

# Time is Money: A Survey of the Social Cost of Payment Instruments\*

Vivien Deák – László Kajdi – István Nemeckó – Tamás Végső

*The number of payment transactions in Hungary has increased by almost one and a half times over ten years. The use of electronic payment instruments has grown dynamically, while only a moderate increase in cash use was observed. The analysis shows the evolution of the payments market and quantifies the social costs attached to the use of payment instruments. The value of the latter was HUF 832 billion in 2019, representing real growth of 20 per cent over 10 years, mainly due to the costs of developing the acquiring infrastructure and the significant increase in the number of transactions. The real cost per transaction has fallen by 10 per cent for cash, by one half for cards and by one sixth for credit transfers, reflecting the improved efficiency. As electronic payment is now available in most retail payment situations, the cost per transaction is expected to decrease further in the coming years as volume increases.*

**Journal of Economic Literature (JEL) codes:** E42, D12, D23, D24

**Keywords:** payments, payment instrument, social cost, unit cost

## 1. Introduction

As the payments market continues to evolve, an increasingly sophisticated and wide range of options is available for choosing the preferred payment method and instrument in each payment situation. With the improvement of the user experience, it is now possible to shop, pay bills and even transfer money in a few seconds, quickly and conveniently from home. A wallet for shopping is not even needed, as it is now possible to pay with a smartphone or smartwatch, in addition to cash and payment card. According to *Deák et al. (2021a)*, more than half of the population is happy to use electronic payment instruments, while one third would

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only pay electronically if they had the option. This means that it is important to have at least one electronic payment instrument available in addition to cash in all payment situations. *Ilyés – Varga (2016)* came to the conclusion that by supporting and accelerating the continuous efficiency improvement of the payments market, the performance and competitiveness of the economy as a whole can be improved, and thus it is important to periodically review whether and how much efficiency gains are generated at the societal level by the increasing use of cashless payment methods. In essence, electronic payment instruments contribute to efficiency gains by sparing the resources needed to carry out financial transactions. This can be manifested in time savings (e.g. online instead of physical shopping), the introduction of previously unavailable operations (instant payment even on weekends) or the provision of an existing service in a better quality or at a lower cost, while the automation of electronic payment instruments and the reduction of manual processes have a positive impact on the operational efficiency of corporates. In 2020 and 2021, ten years after the previous survey, the central bank of Hungary (Magyar Nemzeti Bank, MNB) conducted a comprehensive questionnaire survey with different actors in the payment chain to study the social costs of payment methods, based on the pan-European methodology developed by the European Central Bank (ECB).

Our analysis uses data collected from the main actors in the payment chain to quantify the social costs associated with each payment instrument, i.e. the total resource inputs (time, assets, fees paid outside the sectors surveyed excluding the fees for payment services) required to use each payment method. We also look at how costs and the efficiency of payment instruments have changed in the decade since the previous survey, and as a result of what factors. All of these results can serve as a basis for developing further measures to reduce social costs, so that the development of the payment market can generate savings at the social level, also making the economy more efficient as a whole.

The structure of the paper is as follows: in *Section 2* we review the results of the main studies published so far on this topic, and in *Section 3* we present the main trends in the payments market and changes in the use of payment instruments between 2009 and 2019–2020. We also look at the changes in transaction numbers, infrastructure, payment process efficiency and consumer habits. In *Section 4*, we describe the methodology of our analysis in detail, while in *Section 5* we examine the changes in the social cost of payment instruments and the reasons for such. We show how the social cost of the different payment instruments evolves, net of the effects of significant wage growth and inflation, and we also discuss the evolution of unit costs per transaction.

## 2. Overview of the literature

The assessment of the social costs of payment instruments started in some European countries as early as after the turn of the millennium: the costs of cash, cards and e-wallets for 2002–2003 were analysed in Sweden (*Bergman et al. 2007*), the Netherlands (*Brits – Winder 2005*) and Belgium (*NBB 2006*). In all three countries, the main conclusion was that replacing cash transactions with electronic instruments would lead to cost savings at the social level. This is mainly due to the fact that cash payments have a high proportion of variable costs, while electronic payments are dominated by fixed costs, and thus the cost increase of additional transactions is negligible. For several decades, the Norwegian central bank has also regularly analysed the evolution of the social costs of payment instruments, and after 1988, 1994, 2001 and 2007 (*Gresvik – Haare 2009a, 2009b*), it analysed the issue for 2013, too. Between 2007 and 2013, the costs compared to GDP and the unit costs both continued to fall in Norway's already efficient payment system (*Norges Bank 2014*), with the banks incurring the largest share of the costs. The unit cost of card payments was lower than that of cash, with maintenance of the cash infrastructure as the most significant cost factor.

The first comprehensive European study on the subject was published in 2012 (*Schmiedel et al. 2012*), in which the ECB – in cooperation with the central banks of thirteen European countries<sup>1</sup> (including the MNB, cf. *Turján et al. 2011*) – examined the social costs of payments. For each sector, a similar conclusion was reached as in the Norwegian central bank study: the cost items related to banks and financial infrastructure accounted for a share of around 50 per cent (in the interests of comparability, however, the household surveys that were conducted by only a few central banks were excluded). The ratio of social costs to GDP was close to 1 per cent on average in Europe, but with relatively high differences between countries (0.42–1.35). Consistent with previous research, unit costs have typically been lowest for cash, but this is mainly due to the high number of transactions and the high proportion of variable costs.

Approximately a decade after the first European survey, many central banks, such as the MNB, decided to repeat the survey, but the focus of the new surveys was quite different regarding the sectors or payment instruments covered. For example, the Austrian survey (*Abele – Schäfer 2016*) only looked at cash and card payment instruments, while the Italian (*Banca d'Italia 2020*) and Finnish (*Sintonen – Takala 2022*) studies did not analyse the costs of the household sector. A significant difference of the Dutch (*Marwijk et al. 2018*) and German (*Cabinakova et al. 2017*) studies is that they basically tallied private rather than social costs. Nevertheless,

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<sup>1</sup> Denmark, Estonia, Finland, Greece, Hungary, Ireland, Italy, Latvia, the Netherlands, Portugal, Romania, Spain, Sweden, Portugal, Portugal, Romania, Spain, Sweden.

general conclusions can also be drawn from the recent surveys: in the countries where a comparison with the 2009 data is possible – such as the Italian study already mentioned as well as the Danish (*DPC 2018a; 2018b; 2018c; 2019a; 2019b; 2019c*), the Polish (*Przenajkowska et al. 2019; 2020*) and Portugal (*Banco do Portugal 2019*) studies – there was a decrease in both the social costs relative to the GDP and the unit costs. In line with previous research, this can be traced back largely to the increasing use of electronic payment instruments and their different cost structure compared to cash.

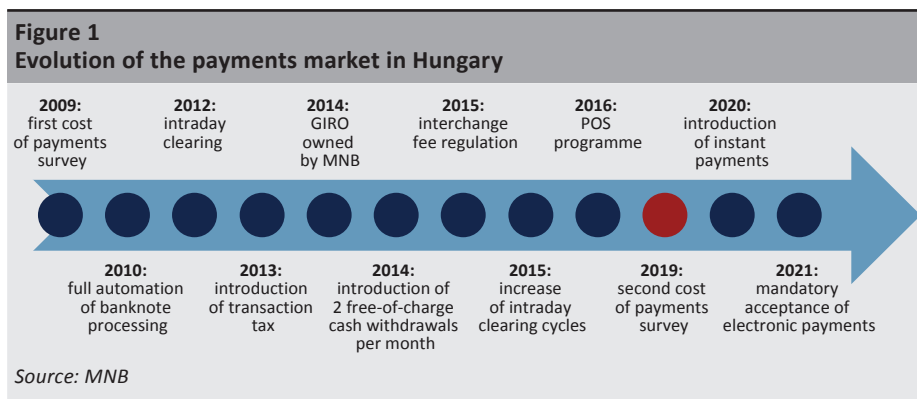
International experience also confirms that the (unit) costs of individual payment instruments are significantly influenced by their usage rate through variable costs. Thus, for a proper interpretation of the domestic data, it may also be useful to take into account the results of the MNB's household survey (*Deák et al. 2021a*). Hungary is clearly one of the most cash-oriented nations in the European Union, while at the same time an important difference is that the proportion of people with regular cash income is more than double the euro area average (23 per cent versus 11 per cent, respectively). The difference is even larger in terms of cash withdrawal habits, where Hungarian residents make cash withdrawals quite infrequently by international standards, but occasionally in very large amounts, more than double the euro area average in nominal terms. This phenomenon may also have a significant impact on the cost of cash withdrawals for economic agents.

As cash-related costs remain the most significant according to most social cost surveys, improvements in cash infrastructure may be particularly important. Recently, the Dutch central bank commissioned a comprehensive analysis on the future of the local cash infrastructure (*McKinsey 2021*), which also investigated the costs of cash use for each actor. Their findings, based on industry surveys, show that between 2012 and 2019 the social costs of cash fell by around 20 per cent, but as transaction numbers fell even more, unit costs rose, with a cash transaction in 2019 being more than twice as expensive as a card payment. A significant part of the costs, around 45 per cent, is related to the acceptance of cash payments.

