2 FINANCIAL AND ECONOMIC REVIEW

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

Vivien Deák – László Kajdi – István Nemecskó – 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

* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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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[1] (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,

[1] 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.

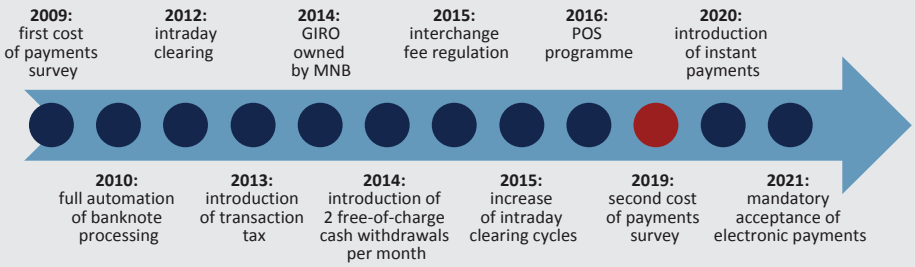
As cash-related costs remain the most significant according to most social cost surveys, improvements in cash infrastructure may be particularly important. Recently, the Dutch central bank commissioned a comprehensive analysis on the future of the local cash infrastructure (*McKinsey 2021*), which also 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.[2]

Figure 1
Evolution of the payments market in Hungary



Source: MNB

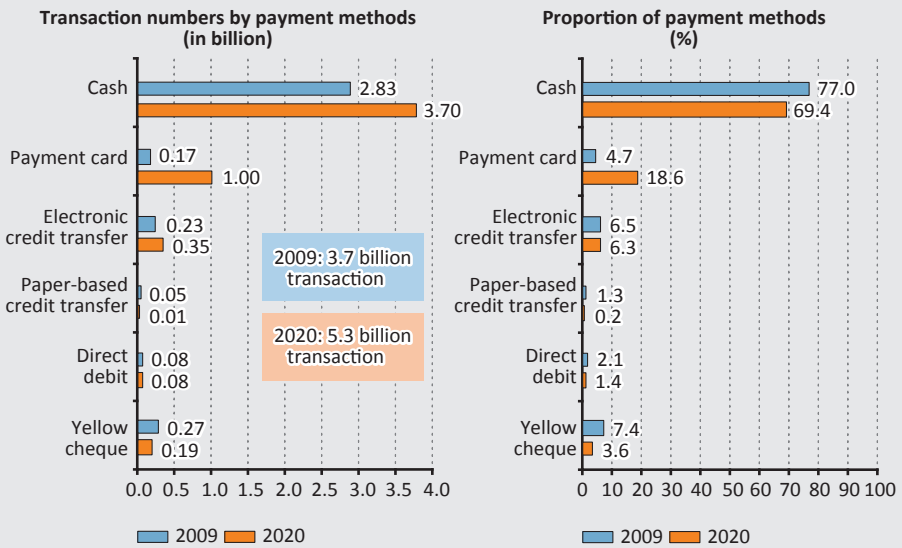
3.1. Main payments market processes

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.

[2] Stadat 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



Note: As the cost data is for 2019 and for some sectors for 2020, we presented the transaction figures for 2020.

Source: MNB

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.

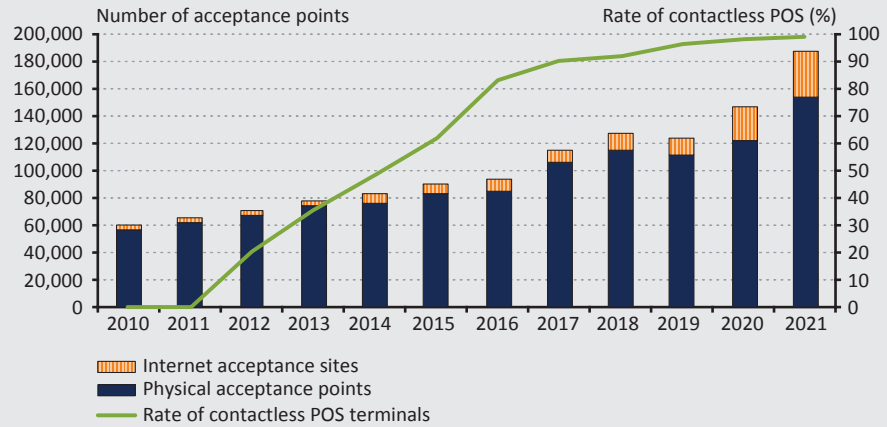
For credit institutions, cash-related costs were significantly affected by changes in the sizes of the branch and ATM networks. While the number of domestic branches exceeded 3,500 in 2009, since the early 2010s there have been several waves of major branch closures, resulting in a reduction in the size 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

