The disclosure of consumer data constitutes another category of non-monetary cost. Where data protection and means of payment are concerned, cash is generally regarded as offering a high level of privacy protection (Deutsche Bundesbank, 2022a). To enable a better assessment of how households rate data protection when using cash compared to other means of payment, the respondents in this survey were asked which payment instrument they think offers the greatest and the least amount of privacy protection. For just under 85% of respondents, cash offers the most protection, with around 10% citing debit cards and 2% citing credit cards and mobile payment methods, respectively (see Figure 10). When asked which means of payment afforded the least amount of privacy protection, around 75% stated mobile payment methods, approximately 10% stated credit cards, 8% debit cards and 3% cash.



The results demonstrate that the majority of consumers attribute the highest level of privacy protection to cash and the lowest to mobile payment methods. This is most likely due to the fact that, as a rule, cash payments do not leave any digital traces. Consequently, there are no costs in the form of data disclosure when using cash for transactions. Two approaches are presented in the following for assessing the costs of data disclosure when using cashless means of payment.



### Approach 1: indirect capture via willingness to pay

Respondents were asked how much they would be prepared to pay if they could have all the payment data that is collected when they use a card to make a purchase erased immediately. This line of questioning was carried out iteratively. All individuals were first asked whether they would be prepared to pay €3 to have the data that is collected when making a standard card payment erased. Those who were not prepared to do so were then asked if they would pay €1. Those who were not prepared to pay this price were then asked if they would be willing to pay €0.50. The willingness to pay for data to be erased is used as a measure of the harm caused by disclosing personal data.

Ultimately, around 42% of respondents would be prepared to pay €0.50 for an immediate erasure of this kind, 28% would also pay €1 and 12% would even pay €3 (see Table 3). The average amount for those who were willing to pay for this type of erasure was €1.43, and €0.60 or 1.21% of the transaction amount for all respondents. Based on the number of card transactions made in 2023 per capita and year (180 transactions), this would result in an estimated annual value of a little over €108 as the cost of disclosing personal data. That a large percentage of respondents were willing to pay to have the data generated during a card payment transaction erased indicates that data protection is important to consumers and that using cashless means of payment incurs a cost when data is disclosed.<sup>21</sup>

| Willingness to pay for data erasure                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                         |                  | Table 3 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------------------|---------|
| Amount suggested                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Share of individuals agreeing to amount | Cumulative share |         |
| €3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 12%                                     | 12%              |         |
| €1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 16%                                     | 28%              |         |
| €0.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 14%                                     | 42%              |         |
| <€0.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 58%                                     | 100%             |         |
| No answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0%                                      | 100%             |         |
| Questions: Imagine you are paying for a purchase by card. For every card transaction you execute, merchants and payment service providers usually store data about you, such as your account number, and the time and place of payment. Would you be prepared to pay €3 per purchase to have your data erased immediately? If not: would you be prepared to pay €1 per purchase to have your data erased? If not: would you be prepared to pay €0.50 per purchase to have your data erased? |                                         |                  |         |

<sup>21</sup> For reasons of simplicity, the respondents were only asked about their willingness to pay for the erasure of the data generated when using a standard payment card. It is conceivable that the willingness to pay and the associated cost of disclosing data may differ for debit and credit cards, cards and mobile payment methods, or between financial service providers. Different levels of willingness to pay to have data erased for different payment methods could, for example, be due to different data protection levels of the respective payment instruments or financial service providers.

## Approach 2: assessment of the benefits of data disclosure

A further approach to determining the cost of disclosing data is to analyse the benefits that companies ascribe to data disclosure. These benefits may represent an estimate of the value of the data/data trove. This can be done by examining loyalty programmes, whereby, in return for disclosing their data to the provider, consumers are granted discounts, rewards and/or cash payments, the amount of which may be an indication of how much providers are willing to pay consumers to disclose their personal payment data. The largest loyalty programme provider in Germany is Payback. As a basic rule, these providers credit their customers with a “Payback point” for every two euro that they spend.<sup>22</sup> Payback points can be redeemed for real goods, discounts or cash at a number of different companies. If a customer exchanges their Payback points for cash, the customer is credited €0.01 for each Payback point. It can thus be assumed that disclosing data is worth at least 0.5% of the turnover to the provider.<sup>23</sup> In the case of Payback, therefore, the cost of disclosing data from a consumer perspective amounts to 0.5% of their purchase.<sup>24</sup>

The business practices of the providers of such loyalty programmes cannot be fully transferred to the disclosure of data when using payment cards or digital payment methods because additional data may be collected when loyalty programmes are used, and as a rule, credit institutions do not necessarily make further commercial use of payment data. However, by comparison, tech companies, which are increasingly moving into the financial sector, may have a greater interest in processing such data. It should also be noted that the cost to consumers determined by this approach depends on the commercial benefit that the party receiving (and processing) the data ascribes to obtaining it. For this reason, information on the terms and conditions for Payback or other providers of loyalty programmes merely provides an approximation of what the cost of data disclosure might be.