### **3. Evolution of the payments market**

Over the past decade, payments became more efficient regarding both cash and electronic solutions. This is described in the next section. First, we look at the change in the number of individual payment instruments, i.e. cash, card, credit transfer, direct debit and postal inpayment money orders (“yellow cheques”), followed by the main infrastructure changes, measures to increase efficiency and major investments that have had an impact on changing consumer behaviour between 2009 and 2019 (*Figure 1*). The development of payments is continuous, and since

the survey period (2019) there have been several major infrastructure investments, such as the introduction of instant payments. These are also mentioned in our study because of their importance, but their impact on costs cannot be quantified due to the timing of the data collection in 2019, as they are typically large, one-off costs. However, they may significantly increase the use of payment instruments (the number of individual transactions) in the coming years. That is, it would be a substantial distortion to include cost factors whose effects on payment patterns were not yet apparent at the time of the survey. In addition to major payment measures, payment habits may also be influenced by the strong growth in internet coverage, with the share of internet users using the internet within 3 months increasing by 37 percentage points over the period examined.<sup>2</sup>



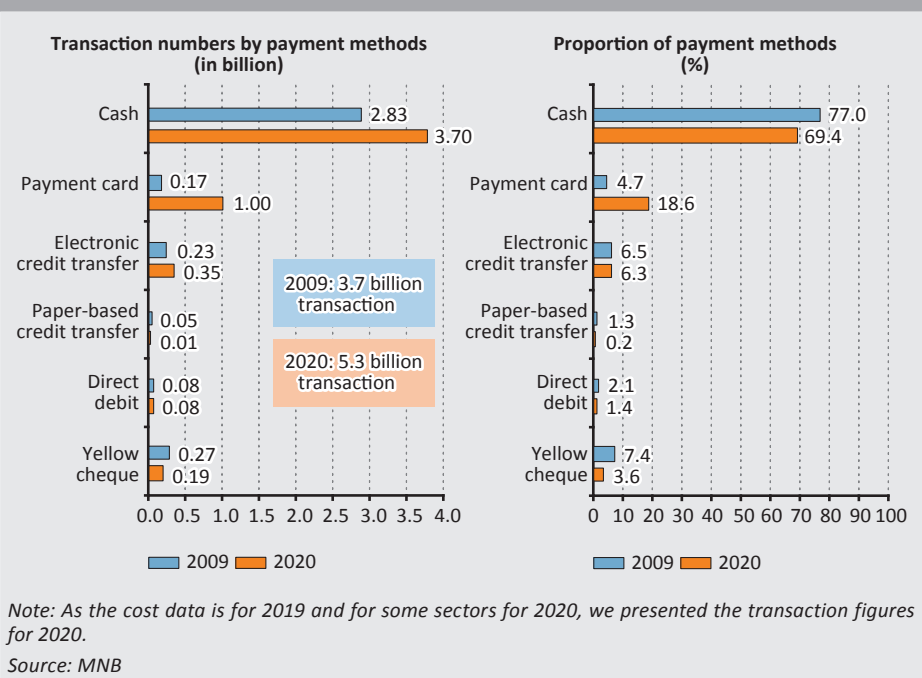
### 3.1. Main payments market processes

The payments market changed significantly between 2009 and 2019, with nearly one and a half times as many transactions occurring compared to 10 years ago. Changes in the number of transactions may be driven by the rapid development of infrastructure, innovation in payment instruments and the evolution of consumer habits, among other things. Within total transactions, the number of cash transactions increased by 30 per cent and the number of card transactions increased nearly fivefold. Credit transfers also grew by 30 per cent, but the number of paper-based credit transfers fell to a quarter. The number of direct debits remained stable and the number of postal inpayment money orders (“yellow cheque”) also decreased.

<sup>2</sup> Statat tables, 12.1.1.17. Evolution of the share of internet users in the population by date of last use [%]. Hungarian Central Statistical Office (HCSO). Downloaded: 5 May 2022.

Looking at the share of each payment instrument (*Figure 2*), the share of card payments increased the most, while the share of cash payments decreased. Despite this, cash still accounted for more than two thirds of transactions, followed by card use with one fifth of transactions. This represents a decrease of nearly 10 percentage points for cash and an increase of about 15 percentage points for cards over 10 years. There are smaller changes in the share of other payment methods.

**Figure 2**  
**Number of transactions and share of transactions for the main payment instruments in 2009 and 2020**



The growth in the share of electronic transactions is expected to continue and accelerate in the future, as more and more innovative solutions based on electronic payments emerge and are used by a larger number of people. Almost one quarter of the population pays by mobile phone (*Deák et al. 2021a*), and more and more people are shopping online, where the share of people using electronic payments already exceeds that of people using cash. This suggests that it is important for the population to be able to choose the optimal payment instrument in any situation, i.e. to use innovative, convenient and fast payment solutions other than cash.

With the increase in the share of electronic payment instruments, the share of the grey economy between the surveys is likely to have decreased due to the payment service measures and various government regulations described in *Figure 1 and in the following sections*, which may affect the survey transaction numbers and thus the results and comparability between surveys.

### **3.2. Cash**

Although the share of cash payment transactions and their role in the economy has been steadily decreasing, they are still the most common form of payment. The cash infrastructure is less characterised by spectacular innovations compared to electronic payment solutions due to its maturity, but a number of factors can be identified that have had a significant impact on the operations of participants in the cash payment industry, as well as the size and composition of their costs between 2009 and 2019.

The amount of HUF cash in circulation almost tripled in 10 years, rising from HUF 2,230 billion to HUF 6,120 billion. This phenomenon may have been partially influenced by the rise in consumer prices, but as we estimate that the number of cash transactions increased by only around 30 per cent during this period, the increase in the volume of cash may be mainly due to hoarding rather than transactional cash demand. This is borne out by the fact that the increase in demand mainly affected higher banknote denominations. The increase in circulating banknotes and coins also led to higher banknote and coin production volumes and related central bank costs, which were also affected by the technological upgrade of forint banknotes between 2014 and 2019. As a result, the average lifespan of small denomination paper money has risen from 21–35 months to 34–42 months, based on central bank banknote destruction data, which acts in the direction of reducing production needs in the long term.

The regulatory decisions taken by the central bank over the past decade have led to improved efficiency in the cash supply chain and thus to a significant reduction in the unit costs of its operations. The most important of these were the encouragement of cooperation between professional cash handlers, the development of containerised banknote circulation, the introduction of the coins-held-to-order scheme, and the setting of high quality standards for cash recycling (*Bódi-Schubert et al. 2012*). These steps have contributed to the reduction and consolidation of transport operations, the efficient scaling of logistics infrastructure and the need for cash supply chain operators to streamline their operations, leading to cost optimisation.

For credit institutions, cash-related costs were significantly affected by changes in the sizes of the branch and ATM networks. While the number of domestic branches exceeded 3,500 in 2009, since the early 2010s there have been several waves of major branch closures, resulting in a reduction in the size of the network by around 45 per cent by the end of 2019 (*MNB 2021*). This trend has been partly offset by an increase in the number of ATMs over a 10-year period, but while the 5,095 ATMs in operation in 2019 are about 7 per cent more than the network in 2009, there has been a slight decrease compared to 2017, and this has continued in the period since then. At the same time, the ATM network also saw a qualitative improvement with the emergence of ATMs accepting deposits and capable of on-the-spot re-circulation of banknotes, which in 2019 accounted for 15 per cent of the total network, and the share of cash inflow to credit institutions through ATMs approached 20 per cent, according to payments statistics. By using similar machines, the frequency of cash replenishment can be reduced and the burden on branch counters can be reduced.

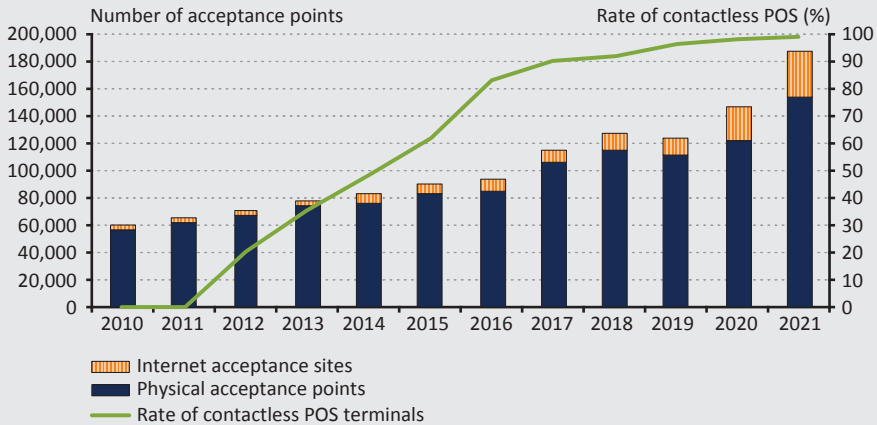
The most significant change in the legal environment related to the cost of using cash was the introduction of the financial transaction tax in 2013 and the related free-of-charge cash withdrawals guaranteed since February 2014, up to a maximum of HUF 150,000 twice a month. Research based on several questionnaire surveys (*Deák et al. 2021a; Végső et al. 2018*) has shown that the Hungarian population has adapted its habits to the changed fees, withdrawing cash much less frequently than before, but usually in significantly larger amounts. The change is also supported by the MNB's payment systems data, which show that the total annual number of cash withdrawals by card in Hungary fell by around 15 per cent between 2009 and 2019. This has also led to a proportional reduction in the variable costs associated with cash withdrawals, but our results show that the social cost per cash withdrawal has increased significantly due to the non-negligible fixed cost items.