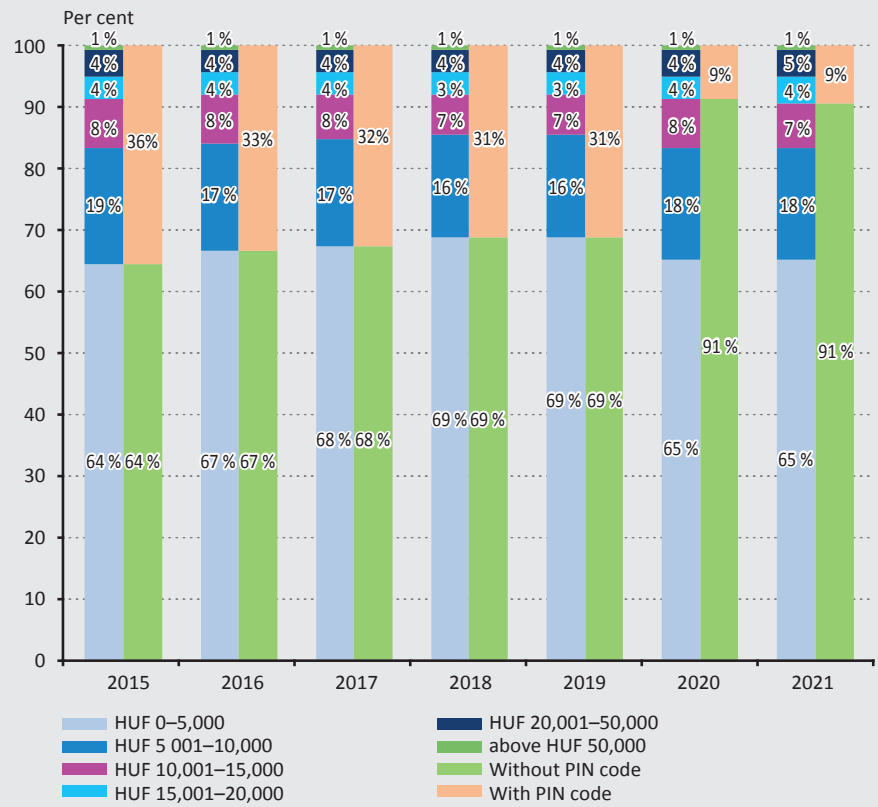
The regulatory reduction of interchange fees is also noteworthy, which has both restrained acquirer costs and helped a number of non-bank players involved only in acquiring services to enter the market, thus reducing market concentration and increasing competition (*Kajdi – Kiss 2021*). In this area, 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[3] 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

[3] 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[4] from the Hungarian Central Statistical Office (HCSO) were also used to complete the data.

[4] 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.