Extrapolating the turnover figures cited in the Bundesbank’s most recent study on payment behaviour, consumer spending per capita amounted to around €19,840 in 2023 (Deutsche Bundesbank, 2024a).<sup>25</sup> Physical debit and credit cards and mobile payment methods together accounted for 39% of turnover. If one assumes that the cost of disclosing data is 0.5% of the transaction amount, as in the case of Payback, this would result in a cost of €0.26 per transaction for payment cards. Given that, as a rule, cash payments do not generate any digital traces or personal payment data, the cost of data disclosure for cash is set at €0.

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<sup>22</sup> This does not include potential promotional offers which let shoppers earn more points per euro.

<sup>23</sup> However, retailers also use Payback for customer retention purposes and may therefore be prepared to accept higher costs than the revenue associated with collecting data.

<sup>24</sup> It is assumed that the providers’ willingness to pay depends, amongst other things, on the intensity of data utilisation and/or the revenue that can be generated from it. If a great deal is offered, then utilisation is intensive - and thus also the restriction of privacy. With low utilisation, there is less restriction and a lower cost for consumers.

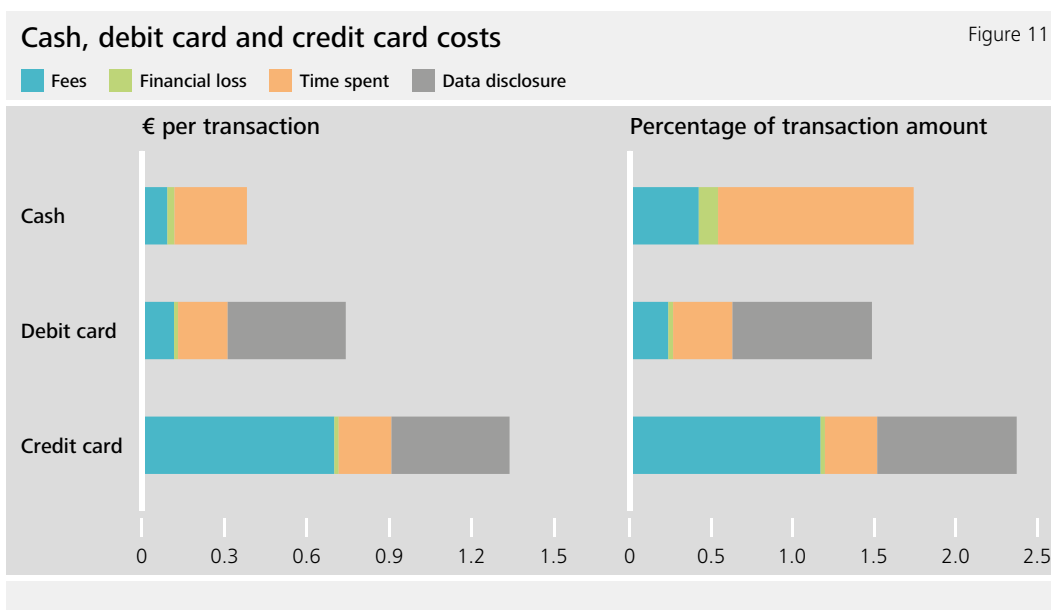
<sup>25</sup> The sample includes German-speaking people aged 18 and over.

Ultimately, the two approaches produce different results (Approach 1: €0.60 per card transaction; Approach 2: €0.26 per card transaction). Using the average of the two approaches, the cost would be €0.43 per card transaction or 0.86% of card turnover.