### **3.3. Bank cards**

Card payments have exploded over the past decade and are now considered the main driver of electronic payments. The development has covered both card infrastructure and usage and is the result of a combination of factors. There has been a substantial increase in the acquirer network (*Figure 3*) and a considerable decline in the number of businesses where consumers cannot pay by card. Both the POS installation programme announced by the Ministry of Finance in 2016, which aimed at installing 60,000 terminals in two waves, and the card company initiatives have contributed to this.



**Figure 3**  
Evolution of the domestic card acquirer network, 2010–2021



Note: The figures show the status as of 31 December.

Source: MNB

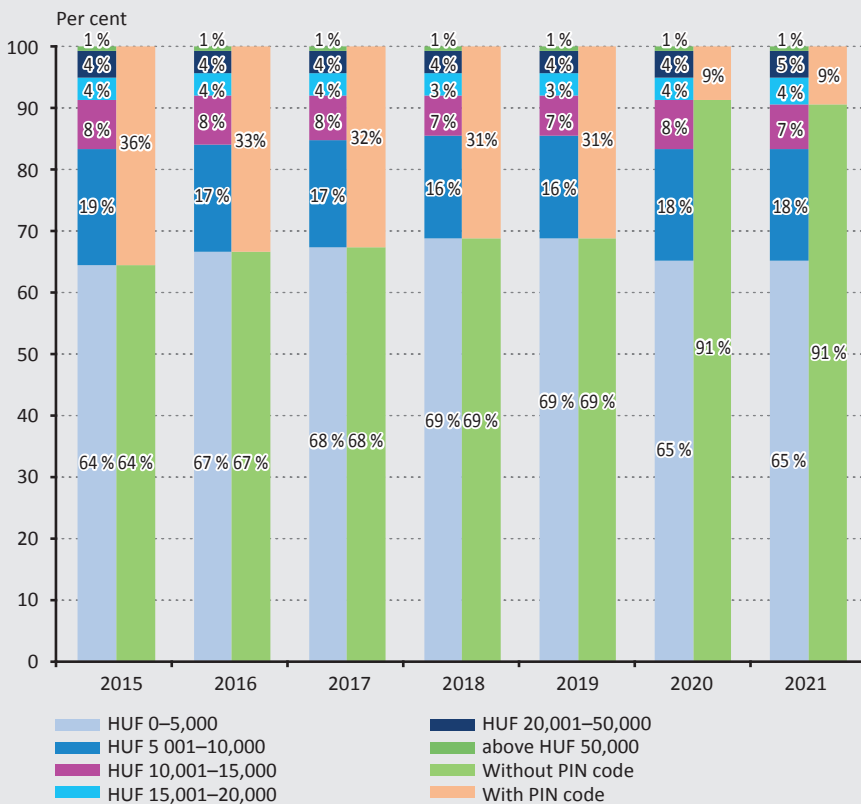
The regulatory reduction of interchange fees is also noteworthy, which has both restrained acquirer costs and helped a number of non-bank players involved only in acquiring services to enter the market, thus reducing market concentration and increasing competition (Kajdi – Kiss 2021). In this area, the MNB, in cooperation with the regulatory Ministry of Finance, has been active and it reduced interchange fees on debit and credit card purchases to 0.2 and 0.3 per cent respectively, a year before the European regulation came into force in 2015.

In addition to the evolution of the acquirers’ network, it is worth looking at the number of payments per POS terminal. Based on the ratio of physical card transactions to POS terminals, it can be established that the number of payments per POS terminal increased by 62 per cent compared to 2009, suggesting that not only new terminals and acquirer locations contributed to the large increase in the number of transactions, but also that the traffic on existing terminals increased significantly.

The dynamic growth in card usage has been supported by the development of the acquiring infrastructure and, in particular, by the spread of contactless payments based on the NFC technology. In addition to the increasing number of POS terminals supporting contactless payments, as shown in Figure 3, card issuers have gradually replaced payment cards, so that by the end of 2021, their share of all cards was 93 per cent. This has made fast, convenient electronic payments available to a wide range of consumers. This process was further reinforced by the introduction of

the HUF 5,000 card company limit<sup>3</sup> for contactless payments, and then, due to the pandemic, its increase to HUF 15,000 in 2020 (Figure 4). As the household survey was conducted in September 2020 rather than in 2019, unlike the other elements of the survey, the impact of the increase of the PIN code payment limit has already been reflected in the results. It can also be assumed that, in preparation for the mandatory electronic acceptance introduced from 2021 (see Section 3.5), a significant proportion of merchants have already enabled electronic payments at the time of the data collection and this may also have an impact on the results.

**Figure 4**  
Distribution of card payments in shops by value band and PIN code entry between 2015 and 2021



Note: For 2020, although the increase in the limit without PIN came into effect from September, to avoid distortion we have set the PIN-free rate above HUF 15,000 for the whole-year card proportions.

Source: NTCA, MNB calculation

<sup>3</sup> The limit amount below which entry of the PIN is not required when making a purchase.

Also partly related to the pandemic situation is the increase in online card acquirers and purchases. This segment was already outpacing physical payments before 2020, but the restrictions introduced due to the pandemic situation and changing consumer habits and merchant services have given a new boost to online growth. While in the past a significant share of card fraud was mainly linked to online purchases, the strong customer authentication that will be mandatory from the beginning of 2021 has brought significant improvements in this area, and the security of the Hungarian card system, which has been highly secure even in international terms, has further improved, which could also greatly help to increase consumer confidence in online card purchases.

### **3.4. Credit transfers**

Since the last similar survey in 2009, a number of improvements have also been made in the area of credit transfers, mainly to speed up transactions. The speed of processing credit transfers is one of the key factors in making this type of payment as widely available as possible. Although European regulations generally require a processing time by the next day, for several years the MNB has made it a priority to speed up domestic payments.

The first element of this was the introduction of intraday settlement in 2012, which allowed for cyclical settlement and clearing of interbank transactions five times a day. In order to further and more directly implement public policy aspects, GIRO Zrt., the company responsible for interbank clearing, was taken over by the MNB in 2014. In addition to the continuous reduction of clearing fees, this has also resulted in the doubling of the number of intraday settlement cycles from September 2015, and the operating hours have also been extended; thus, transactions are processed on this platform in an average of one hour during the day on weekdays. From a technical point of view, the introduction of intraday settlement and making cycles more frequent supported the MNB's regulatory intention to impose a four-hour time limit on payment service providers for electronic credit transfers, which is even stricter than the European requirements. The potential for wider usage resulting from faster processing is reflected not only in the steady increase in credit transfer traffic, but also in the dramatic decline in paper-based credit transfers, which have been much more cumbersome and expensive from a customer perspective over the past decade, and which take longer.

### **3.5. What has happened since the survey?**

Of particular importance for the expected future development of electronic payments is the introduction of instant payments in March 2020. In the current cost survey, this development, which requires significant resource inputs for both the MNB and the banking sector, has not been examined, as the impacts over the

reference period of the survey is considered to be moderate in the initial period after the system start-up. Indeed, it is important to note that the introduction of instant payments is not just another step in the process of speeding up the flow of money. On the one hand, with transactions legally required to be completed in a few seconds, it is now possible to ensure real-time payments that are competitive with cash transactions, and with the widespread use of smartphones and almost complete mobile internet coverage, transfers can be made in virtually any payment situation. On the other hand, it should be emphasised that the basic infrastructure for instant payments will be able to build an open and interoperable ecosystem through market services, i.e. any customer of any bank will have access to new, modern instant payment solutions. This also means that it will be easier for new payment service providers to enter the market, thus increasing competition and giving consumers cheaper access to innovative payment solutions. The MNB supports this in particular by developing central rules and standards (including a QR code standard, regulated feedback on transaction completion and a common brand). Two other related services in the central infrastructure, the processing of payment requests and the management of secondary account identifiers, also represent additional opportunities for market development.

In March 2020, the emergence of the coronavirus brought major changes to everyday life, including payment habits, with even stronger demand for electronic payment options, which also affected the supply side. Closures and the avoidance of physical contact have led to increased digitalisation, more people working from home, more online transactions and purchases, and more people opting for contactless electronic payments. At the same time, developments in payment services have accelerated, with more and more merchants offering electronic payments, further strengthened by the mandatory electronic payment option for merchants using online cash registers from 2021. As well as opening up new points of acquiring for consumers, it could also support the uptake of instant payments in the future as a cheaper electronic payment instrument for merchants than card payments. With the introduction of instant payments and the mandatory acceptance of electronic payments, it is now possible to pay electronically in addition to cash in most payment situations.