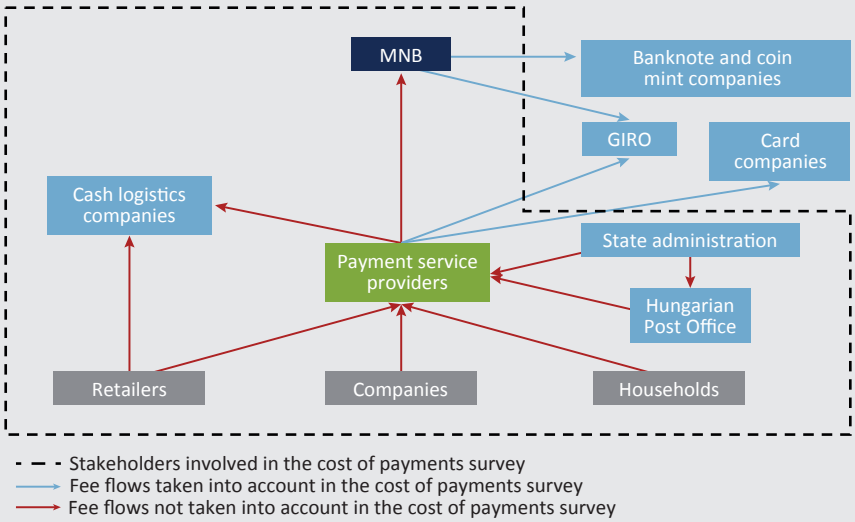
A questionnaire was also used to assess the costs of the banking sector – for the period covered in 2019 – with respondents covering almost the entire domestic sector. No separate data was collected for the costs of non-banking agents, in which case an estimate was made on the basis of the data of banking 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,[5] 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

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

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.

Table 2
Social cost of payment instruments in 2009 (HUF billion)

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

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.[6]

[6] 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[7]), assuming that their price changed with inflation. The costs thus calculated are shown in *Table 3*.

Table 3
Social cost of payment instruments in 2019 adjusted for wage growth and inflation between 2009 and 2019 (HUF billion)

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

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.

[7] Stadat tables, 3.6.1. A fogyasztóiár-index (Consumer price index), HCSO. Downloaded: 1 November 2021.

Table 4
Difference between the adjusted social costs in 2019 and 2009 (HUF billion)

	Cash	Debit card	Credit transfer	Direct debits	"Yellow cheque"	Pension	Total
MNB	–0.86	0.11	0.05		–0.42		**–1.12**
Cash-in-transit companies	–5.45				–0.93		**–6.38**
Payment service providers, Magyar Posta, State Treasury	–39.32	16.75	–7.98	–2.31	–7.06	–4.09	**–44.01**
Businesses (including retailers)	32.34	53.35	17.67	2.90	–2.91		**103.35**
Households	7.67	5.16	–11.37	–0.08	15.02		**16.40**
State	–1.17	0.15	0.21	0.02	–0.09		**–0.88**
Total	**–6.79**	**75.52**	**–1.42**	**0.53**	**3.61**	**–4.09**	**67.36**

Source: MNB calculations

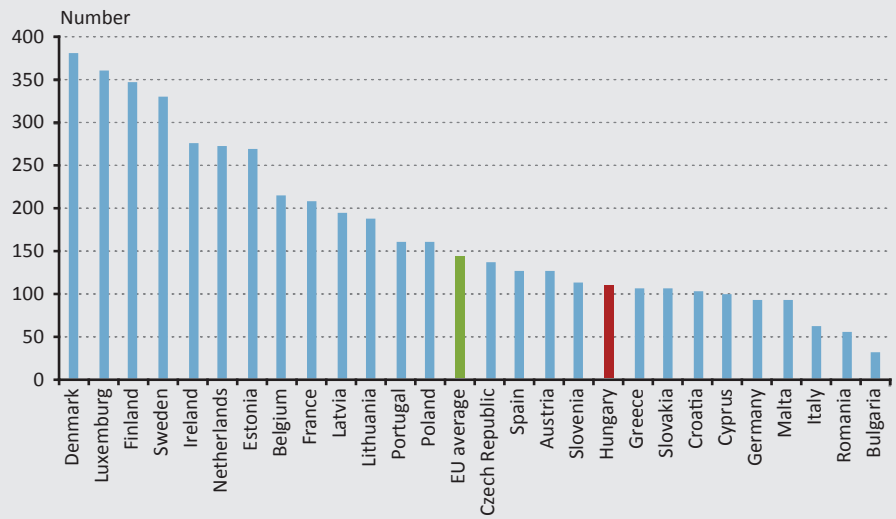
Partly as a result of the regulatory measures gradually introduced by the MNB over the past decade, the efficiency of cash handling improved significantly between 2009 and 2019, which manifested itself mainly at banks and cash logistics providers. *Table 4* also shows that for cash, the adjusted costs 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[8] 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

[8] *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*).