### **3.3. Overall costs**

Adding all of the cost categories together – fees, financial loss, time spent, data disclosure – the average absolute cost for consumers is €89.91 for cash, €102.59 for debit cards and €55.50 for credit cards per year. In order to make sensible comparisons of these costs, they have to be analysed per transaction or in relation to turnover (see Table 4, Figure 11). All in all, this results in a cost of €0.38 per cash transaction, €0.74 per debit card transaction and €1.34 per credit card transaction. Looked at in terms of turnover, costs work out at 1.74% of the transaction amount for cash payments, 1.49% for debit card payments and 2.38% for credit card payments.

| Costs of cash, debit cards and credit cards from a consumer perspective |                            |                   |                                  |                   |                                  |                   | Table 4                          |
|-------------------------------------------------------------------------|----------------------------|-------------------|----------------------------------|-------------------|----------------------------------|-------------------|----------------------------------|
|                                                                         |                            | Cash              |                                  | Debit card        |                                  | Credit card       |                                  |
|                                                                         |                            | € per transaction | Percentage of transaction amount | € per transaction | Percentage of transaction amount | € per transaction | Percentage of transaction amount |
| Fees                                                                    | Account fees               | 0.03              | 0.14%                            | 0.05              | 0.09%                            | 0.05              | 0.09%                            |
|                                                                         | Debit card fees            | 0.05              | 0.21%                            | 0.07              | 0.14%                            | 0.00              | 0.00%                            |
|                                                                         | Credit card fees           | 0.00              | 0.00%                            | 0.00              | 0.00%                            | 0.65              | 1.08%                            |
|                                                                         | Withdrawal fees            | 0.01              | 0.07%                            | 0.00              | 0.00%                            | 0.00              | 0.00%                            |
|                                                                         | Total                      | 0.09              | 0.42%                            | 0.12              | 0.24%                            | 0.70              | 1.17%                            |
| Financial loss                                                          | Theft/fraud                | 0.03              | 0.12%                            | 0.01              | 0.03%                            | 0.02              | 0.03%                            |
|                                                                         | Total                      | 0.03              | 0.12%                            | 0.01              | 0.03%                            | 0.02              | 0.03%                            |
| Time spent                                                              | Time required for ATM trip | 0.20              | 0.92%                            | 0.00              | 0.00%                            | 0.00              | 0.00%                            |
|                                                                         | Checking statements        | 0.00              | 0.00%                            | 0.11              | 0.23%                            | 0.13              | 0.21%                            |
|                                                                         | Payment times              | 0.06              | 0.28%                            | 0.07              | 0.13%                            | 0.07              | 0.11%                            |
|                                                                         | Total                      | 0.26              | 1.20%                            | 0.18              | 0.36%                            | 0.19              | 0.32%                            |
| Data disclosure                                                         | Privacy                    | 0.00              | 0.00%                            | 0.43              | 0.86%                            | 0.43              | 0.86%                            |
|                                                                         | Total                      | 0.00              | 0.00%                            | 0.43              | 0.86%                            | 0.43              | 0.86%                            |
| Overall total                                                           |                            | 0.38              | 1.74%                            | 0.74              | 1.49%                            | 1.34              | 2.38%                            |



This means that there is no clear order when it comes to the cost of the different ways to pay. For consumers, card payments are almost twice (debit card) or more than three times (credit card) as expensive per transaction as cash payments. However, viewed in relation to transaction amount, debit cards are less expensive than cash payments. Based on these two criteria, credit cards remain the most expensive for consumers. The different ranking of cash and debit cards is partly explained by differences in usage behaviour: the number of transactions is higher for cash than for cards, however, the transaction amounts are lower on average.