According to the available central bank data, cash circulation and cash infrastructure in the 2019–2022 period were also primarily characterised by the trends described in *Section 3.2*. The share of cash payments has been declining steadily at a moderate pace, and from March 2020, the coronavirus pandemic has further increased the use of electronic payments. Nevertheless, mainly as a result of savings demand, the

volume of cash in circulation continued to expand dynamically, but at a decelerating pace, except for the significant demand shocks experienced at the time of the domestic emergence of the coronavirus and the outbreak of the Russian–Ukrainian war in February 2022. At the same time, the number of cash withdrawals also decreased, but their aggregate value increased slightly, with the result that the average amount withdrawn in one transaction exceeded HUF 90,000 in Q4 2021 (compared to HUF 79,000 in the same period of 2019). There was also a decrease in the number of bank branches and ATMs in operation, while the proportion and turnover of ATMs with banknote deposit and return machines increased, further improving the efficiency of the supply chain. A recent, not insignificant change in this area is the emergence of cashless bank branches that do not provide cash services, which contributes to reducing costs but is seen as a negative development in terms of the security of supply.

## **4. Presentation of the methodology used**

### **4.1. Data used**

In the 2019 survey on the social costs of payment instruments, the MNB also conducted an extensive data collection for international comparisons, covering almost all actors in the payment chain.

Two surveys with largely identical contents were carried out in December 2019 and January 2020 to assess the costs of merchants and other corporates, using a 300-item sample for both target groups. These data have already been used by *Deák et al. (2021b)* to investigate merchant payment behaviour. In addition to the payments of businesses by different methods, the detailed costs incurred and the time taken to process payments were also collected. The advantage of sample surveys is that they also provide a detailed picture of the demographics and underlying detailed business management data of undertakings, which can be linked to their payment data, but the significant respondent burden and small sample size can introduce a degree of bias in the data. To correct for this, the National Tax and Customs Administration's (NTCA) online cash register database, which contains complete transaction-by-transaction data for the retailers obliged to use online cash registers, was used to calculate the costs for businesses. Data on enterprises<sup>4</sup> from the Hungarian Central Statistical Office (HCSO) were also used to complete the data.

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<sup>4</sup> Stadat tables, 3.2. Performance of economic and non-profit organisations and enterprises. HCSO. Downloaded: 1 November 2021.

The payment habits of the population were also surveyed using a questionnaire in September 2020, with a sample of 1,500 items representative of gender, age, region, type of settlement and education. In addition to questions on sociodemographic characteristics and payment habits and preferences, the survey also included a payment diary, asking respondents to record the details of their payment transactions on the surveyed day. A part of the survey data was used by *Deák et al. (2021a)* to investigate the payment habits of the population.

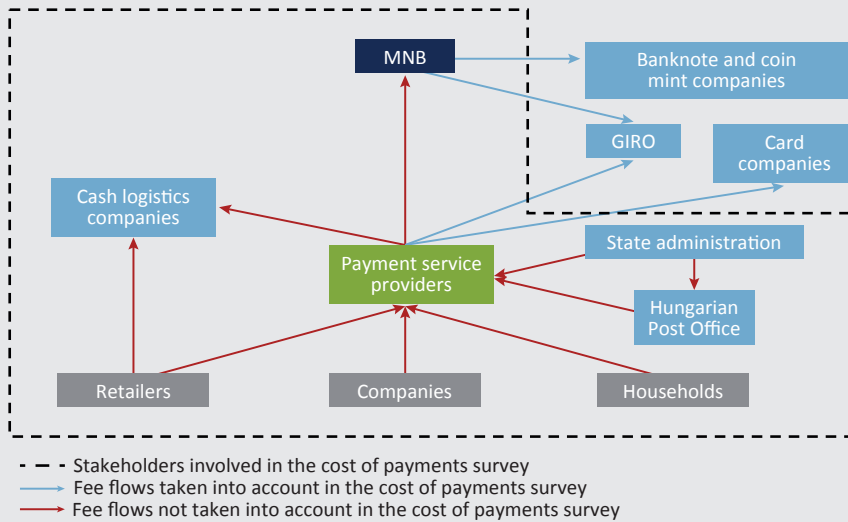
A questionnaire was also used to assess the costs of the banking sector – for the period covered in 2019 – with respondents covering almost the entire domestic sector. No separate data was collected for the costs of non-banking agents, in which case an estimate was made on the basis of the data of banking agents. The MNB data was calculated after data collections from the relevant sectors, while a questionnaire was used to obtain cost data for the Magyar Posta and for municipalities in 2019, with data from 59 municipalities of different sizes. In addition to the above, the Prime Minister’s Office provided data on the transactions of the Document Offices in order to ensure the best possible coverage of state payments.

Due to their complexity, the questionnaires were collected over a wide time span between 2020 and 2021, and as a result the reference period also varied between 2019 and 2020. The costs calculated in the study therefore cover the period 2019–2020, the values shown are annual costs, and the annual cost is referred to as the 2019 social cost.

#### **4.2. Cost calculation methodology used**

In order to determine the social costs of payment instruments, it is necessary to determine the costs and inputs of the various actors. This mainly involves time and investment in equipment and maintenance. The fees paid between operators (*Figure 5*) are not taken into account in our study, as these fees are on the expenditure side for one operator and on the revenue side for the other, so they offset each other in total and do not affect the costs at the level of the whole payment chain. These fees are typically those paid to payment service providers by the population, retailers and corporates, or by state actors (e.g. account management fees), or by payment service providers to the MNB and cash logistics companies.

**Figure 5**  
Actors and flows of fees taken into account in the social cost survey



Source: MNB

To determine the costs at the social level, we first calculated the costs associated with each payment instrument for each actor in the payment chain (population, retailers and corporates, banks, MNB, cash logistics companies and the Hungarian government). As the charges paid to each other are not included in the calculation, the total social cost is the sum of the costs of each sector. Of the major players in the payment chain, only the costs of the card companies were not surveyed in detail, so in this case the amount of fees paid by payment service providers to card companies and card transaction processors were collected and included in the analysis.

In order to make the calculations as accurate as possible, the transaction figures were compared and, if necessary, corrected using the quarterly published payment data by the MNB, which include card payments, credit transfer transactions, cash withdrawals and deposits of the population, retailers and corporates. We also used the online cash register database, which can provide an accurate picture of the number of cash and card payments made in shops. For the total number of purchases, the aggregate number of outgoing transactions (typically population and retailer payments) was the same as the total number of incoming transactions (typically on the retailer and corporate side) for all actors. In our study, the time and efficiency of innovative payment instruments (smartphones, smartwatches, online QR codes, etc.) were not separated from the basic payment methods, as their use was relatively limited at the time of the survey, but it may be worthwhile to investigate their cost-reducing impact in future studies with a similar focus.

For the population, the cost of payment instruments is determined by the time spent on each transaction, which includes the actual time spent on performing the transaction as well as the time spent on getting there and queuing in the case of a credit transfer, a postal inpayment (“yellow cheque”) or an ATM cash withdrawal. By multiplying the wage data available from the questionnaire by the number of purchases made with different payment instruments and the total time spent on paying, we obtain the cost of different payment instruments for the population. In other words, the following equation was used to calculate the social costs of households per income situation:

$$C_H = (T_F + T_U) * W_H * N_H \quad (1)$$

where:

- $C_H$ : the social cost of the household sector
- $T_F$ : the time required for the payment, cash withdrawal and cash deposit transaction
- $T_U$ : the travel time for bank branch, post office or ATM transactions
- $W_H$ : population labour cost per unit of time
- $N_H$ : number of transactions initiated by the household sector

The social cost to the population is obtained by adding up the  $C_H$  values per payment situations.

For retailers and corporates, the costs typically consist of transacting the payments, processing them and purchasing, operating and maintaining the equipment necessary for these. For payments, we looked separately at the execution of on-site and online payment transactions (e.g. cash register handling) and their processing (e.g. invoicing, accounting). The cost of executing and processing payment transactions is calculated by multiplying the employee’s salary by the number of payments and the time taken to make or process the payment. In calculating the time needed, we have also taken into account the time needed to handle complaints and errors, and to execute refunds. For retailers and corporates, asset costs typically consist of the purchase, operation and maintenance of online cash registers and POS terminals. For the calculation, the investment cost of the assets was spread over 10 years, assuming that a newly purchased asset is used by an undertaking for about 10 years. For retailers and corporates, paying bills and the communication costs needed to transact payments (e.g. internet subscription) can be significant cost elements. For bill payments, similarly to the general population, the time needed for the whole process was analysed on the basis of the questionnaire responses. Accordingly,



the following equation was used to calculate the social costs for corporates and merchants, by payment situation:

$$C_V = (T_F + T_O + T_U) * W_V * N_V + C_E * N_E + C_K \quad (2)$$

where:

- $C_V$ : the social costs of the corporate and merchant sector
- $T_F$ : the time required for executing payment transactions at physical acquirers
- $T_O$ : the time required for transacting payments through online acquirers
- $T_U$ : the time needed to travel for a bank branch, post office or ATM transaction
- $W_V$ : labour cost per unit of time for employees processing payments and sales
- $N_V$ : the number of transactions initiated and received by the corporate and merchant sectors
- $C_E$ : the investment cost of equipment used to transact payments (e.g. cash register, POS terminal)
- $N_E$ : the number of devices used to transact payments (e.g. cash register, POS terminal)
- $C_K$ : the cost of maintaining and operating the equipment used to transact payments

The social cost of merchants and corporates is obtained by adding up the  $C_V$  values per payment situation.