Figure 6
Number of card payments per capita in 2020



Note: 2019 data for Cyprus, Malta and Slovenia
Source: ECB (2021)

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.

Table 5
Social costs per transaction (unit costs) in HUF

	Cash	Card	Credit transfer	Direct debits	"Yellow cheque"
2019	104	233	360	165	352
2019 adjusted	67	109	228	137	264
2009	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*).

Table 6
Unit social costs per transaction in some European countries, in euro

	Cash	Card	Credit transfer	Direct debits
Hungary				
2019	0.32	0.72	1.11	0.51
2019 adjusted	0.21	0.34	0.70	0.42
Poland				
2018	0.32	0.33 (0.49)*	0.19	1.12
Italy				
2016	0.35	0.59 (1.10)*	1.63	0.49
Portugal				
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.

Table 7
Unit cost of cash usage in relation to the cash stock in circulation in HUF

	Social cost per 100 forints of cash in circulation	Social cost per banknote in circulation	Social cost per transaction banknote in circulation
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.

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Does the Past Haunt Us No More? How Proximity to Foreign Currency Lending Experience Affects Trust in the Banking System and Financial Literacy*

Zita Fellner – Anna Marosi

While FX lending is often the focus of analyses on non-performing loans and post-crisis debt relief measures, its effect on debtors' subsequent behaviour and attitudes has been addressed to a far lesser extent in the research in recent years. In our study, we seek to fill this gap by examining the effect of proximity to foreign currency lending experience on an individual's trust in the banking system, and financial literacy. For our study, we relied on data from a CATI survey conducted on behalf of the MNB, the central bank of Hungary, in September 2021. The sample of 1,001 respondents represents the Hungarian adult population in terms of gender, age, type of municipality, region and educational level. In addition to the proximity to foreign currency lending experience, modelling controls included sociodemographic variables on the one hand, and variables related to borrowing on the other. The effect of proximity to foreign currency lending experience was examined in terms of both trust in the banking system and components of financial literacy. The effect was quantified using a linear regression model based on OLS estimation. According to our estimate, the role of proximity to foreign currency lending experience is less important than expected. Closer proximity to foreign currency lending experience has no apparent effect on a borrower's overall trust in banks operating in Hungary. At the same time, proximity to foreign currency lending experience increases the likelihood of the respondent's belief that a bank acts in bad faith (exploiting legal loopholes). Among the components of financial literacy, it plays a significant role only in financial knowledge, i.e. controlled for other factors, closer proximity on average increases financial knowledge. Conversely, it fails to influence, in any manner, the adoption of more conscious attitude, behaviour and practices.

Journal of Economic Literature (JEL) codes: D14, E51, R20

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1. Introduction

In our study, we examine the effect of proximity to foreign currency (FX) lending experience on an individual's trust in the banking system and financial literacy. In Hungary, prior to the 2008 financial crisis, foreign currency indebtedness was dominant, partly driven by a generally low level of financial literacy. One question of relevance to financial stability is to what extent experiences with FX debt have been incorporated into the current behaviour, knowledge and attitude of the population. That question is all the more relevant because trust in the banking system has an important role in increasing credit penetration, i.e. financial deepening. Therefore, it is not irrelevant whether negative experiences with FX debt continue to affect the attitude of the population towards the institutional system nowadays.

The study is structured as follows: In *Section 2*, we provide a brief literature review of the main issues being addressed, namely trust in the banking system, financial literacy, and the repercussions of FX debt on individuals. *Section 3* presents the data collection, our explanatory variables, our dependent variables, and the methodology of analysis. In *Section 4*, we present our results in detail, analysing the effects of other variables in our regressions in addition to the role of FX debt. *Section 5* offers a summary of our findings.