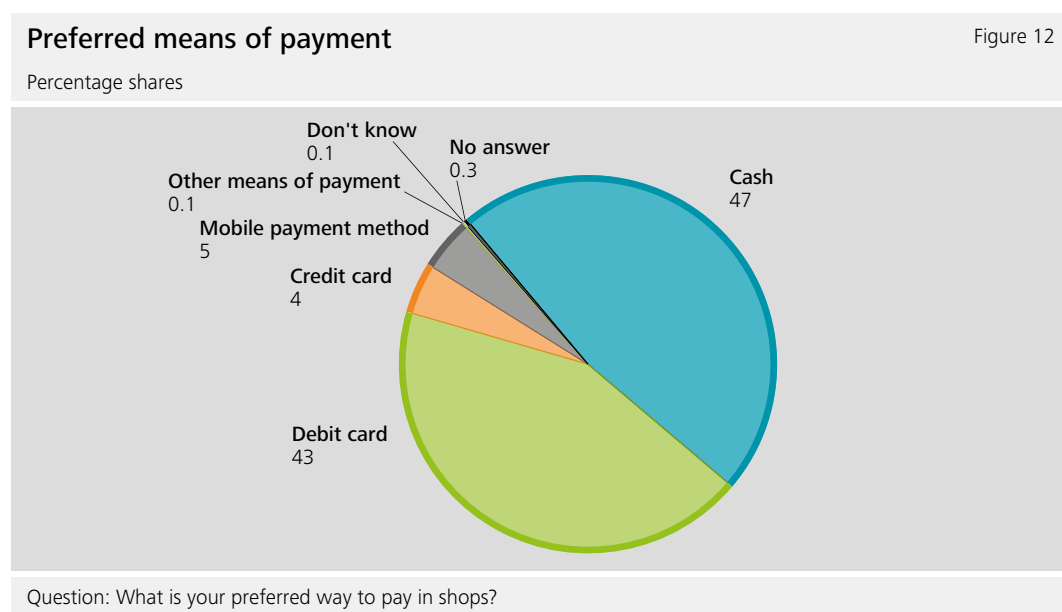
The cost calculations are based on reasonable assumptions. For example, different fees, such as account management fees, cannot be clearly allocated to a particular payment instrument and have to be consigned using allocation keys. An additional challenge with regard to the calculation of the costs is that the non-monetary expenses incurred in the form of time spent and data disclosure have to be priced in monetary terms and the results differ (in some cases significantly) depending on the calculation method used. The approach used in the study of applying average hourly wages for evaluation tends to produce relatively high costs. In addition, the cost calculations constitute average costs. Depending on the account model, payment behaviour, individual perception of the time required and data disclosure, the costs may vary substantially from one consumer to another.

Compared to the findings of other country studies (see Chapter 2.2), the costs determined in this study are in the upper range for both cash and card payments. This is primarily due to the more detailed incorporation of the cost of time spent, the application of the time cost approach and the inclusion of data disclosure. However, if relevant cost categories are left out, the cost incurred by households in dealing with payment instruments is underestimated.

### 3.4. Selected benefit aspects

The use and perception of means of payment are not only based on their costs, but also their benefits. In order to obtain an impression of how consumers rate different payment instruments as a whole, the respondents were initially asked about their preferred means of payment. At 47%, almost half of those surveyed prefer to pay in shops using cash, 43% with a debit card, 5% via mobile payment methods (such as smartphones or smartwatches) and 4% with a credit card (see Figure 12). This strong preference for cash is unexpected, given that, during the pandemic, the popularity of cash payments dropped even further than their already downward trend (see Deutsche Bundesbank, 2022a). The finding is in line with recent surveys, though, which showed that 42% of respondents prefer to pay with cash (Utimaco, 2023; Handelsverband Deutschland, 2024). However, if the cashless payment instruments analysed (debit card, credit card and mobile payment methods) are considered together, approximately 53% of respondents prefer cashless payments.

Differences emerge when these results are compared with those in the study on payment behaviour conducted by the Bundesbank (Deutsche Bundesbank, 2024a). According to that study, 28% prefer to pay in cash, 44% by card and 28% have no clear preference. Thus, fewer people stated that cash was their preferred means of payment. However, there is a significant difference in the design of the question. In the survey conducted for this study, there was no “no preference” option provided: respondents had to choose a payment method or decline to answer (“don’t know/no answer”). Therefore, a possible explanation for the differences in the two results is that although many consumers do not have a clear preferred means of payment, the majority of those who were undecided would, if in doubt, opt for cash.



To further quantify the benefits of cash, respondents were asked if they would be willing to opt for a bank account without a cash withdrawal option if their bank were to reimburse them with a certain amount of money each month. This means that a current account of this kind could only be used for cashless payment transactions – it would not be possible to withdraw or deposit cash. The result demonstrates that even if they were reimbursed up to €20 per month, the majority (72%) would not be interested in this kind of account (see Table 5). Even for the 72% of those surveyed who would not be interested in a cashless current account if they were paid €20 a month, there is surely a payment they would be willing to accept for this kind of account. However, this amount is unknown. If the average for this group was set at €30, this would result in an average of around €25 per month for the respondents overall. Extrapolated to an annualised value, this would amount to around €300. From the consumer perspective, the benefits of cash obviously outweigh the costs associated with it. This demonstrates how highly consumers value access to and the existence of cash.