The costs of payment service providers and the Magyar Posta include items related to all payment instruments, such as costs related to service contracts, document management and archiving, customer service costs, marketing costs, and costs related to fraud. In addition, certain costs are related to specific payment instruments, such as ATM operation, cash supply planning, card issuance, risk analysis for merchants accepting cash, or, in the case of the Magyar Posta, the postal collection of yellow and white cheques, i.e. cash transfer and bill payment orders. Costs were requested by detailed cost item, broken down by payment instrument, using the ABC method,<sup>5</sup> in order to ensure that all factors are covered when completing the questionnaire. The transaction duty is not included in the analysis, as it is not a direct cost of carrying out the transaction, but a tax-like fee that is paid. However, the transaction duty can still affect the use of credit transfers

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<sup>5</sup> ABC (activity based costing): whereby, for jointly pre-defined activities, data managers provide an estimate of the type and amount of resources that will be used to carry them out.

through pricing and thus the social cost of payment instruments. The data from the questionnaire covered almost the entire sector, but in order to obtain complete results, we estimated both the costs of missing bank actors and the costs of non-bank actors for card acceptance.

Cash logistics companies provide their customers with services related to the transport, collection, processing, storage, withdrawal and deposit of cash. As these activities are, to a large extent, outsourced by both credit institutions and large retailers, the survey had to be extended to this sector in order to accurately determine the social costs of cash use. The main points of the questionnaire used were the same as for the questionnaire on cash costs of credit institutions, covering both specific activities (e.g. processing, storing, transporting cash) and general activities. As there are only a few cash-in-transit companies operating in the domestic market, the data received covered the entire sector, so no further extrapolation was necessary. The data was also checked against available corporate information where possible to verify its accuracy.

The costs of the public sector consist mainly of transacting and processing payments. Multiplying the time of the different payments by the number of transactions and the wage provides a significant part of the cost of each payment instrument. In addition, in the public sector, there are also asset costs and costs related to invoice payments, which are calculated in the same way as for corporates and merchants.

On the MNB side, in addition to the costs of operating the banknote and coin production and cash infrastructure, the main costs are labour costs, which consist of the time spent by the staff on the operation and supervision of payment systems and the supply of cash. In terms of asset costs, the central bank has infrastructure items related to cash, card payments and credit transfers.

After calculating the costs of the different actors in the payment chain for each payment instrument, the social costs of each payment instrument can be determined as the sum of the partial costs. These results are presented in the next section.

## **5. Detailed presentation of costs**

The social cost of payment instruments was most affected by the growth in the number of transactions, infrastructure investments, inflation and wage growth between 2009 and 2019. In addition, most payment instruments have seen significant efficiency gains over the period (see *Section 3*), which have been accompanied by cost reductions.

### 5.1. Social costs in 2019

The social cost of payment instruments in 2019 was HUF 832 billion. Of the different payment instruments, cash remains the most used one, with the highest social cost, accounting for around 46 per cent of the total cost. This is followed by card, credit transfer, postal inpayment money order (“yellow cheque”) and direct debit, which account for 28 per cent, 15 per cent, 8 per cent and 2 per cent of the social cost, respectively. Among the actors in the payment chain, retailers and corporates have the highest costs, mainly because they are the sector with the highest number of transactions, as they receive the majority of purchases on the incoming side. Due to the high volume of transactions, the handling and processing of these transactions is labour-intensive and costly on the retail and corporate side. The purchase and operation of these devices is also more costly for retailers and corporates, as a significant proportion of them are required by law to have both an online cash register and a POS terminal, which are all expensive to purchase, operate and maintain compared to payment-transacting devices in other sectors.

**Table 1**  
Social cost of payment instruments in HUF billion and the number of transactions in 2019

	Cash	Card	Credit transfer	Direct debits	“Yellow cheque”	Pension	Total
<b>MNB</b>	10.28	0.18	0.12				<b>10.58</b>
<b>Cash-in-transit companies</b>	17.23						<b>17.23</b>
<b>Payment service providers, Magyar Posta, State Treasury</b>	44.94	97.86	55.91	6.64	27.81	4.18	<b>237.34</b>
<b>Businesses (including retailers)</b>	276.23	120.54	66.25	4.45	2.91		<b>470.39</b>
<b>Households</b>	37.59	13.04	6.27	1.59	37.09		<b>95.58</b>
<b>State</b>	0.35	0.26	0.29	0.03	0.06		<b>0.99</b>
<b>Total social cost</b>	<b>386.62</b>	<b>231.88</b>	<b>128.85</b>	<b>12.70</b>	<b>67.87</b>	<b>4.18</b>	<b>832.10</b>
<b>Total number of transactions (millions)</b>	<b>3,702</b>	<b>995</b>	<b>358</b>	<b>77</b>	<b>193</b>	<b>14</b>	<b>5,339</b>

Source: MNB

Apart from the actual costs, it is also worth looking at the costs as a share of GDP, so that the social costs can be compared both with previous years and with other countries. The social cost of payment instruments amounted to 1.7 per cent of GDP in 2019. While in principle this is higher than for other central banks, it is important

to emphasise that the values for individual countries are not directly comparable, as the relatively high domestic value is largely due to the fact that, for example, the costs of more actors were included than in other studies. Also in a departure from the results of other central banks (Denmark, Poland, Italy and Portugal) presented in *Section 2*, the second wave of the survey in 2019 showed an increase in costs relative to GDP compared to 2009, mainly due to infrastructure expansion and a significant increase in transaction numbers.

## 5.2. How have costs been affected over the past 10 years?

Strong investment in infrastructure over the past 10 years has increased the social cost of payment instruments in the short term.

It is worth comparing the social costs presented in *Section 5.1* with the costs in 2009 (*Table 2*) to obtain a more accurate picture of how the changes in payment habits and the transformation of the payment infrastructure have affected the evolution of social costs.

	Cash	Card	Credit transfer	Direct debits	“Yellow cheque”	Pension	Total
<b>MNB</b>	7.16		0.02		0.42		<b>7.60</b>
<b>Cash-in-transit companies</b>	16.01				0.93		<b>16.94</b>
<b>Payment service providers, Magyar Posta, State Treasury</b>	66.86	43.23	42.25	6.38	24.10	6.65	<b>189.47</b>
<b>Businesses (including retailers)</b>	97.39	4.48	18.31	0.40	4.79		<b>125.37</b>
<b>Households</b>	19.97	2.08	14.51	0.94	8.58		<b>46.08</b>
<b>State</b>	1.42				0.14		<b>1.56</b>
<b>Total</b>	<b>208.81</b>	<b>49.79</b>	<b>75.09</b>	<b>7.72</b>	<b>38.96</b>	<b>6.65</b>	<b>387.02</b>

*Source: Edited based on Turján et al. (2011)*

For the sake of comparability, the cost variables in the 2019 calculation in which we used workers’ wages have been corrected to 2009 values, as the change in wages is a process that is independent of the evolution of payments, so using 2019 wages would significantly distort the results as they have doubled since 2009.<sup>6</sup>

<sup>6</sup> Stadat tables, 2.1.38. A teljes munkaidőben alkalmazásban állók havi bruttó átlagkeresete (Average gross monthly earnings of full-time employees), HCSO. Downloaded: 1 November 2021.

And for asset costs, we adjusted the 2019 values for inflation (between 2009 and 2019, inflation increased the cost of assets by 1.3 times<sup>7</sup>), assuming that their price changed with inflation. The costs thus calculated are shown in *Table 3*.

	Cash	Card	Credit transfer	Direct debits	“Yellow cheque”	Pension	Total
<b>MNB</b>	6.30	0.11	0.07				<b>6.48</b>
<b>Cash-in-transit companies</b>	10.56						<b>10.56</b>
<b>Payment service providers, Magyar Posta, State Treasury</b>	27.54	59.98	34.27	4.07	17.04	2.56	<b>145.46</b>
<b>Businesses (including retailers)</b>	129.73	57.83	35.98	3.30	1.88		<b>228.72</b>
<b>Households</b>	27.64	7.24	3.14	0.86	23.60		<b>62.48</b>
<b>State</b>	0.25	0.15	0.21	0.02	0.05		<b>0.68</b>
<b>Total</b>	<b>202.02</b>	<b>125.31</b>	<b>73.67</b>	<b>8.25</b>	<b>42.57</b>	<b>2.56</b>	<b>454.38</b>

Source: MNB calculations

The difference between 2009 and 2019 costs adjusted for wages and inflation is shown in *Table 4*. The correction filters out the effects of dynamic wage growth and inflation, so that the residual value represents an increase in the social cost if positive and a decrease in the social cost if negative. Although the adjusted social costs in 2019 are also higher than in 2009, this is in line with the earlier findings of *Ilyés and Varga (2016)*, who pointed out that, although the increasing use of electronic payment instruments (bank cards) leads to social cost savings, this is not a linear process: “Due to the different cost structure of the cash and the debit card transactions, a small amount of substitution leads to a temporary increase in the total social cost, but after the turnaround, an actual and – with the increase of the substitution exponential – increase in savings can be achieved” (*Ilyés – Varga 2016:150*). The reasons for this are explained in more detail below.

<sup>7</sup> Stadat tables, 3.6.1. A fogyasztóiár-index (Consumer price index), HCSO. Downloaded: 1 November 2021.

<b>Table 4</b>							
<b>Difference between the adjusted social costs in 2019 and 2009 (HUF billion)</b>							
	Cash	Debit card	Credit transfer	Direct debits	“Yellow cheque”	Pension	Total
<b>MNB</b>	-0.86	0.11	0.05		-0.42		<b>-1.12</b>
<b>Cash-in-transit companies</b>	-5.45				-0.93		<b>-6.38</b>
<b>Payment service providers, Magyar Posta, State Treasury</b>	-39.32	16.75	-7.98	-2.31	-7.06	-4.09	<b>-44.01</b>
<b>Businesses (including retailers)</b>	32.34	53.35	17.67	2.90	-2.91		<b>103.35</b>
<b>Households</b>	7.67	5.16	-11.37	-0.08	15.02		<b>16.40</b>
<b>State</b>	-1.17	0.15	0.21	0.02	-0.09		<b>-0.88</b>
<b>Total</b>	<b>-6.79</b>	<b>75.52</b>	<b>-1.42</b>	<b>0.53</b>	<b>3.61</b>	<b>-4.09</b>	<b>67.36</b>

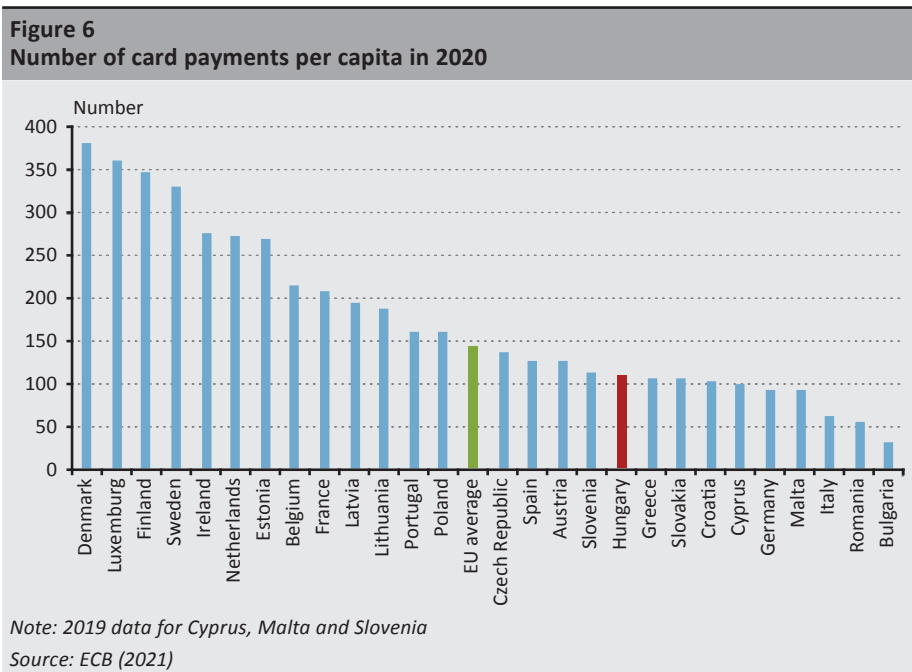
Source: MNB calculations

Partly as a result of the regulatory measures gradually introduced by the MNB over the past decade, the efficiency of cash handling improved significantly between 2009 and 2019, which manifested itself mainly at banks and cash logistics providers. *Table 4* also shows that for cash, the adjusted costs for cash logistics companies and banks are significantly lower than the values calculated in 2009. It can be concluded from this that cash, especially in these two sectors, has seen significant efficiency gains as a result of the changes described in *Section 3.2*.

There has been a significant expansion in the card acquirer infrastructure and card sales, with the cost of this being felt across all sectors surveyed, but mainly by retailers and corporates. Retailers and corporates have seen a significant increase in card-related costs, mainly due to strong investments in infrastructure and a significant increase in the number of transactions. As shown in *Section 3*, the card acquirer network tripled and the number of card transactions increased fivefold between 2009 and 2019. The expansion of infrastructure led to significant cost increases in the retail and corporate sectors, while the sharp increase in the number of transactions resulted in a large increase in the labour costs of transacting payments. By 2019, the majority of shops will be required to accept some form of electronic payment, and by 2021, all shops using an online cash register will be required by law<sup>8</sup> to accept some form of electronic payment. As a result, the card infrastructure is essentially complete, and no major infrastructure investments and consequent cost increases are expected in the coming years. The significant investment in infrastructure means that electronic payments are now available

<sup>8</sup> 2005. évi CLXIV. törvény a kereskedelemről (Act CLXIV of 2005 on Trade). <https://net.jogtar.hu/jogszabaly?docid=a0500164.tv>

in addition to cash in most payment situations, which could further increase the number of electronic transactions. This is also confirmed by an international comparison of the use of card payments: despite the more intensive use of cards in recent years, there is still plenty of room for improvement in Hungary (Figure 6).



95 per cent of credit transfers are now submitted electronically, reducing the time needed and increasing efficiency. For households and banks, the adjusted cost of credit transfers is lower than in 2009. This suggests that there was a significant improvement in the efficiency of credit transfers, which also reduced costs. As explained in Section 3.4, the clearing of credit transfers speeded up, so the time required dropped significantly. Furthermore, as described in Section 3.2, the number of paper-based credit transfers also fell sharply. Together, this led to a reduction in costs. By reducing the number of transfers submitted on paper, banks were able to save costs by optimising processing in the branches, while the population saved time by using more convenient and faster electronic submission channels. For retailers and corporates, the increase in costs is likely to have been driven by a significant increase in the number of transactions, which is estimated at around 70 million. According to Deák et al. (2021b), the role of credit transfers is significant

for corporates, which is the sector that makes the most transfers and is thus the sector the most affected by the increase in the number of transactions.

For direct debits, the increase in costs was minimal. This is presumably due to the fact that there were no significant efficiency gains in 2019, while the costs of the necessary infrastructure (communication, invoicing) increased. Widespread internet coverage and smartphone use may also have contributed to some extent to the increase in costs, as these allow users to exercise more control over direct debits, but the tracking of transactions (in a mobile app or internet banking) is an additional time-consuming task. The users get almost instant notifications, they can check the completion of the transaction in a mobile app or in an internet bank, but this is reflected in the transaction time spent.

Postal inpayment money orders (“yellow cheques”) paid in post offices have also seen an increase in costs. This is because there was no significant increase in the efficiency of this payment instrument in 2019, but the cost of the necessary infrastructure also increased. Another important factor is that service providers made significant efforts to steer consumers to electronic payment instruments, resulting in a reduction of 75 million yellow cheque transactions. However, the reduction in the number of transactions is not directly proportional to the reduction in costs, because as long as a given retail customer or company uses even one yellow cheque, the time savings are not significant, as one cheque requires the same amount of queuing time and payment is not significantly faster than in the case of multiple cheques. So significant cost savings could be achieved by increasing the number of people who do not use yellow cheques at all.

Overall, four main factors explain the increase in the social cost of payment methods: 1. significant wage growth; 2. inflation (especially in asset spending); 3. stronger investment in infrastructure (especially in card acceptance); 4. growth in transaction numbers. The costs, on the other hand, have been reduced by increasingly efficient transaction processing, especially for cash and credit transfers. The effects of the number of transactions and efficiency gains as well as the necessary investments on the costs can be explained by examining the unit costs, i.e. the costs per transaction, which are presented in the following section.

### **5.3. Unit costs**

In terms of unit social costs, in 2019, all of the payment instruments examined showed an increase compared to 2009. The cost of a cash transaction increased by 50 per cent, the cost of a card transaction by 14 per cent and the cost of a credit transfer by 30 per cent in 10 years. It is also worth looking at unit costs adjusted



for wage growth and inflation to get a more accurate picture of how much of the increase in costs per transaction is explained by economic changes that are not related to the payments market.

*Table 5* shows that the adjusted 2019 unit costs, for the most popular payment instruments, are only about half of the unadjusted values for cards and two thirds for cash and credit transfers, and the cost per transaction is even lower than in 2009, i.e. the nominal increase in the cost per transaction level is indeed primarily driven by the increase in wages and prices, while the unit costs for these payment methods decreased in real terms. The reduction in the adjusted cost per transaction is due to the efficiency-enhancing investments and measures detailed in *Section 3*. In the case of cash, the more efficient cash supply and handling had a cost-reducing effect. In the case of cards, the infrastructure tripled and the number of transactions increased fivefold, so the further growth in the number of transactions no longer requires a major investment in card infrastructure, and therefore unit costs may fall further in the future. In the case of credit transfers, the efficiency gains from the decline in paper-based credit transfers and the significant reduction in the bank branch network over the past ten years could reduce the real cost of transferring money.

<b>Table 5</b>					
<b>Social costs per transaction (unit costs) in HUF</b>					
	<b>Cash</b>	<b>Card</b>	<b>Credit transfer</b>	<b>Direct debits</b>	<b>“Yellow cheque”</b>
<b>2019</b>	104	233	360	165	352
<b>2019 adjusted</b>	67	109	228	137	264
<b>2009</b>	74	201	270	100	144

*Source: MNB calculations*

Looking at the unit costs, it can be concluded that the methodological and sectoral differences described in the previous sections are responsible for the higher social costs compared to other European countries. The cost per transaction converted into euros at the 2019 central exchange rate is already lower or only slightly higher than the unit cost in other European countries (*Table 6*).