| Bank account without cash withdrawal option                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                  | Table 5 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------------------|---------|
| Amount suggested                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Percentage of those in favour | Cumulative share |         |
| €1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 7%                            | 7%               |         |
| €5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 6%                            | 13%              |         |
| €20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 14%                           | 27%              |         |
| >€20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 72%                           | 99%              |         |
| No answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1%                            | 100%             |         |
| Interpretation: 6% of respondents would not accept this kind of account in exchange for €1 per month, but would accept it in exchange for €5 per month.<br>Questions: Imagine your bank were to pay you €1 every month, but in exchange for this you would no longer be able to withdraw cash from your account. Would you be willing to opt for an account that did not include the possibility to withdraw cash under these conditions? If not: what if the bank paid you €5 a month? Would you then be willing to opt for an account that did not include the possibility to withdraw cash? If not: what if the bank paid you €20 a month? Would you then be willing to opt for an account that did not include the possibility to withdraw cash? |                               |                  |         |

In a further question, respondents were asked to imagine that they were about to pay €50 in cash in a shop and were offered a discount if they switched to paying by card. Discounts were given in an ascending order: €0.50, €1 and €3. The responses indicate that even with a price reduction of €0.50, around half of those surveyed would be willing to pay by card instead of cash (see Table 6). However, 26% stated that they would not refrain from paying in cash even if they were offered a discount of €3, which is as much as 6% of the purchase amount. Calculating an average amount requires assumptions as to the price discount at which those respondents who would still be willing to pay by cash even if offered €3 would ultimately be prepared to switch to cards. Assuming an average amount of €5 for this group, this would result in an average value of around €2 per transaction for all respondents. This corresponds to 4% of the purchase amount.

## Switching to card payment in exchange for a discount

Table 6

| Amount suggested | Percentage of those in favour | Cumulative share |
|------------------|-------------------------------|------------------|
| €0.5             | 55%                           | 55%              |
| €1               | 7%                            | 62%              |
| €3               | 11%                           | 73%              |
| >€3              | 26%                           | 99%              |
| No answer        | 1%                            | 100%             |

Interpretation: While 7% of respondents would not switch to a card payment for a price reduction of €0.50, they would do so if the price reduction was €1.

Questions: Assume you are in a shop and are about to pay €50 in cash. The shop assistant offers you a 50 cent discount if you pay by card. Would you pay by card? If not: if you were to be given a discount of €1, would you pay by card then? If not: if you were to be given a discount of €3, would you pay by card then?

Overall, it is obvious that a sizeable percentage of consumers would not be prepared to stop using cash, even if they were offered relatively high compensation payments, and/or are very willing to pay to use cash. Therefore, it seems that cash is regarded as highly important.



## 4. CONCLUSION

This study determined the costs of cash and cashless means of payment for consumers in Germany. Ultimately, there is no clear ranking of the different costs. The cost per transaction of €0.38 for cash is lower than the €0.74 for debit card payments. However, considering the cost in relation to the transaction amount, debit cards (1.49%) are cheaper than cash (1.74%). At €1.34 and 2.38% respectively, credit card payments are more expensive in both cases.

The costs calculated here are relatively high when compared to previous studies. However, this study included a wide range of costs that have not been taken into account to date. This applies in particular to the more detailed capture of time spent (which is relatively high for cash) and the cost of data disclosure (of relevance for cashless means of payment). Thus, in determining the various costs, the study broke new ground in several respects. "Paying with personal data" is analysed for the first time. Therefore, this study differs from others in that it encompasses a number of new issues and aspects that are suited to a holistic assessment of the cost of cash and cashless means of payment from a consumer perspective. The comparatively high costs of disclosing data in the case of cashless means of payment reinforce the Eurosystem's endeavours to provide consumers with a digital euro that minimises the use of their data as far as possible.

The analyses of the costs are complemented by selected benefit aspects: how much is it worth to people to be able to use cash? It has shown that having access to cash continues to be one of the main reasons for having a current account. Consumers would only be willing to stop using cash in return for significant compensation. The results also suggest that consumers attach great value to the option to use cash. In fact, the survey demonstrates that cash is the most popular way to pay in Germany.

Overall, the results show that consumers in Germany can pay with both cash and debit cards at similarly favourable rates. Today, the consumer's freedom to choose between cash and cashless payments is not restricted by what they cost. Indeed, people in Germany can decide between cash or cashless payment according to their own preferences. However, this freedom of choice cannot be taken for granted in the future. This is due to the fact that households have reported a significant increase in fees over recent years. Costs in the form of time spent, which are by far the single largest cost item in the case of cash, also need to be monitored. The growing reduction in the number of cash withdrawal options in recent years may result in higher costs for cash in the future, thus making it harder to use. A functioning cash infrastructure needs to be kept in place in order to prevent the cost of cash from increasing continuously from a consumer perspective, and to ensure that freedom of choice is maintained.

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