<b>Table 6</b>				
<b>Unit social costs per transaction in some European countries, in euro</b>				
	<b>Cash</b>	<b>Card</b>	<b>Credit transfer</b>	<b>Direct debits</b>
<b>Hungary</b>				
2019	0.32	0.72	1.11	0.51
2019 adjusted	0.21	0.34	0.70	0.42
<b>Poland</b>				
2018	0.32	0.33 (0.49)*	0.19	1.12
<b>Italy</b>				
2016	0.35	0.59 (1.10)*	1.63	0.49
<b>Portugal</b>				
2017	0.34	0.38 (1.88)*	0.39	0.27
Note: * The values represent the unit cost of debit cards and in parentheses the unit cost of credit cards. Source: Calculated from data from MNB, Banca d'Italia (2020), Banco do Portugal (2019) and Przenajkowska et al. (2019; 2020)				

### 5.3.1. Unit costs in relation to cash in circulation

When interpreting the costs associated with the use of cash, it is important to bear in mind that cash in the economy is used not only for payment, but also as a reserve and a store of wealth. This is evidenced, inter alia, by the increase in the amount of cash in circulation, which significantly exceeded the increase in the number of cash transactions, and by the fact that the increase mainly affected high-value denominations (HUF 10,000 and 20,000). This phenomenon is well illustrated if the unit cost of cash use is calculated on the basis of the volume of cash in circulation rather than the number of transactions. The relevance of this indicator is underlined by the fact that, unlike electronic payment instruments, the cost of cash payments depends to a not insignificant extent on the value of the transaction and the amount of banknotes and coins used. In the further calculations, the values not adjusted for wage and price increases (*Table 1*) are taken as absolute cost, as these variables are assumed to have a direct impact on the amount of cash in circulation.

The result of the calculations shows that the social cost per 100 forints of cash in circulation fell by about one third between 2009 and 2019 (*Table 7*), and the difference is as high as 10 per cent even if the denominator is the number of banknotes in circulation, which partly corrects for the shift in denomination structure mentioned earlier.

By contrast, if we attempt to ignore the amount of cash used as a savings instrument, we find that the cost per banknote in circulation serving transaction purposes has remained almost constant over the period, increasing by only 2.5 per cent. Decomposition of the demand to transactions and savings is based on the

MNB’s banknote processing data for 2012–2018, taking into account the circulation velocity of each denomination and seasonal demand fluctuations, and assuming that the four smaller denominations serve exclusively transactional purposes and that the transactional share of the HUF 10,000 and HUF 20,000 denomination stock is characterised by the same circulation patterns as the smaller denominations. Our results are based on the models of *Anderson (1977)* and *Fischer et al. (2004)*, which can be regarded as an estimate of magnitude, and show that around 40 per cent of HUF 20,000 and 75 per cent of HUF 10,000 banknotes are involved in cash transactions, so we have adjusted the 2009 and 2019 stock data by these proportions.

	<b>Social cost per 100 forints of cash in circulation</b>	<b>Social cost per banknote in circulation</b>	<b>Social cost per transaction banknote in circulation</b>
2009	9.36	817.84	1,040.86
2019	6.35	733.88	1,066.88

*Source: MNB calculations*

The results confirm that the dynamic growth in the stock of cash in circulation in recent years has not been accompanied by a proportional increase in the social costs associated with cash use, which, in addition to the increasing efficiency of the cash infrastructure, may be due to the fact that a significant proportion of banknotes in circulation are used for savings rather than for transactional purposes.

## **6. Summary**

Today, we can manage our finances conveniently, shop online, pay without a wallet using our smart phone or smart watch, and complete our credit transfers in seconds. Thanks to developments and infrastructure expansion, we can choose the payment instrument that suits us almost everywhere. Surveying the social cost of payment instruments is important because efficient payments have an impact, in addition to consumer welfare, on competitiveness and economic growth as well. The MNB, in line with other European central banks, once again surveyed the social costs of different payment instruments in 2019–2020, ten years after the first such study.

Overall, the social cost of payment instruments was HUF 832 billion in nominal terms, equivalent to 1.7 per cent of GDP, which represents a 20-per cent increase in social costs in real terms. This was mainly due to an increase in the number of transactions, changes in customer habits and, in the case of cards, a significant, three-fold increase in the acquiring infrastructure, which in parallel led to a five-fold increase in traffic. Thanks to these investments, an electronic payment instrument

is now available in the majority of payment situations. Credit transfers also saw a significant increase in the number of transactions, while the number of direct debits remained unchanged and the number of yellow cheque payments decreased.

Average wages have nearly doubled in ten years, while inflation has increased prices by 1.3 times. To examine the efficiency of the payments market, the effects of wage growth and inflation are filtered out. Looking at adjusted social costs (real costs), there have been significant efficiency gains for the main payment instruments. For banks and cash-in-transit companies, the efficiency of cash handling improved significantly between 2009 and 2019–2020, so the adjusted social cost is lower than in 2009. There was a significant expansion in the card acquiring infrastructure and card sales, which is the main reason for the increase in costs in the sectors under review, especially retailers and corporates, which is still evident even after the correction. There were significant efficiency gains in credit transfers, with 95 per cent of them now submitted electronically, so the adjusted total social cost is also lower than in 2009.

In addition to absolute costs and adjusted costs, we also examined the evolution of social costs per transaction. Unit costs increased for all payment instruments compared to 2009. Again, unit costs adjusted for wage growth and inflation may give a more accurate picture. These showed a decrease in the unit cost of both cash and credit transfer payments compared to 2009 (the former fell by around 10 per cent to HUF 67 and the latter by around one sixth to HUF 228), but the biggest drop was seen in the cost per card payment. The adjusted social cost per card payment is HUF 109, which is about half of the 2009 value, and this could decrease further as the card acquiring infrastructure is now considered almost complete, so the unit cost could decrease further as the number of transactions increases. An analysis of the social cost per transaction also shows that over ten years, while the number of transactions has increased, there were significant efficiency gains for the main payment instruments.

The main focus of the analysis is on the period between 2009 and 2019–2020, but it is important to note that there have already been a number of important developments and legislative changes since then that may affect the evolution of the social cost of payments. The most important of these is the instant payments system, launched in March 2020, which required a significant infrastructure investment by the various players, but which could further increase the efficiency of credit transfers. With the introduction of instant payments, the scope of credit transfers, which were previously typically used only on an ad-hoc basis, has significantly expanded, allowing the infrastructure to process a large number of transactions that are currently still cash-based, thus significantly increasing its utilisation and further reducing the unit cost of transfers. From 2021, merchants with online cash registers will be obliged to accept electronic payments, which will

mean that a cashless alternative will be available in most payment situations. In the future, further significant growth in the number of electronic payment transactions is expected to be achieved through the existing infrastructure, further reducing the cost per transaction and increasing the efficiency of payments.

## References

- Abele, H. – Schäfer, G. (2016): *The cost of cash and debit cards in Austria*. Journal of Financial Market Infrastructures, 4(4): 1–16.
- Anderson, P. (1977): *Currency in use and in hoards*. New England Economic Review, March/April: 21–30.
- Banca d'Italia (2020): *Il costo sociale degli strumenti di pagamento in Italia*. Tematiche Istituzionali, March. [https://www.bancaditalia.it/pubblicazioni/tematiche-istituzionali/2020-costo-soc-strum-pagamento/Tem\\_Istituzionali\\_2020\\_costo\\_sociale\\_strumenti\\_pagamento.pdf](https://www.bancaditalia.it/pubblicazioni/tematiche-istituzionali/2020-costo-soc-strum-pagamento/Tem_Istituzionali_2020_costo_sociale_strumenti_pagamento.pdf)
- Banco do Portugal (2019): *Custos sociais dos instrumentos de pagamento de retalho em Portugal*. Lisbon. [https://www.bportugal.pt/sites/default/files/anexos/pdf-boletim/estudo\\_custos\\_sociais\\_instrumentos\\_pagamento\\_jan2019.pdf](https://www.bportugal.pt/sites/default/files/anexos/pdf-boletim/estudo_custos_sociais_instrumentos_pagamento_jan2019.pdf)
- Bergman, M. – Guibourg, G. – Segendorf, B. (2007): *The Costs of Paying – Private and Social Costs of Cash and Card Payments*. Working Paper Series, 212, Sveriges Riksbank. <https://doi.org/10.2139/ssrn.1022266>
- Bódi-Schubert, A. – Ábrahám, Zs. – Lajkó, E. (2012): *Network-based analyses of Hungarian cash supply*. Occasional Papers 104, Magyar Nemzeti Bank. <https://www.mnb.hu/letoltes/op104.pdf>
- Brits, H. – Winder, C. (2005): *Payments are no free lunch*. Occasional Studies, 3(2), De Nederlandsche Bank. [https://www.dnb.nl/media/hg3dqbrz/200510\\_02\\_-\\_payments\\_are\\_no\\_free\\_lunch.pdf](https://www.dnb.nl/media/hg3dqbrz/200510_02_-_payments_are_no_free_lunch.pdf)
- Cabinakova, J. – Kuemann, F. – Horst, F. (2017): *The costs of cash payments in the retail sector*. Deutsche Bundesbank, Frankfurt am Main. <https://www.bundesbank.de/en/publications/reports/studies/the-costs-of-cash-payments-in-the-retail-sector-808970>
- Deák, V. – Nemeckó, I. – Végső, T. – Bódi-Schubert, A. (2020): *A koronavírus járvány hatása a magyarországi pénzforgalomra 2020-ban (Impact of the coronavirus pandemic on Hungary's payment turnover in 2020)*. Special article (szakmai cikk), Magyar Nemzeti Bank. <https://www.mnb.hu/letoltes/a-koronavirus-jarvany-hatasa-a-magyarorszag-i-penzforgalomra-2020-ban.pdf>. Downloaded: 17 March 2022.

Deák, V. – Nemeckó, I. – Végső, T. (2021a): *Payment Habits of the Hungarian Households in 2020*. Occasional Papers 143, Magyar Nemzeti Bank. <https://www.mnb.hu/letoltes/mnb-op-143-final.pdf>

Deák, V. – Kajdi, L. – Nemeckó, I. (2021b): *Analysis of Retailer and Corporate Payment Habits in Hungary*. Financial and Economic Review, 20(2): 33–59. <https://doi.org/10.33893/FER.20.2.3359>

DPC (2018a): *The aggregate costs of payments in Denmark were kr. 15.6 billion in 2016*. Analysis, Danish Payments Council. <https://www.nationalbanken.dk/en/publications/Pages/2018/09/The-aggregate-costs-of-payments-in-Denmark-were-kr--15-6-billion-in-2016.aspx>. Downloaded: 17 March 2022.

DPC (2018b): *Background to series on the costs of payments in Denmark*. Analysis, Danish Payments Council. [https://www.nationalbanken.dk/en/bankingandpayments/danish\\_payments\\_council/Documents/Background%20to%20series%20on%20the%20costs%20of%20payments%20in%20Denmark.pdf](https://www.nationalbanken.dk/en/bankingandpayments/danish_payments_council/Documents/Background%20to%20series%20on%20the%20costs%20of%20payments%20in%20Denmark.pdf). Downloaded: 17 March 2022.

DPC (2018c): *The costs of consumer-to-business payments have decreased considerably*. Analysis, Danish Payments Council. [https://www.nationalbanken.dk/en/bankingandpayments/danish\\_payments\\_council/Documents/The%20costs%20of%20consumer%20to%20business%20payments%20have%20decreased%20considerably.pdf](https://www.nationalbanken.dk/en/bankingandpayments/danish_payments_council/Documents/The%20costs%20of%20consumer%20to%20business%20payments%20have%20decreased%20considerably.pdf). Downloaded: 17 March 2022.

DPC (2019a): *Business-to-business payments entailed social costs of kr. 4.2 billion*. Analysis, Danish Payments Council. [https://www.nationalbanken.dk/en/bankingandpayments/danish\\_payments\\_council/Documents/BR\\_Business-to-business%20payments%20in%20Denmark%202016.pdf](https://www.nationalbanken.dk/en/bankingandpayments/danish_payments_council/Documents/BR_Business-to-business%20payments%20in%20Denmark%202016.pdf). Downloaded: 17 March 2022.

DPC (2019b): *The mobile phone has contributed to reducing the costs of person-to-person payments*. Analysis, Danish Payments Council. [https://www.nationalbanken.dk/en/bankingandpayments/danish\\_payments\\_council/Documents/BR\\_The%20mobile%20phone%20has%20contributed%20to%20reducing%20the%20costs%20of%20person-to-person%20payments.pdf](https://www.nationalbanken.dk/en/bankingandpayments/danish_payments_council/Documents/BR_The%20mobile%20phone%20has%20contributed%20to%20reducing%20the%20costs%20of%20person-to-person%20payments.pdf). Downloaded: 17 March 2022.

DPC (2019c): *Payments involve considerable economies of scale*. Analysis, Danish Payments Council. [https://www.nationalbanken.dk/en/bankingandpayments/danish\\_payments\\_council/Documents/BR\\_Payments%20involve%20considerable%20economies%20of%20scale.pdf](https://www.nationalbanken.dk/en/bankingandpayments/danish_payments_council/Documents/BR_Payments%20involve%20considerable%20economies%20of%20scale.pdf). Downloaded: 17 March 2022.

ECB (2021): *Statistical Data Warehouse, Table 7.4*. European Central Bank. Downloaded: 24 February 2022.

Fischer, B. – Koehler, P. – Seitz, F. (2004): *The Demand for Euro Area Currencies: Past, Present and Future*. ECB Working Paper Series, No. 330. <https://doi.org/10.2139/ssrn.526993>

- Gresvik, O. – Haare, H. (2009a): *Costs in the Norwegian payment system*. Norges Bank Staff Memo No. 4. [https://www.norges-bank.no/globalassets/upload/publikasjoner/staff-memo/2009/staff\\_memo\\_0409.pdf](https://www.norges-bank.no/globalassets/upload/publikasjoner/staff-memo/2009/staff_memo_0409.pdf). Downloaded: 17 March 2022.
- Gresvik, O. – Haare, H. (2009b): *Costs in the payment system*. Norges Bank Economic Bulletin 1/2009, Vol. 80, pp. 16–27.
- Ilyés, T. – Varga, L. (2016): *Macroeconomic effects of the increase of electronic retail payments – A general equilibrium approach using Hungarian data*. Financial and Economic Review, 15(2): 129–152. <https://en-hitelintezetiszemle.mnb.hu/letoltes/tamas-ilyes-lorant-varga-en.pdf>
- Kajdi, L. – Kiss, M. (2021): *The impact of policy effects on the Hungarian payments card market*. Journal of Banking Regulation, 23(2): 107–119. <https://doi.org/10.1057/s41261-021-00152-6>
- Marwijk, M. van – Ruiter, M. de – Zeijden, P. van der (2018): *Kosten van het toonbankbetalingsverkeer in 2017*. Zoetermeer. [https://www.pin.nl/wp-uploads/2018/12/Kosten\\_van\\_het\\_toonbankbetalingsverkeer\\_2017.pdf](https://www.pin.nl/wp-uploads/2018/12/Kosten_van_het_toonbankbetalingsverkeer_2017.pdf). Downloaded: 17 March 2022.
- McKinsey (2021): *The Future of the Cash Infrastructure in the Netherlands*, June. <https://www.dnb.nl/media/ks0d0d30/report-mckinsey-the-future-of-the-cash-infrastructure-in-the-netherlands-executive-summary-only.pdf>. Downloaded: 17 March 2022.
- MNB (2021): *Financial Stability Report*, June. Magyar Nemzeti Bank. <https://www.mnb.hu/letoltes/financial-stability-report-2021-june.pdf>
- NBB (2006): *Costs, advantages and drawbacks of the various means of payment*. National Bank of Belgium Economic Review, 2006(1): 41–47. [https://www.nbb.be/doc/ts/publications/economicreview/2006/ecorevi2006\\_h3.pdf](https://www.nbb.be/doc/ts/publications/economicreview/2006/ecorevi2006_h3.pdf)
- Norges Bank (2014): *Costs in the Norwegian payment system*. Norges Bank Papers No. 5. <https://www.norges-bank.no/en/news-events/news-publications/Reports/Norges-Bank-Papers/2014/52014/>
- Przenajkowska, K. – Polasik, M. – Maciejewski K. – Koźliński, T. (2019): *Costs of payment instruments on the Polish market*. Narodowy Bank Polski, Warsaw. [https://www.nbp.pl/en/system\\_platniczy/costs-of-payment-instruments.pdf](https://www.nbp.pl/en/system_platniczy/costs-of-payment-instruments.pdf)
- Przenajkowska, K. – Polasik, M. – Kotkowski, R. – Krawczyk, W. (2020): *Costs of payment instruments on the Polish market broken down into fixed costs and variable costs*. Narodowy Bank Polski, Warsaw. [https://ssl.nbp.pl/en/system\\_platniczy/costs-of-payment-instruments-broken-down-into-fixed-variable-costs.pdf](https://ssl.nbp.pl/en/system_platniczy/costs-of-payment-instruments-broken-down-into-fixed-variable-costs.pdf)

- Schmiedel, H. – Kostova, G. – Ruttenberg, W. (2012): *The Social and Private Costs of Retail Payment Instruments: A European Perspective*. ECB Occasional Paper Series No. 137. <https://doi.org/10.2139/ssrn.2145439>
- Sintonen, M. – Takala K. (2022): *Vähittäismaksamisen kustannukset: mitä maksaminen maksaa?* Suomen Pankki, Yleistajuiset selvitykset A 128. <https://urn.fi/URN:NBN:fi-bof-202202021041>
- Turján, A. – Divéki, É. – Keszy-Harmath, É. – Kóczán, G. – Takács, K. (2011): *Nothing is free: A survey of the social cost of the main payment instruments in Hungary*. Occasional Papers 93, Magyar Nemzeti Bank. <https://www.mnb.hu/letoltes/op93-fmtk.pdf>
- Végső, T. – Belházné Illés, Á. – Bódi-Schubert, A. (2018): *Késpénz vagy kártya? – A magyar lakosság fizetési szokásainak feltáró elemzése (Cash or card? – An explorative analysis of consumers' payment behaviour in Hungary)*. Pénzügyi Szemle (Public Finance Quarterly), 63(4): 455–479.