2. Literature review

2.1. Trust in the banking system

Mutual trust between the banking system and customers is the basis of banking: deposit-taking and lending are two core activities of banks, a medium- or long-term transaction in an asymmetric information situation, the subject of which is the bank's or the customer's money. *Kovács and Terták* (*2019: pp. 38–47*) argue in their work that although banking has undergone significant changes as a result of financial innovation and technological development, this fundamental feature of the business relationship has not disappeared.

Müller and Kerényi (*2019*) discuss trust in the financial intermediation system in relation to *FinTech*. Their study is theoretical rather than empirical: based on *Koslowki* (*2011*), they argue that institutional trust is the focus of attention after periods of crises, after an economy has successfully passed through the bottom of the crisis as a result of the most urgent interventions. As a case study, they show that after the financial crisis of 2008, the European Union set up a number of institutions to maintain and control the safe functioning of the financial sector in response to the crisis of confidence (as well). Regulations in Hungary were also strengthened accordingly. However, the restoration of confidence proved to be

a longer-lasting process than the economic crisis: trust in the banking sector was restored by the mid-2010s as a result of the joint involvement of state and market actors (*Müller – Kerényi 2019: p. 11*).

While there is limited research available on the evolution of household trust in the banking system, it is common knowledge that whatever its previous level was, it was negatively impacted by the 2008 financial crisis. Of the ad-hoc surveys, one of the most comprehensive is the World Values Survey conducted in 60 countries between 2010–2014.[1] It found that in many countries more than half of the population trusts in banks (however, due to differences in reference periods, the results of specific countries may not be comparable). The results show significant regional differences, with the populations of European countries appearing to be more mistrustful by global standards. Hungary did not participate in this research, but the MNB conducted a survey on the subject in 2019, also on an ad-hoc basis, finding that one quarter of the Hungarian population had no trust in banks at all (*El-Meouch et al. 2020*).

Based on the 2018 OECD Financial Literacy Survey, *Béres* (*2020*) analysed trust in deposit insurance in reference to the attitude that "My money in the bank is safe even if the bank goes bankrupt." Based on his results, in Hungary trust in the banking system is independent of gender and income; however, there is a relationship with age, region, type of municipality and educational level.[2] He also concludes, remarkably, that a higher proportion of respondents, trusting the deposit insurance scheme, set financial goals or prepare a family budget.

2.2. Measuring financial literacy

The OECD *International Network on Financial Education* is at the forefront of measuring the public's financial literacy at the international level. They define financial literacy as "a combination of awareness, knowledge, skill, attitude and behaviour, necessary to make sound financial decisions and ultimately achieve individual financial wellbeing" (*Atkinson – Messy 2012*). In keeping with the concept that they have developed, current research distinguishes three main pillars of financial literacy, namely *knowledge*, *behaviour* and *attitude* (*OECD 2018*). All three factors contribute to the process whereby an individual ultimately decides on financial issues that may determine his or her life in the long term.

[1] The questionnaire and the data used in the survey can be found here: https://www.worldvaluessurvey.org/WVSDocumentationWV6.jsp

[2] The degree of trust was found to exceed the average in the age bracket of 30–39-year-olds, residents of the West Transdanubia and North Great Plain regions, residents of settlements with fewer than 100,000 inhabitants, and respondents with higher educational level.

These components provide a complex view of the financial literacy of Hungarian households in an international comparison. According to the *OECD 2018 survey*, Hungary is in the mid-range in terms of level of financial knowledge, while it is also a country with one of the most cautious financial attitudes, but one of the least aware in terms of behaviour (*Figure 1*). This highlights the risky duality that although risk seeking, impulsivity and a *carpe diem* attitude are not strong characteristics of Hungarian households, they are still not able to develop behaviour to match that mentality.

Following multiple validations, the OECD measurement toolkit includes the following items:

– knowledge (7 questions, values 0–7): (1) time value of money; (2) interest payment on loans; (3) simple interest calculation; (4) compounding; (5) risk and return; (6) inflation; (7) risk diversification.

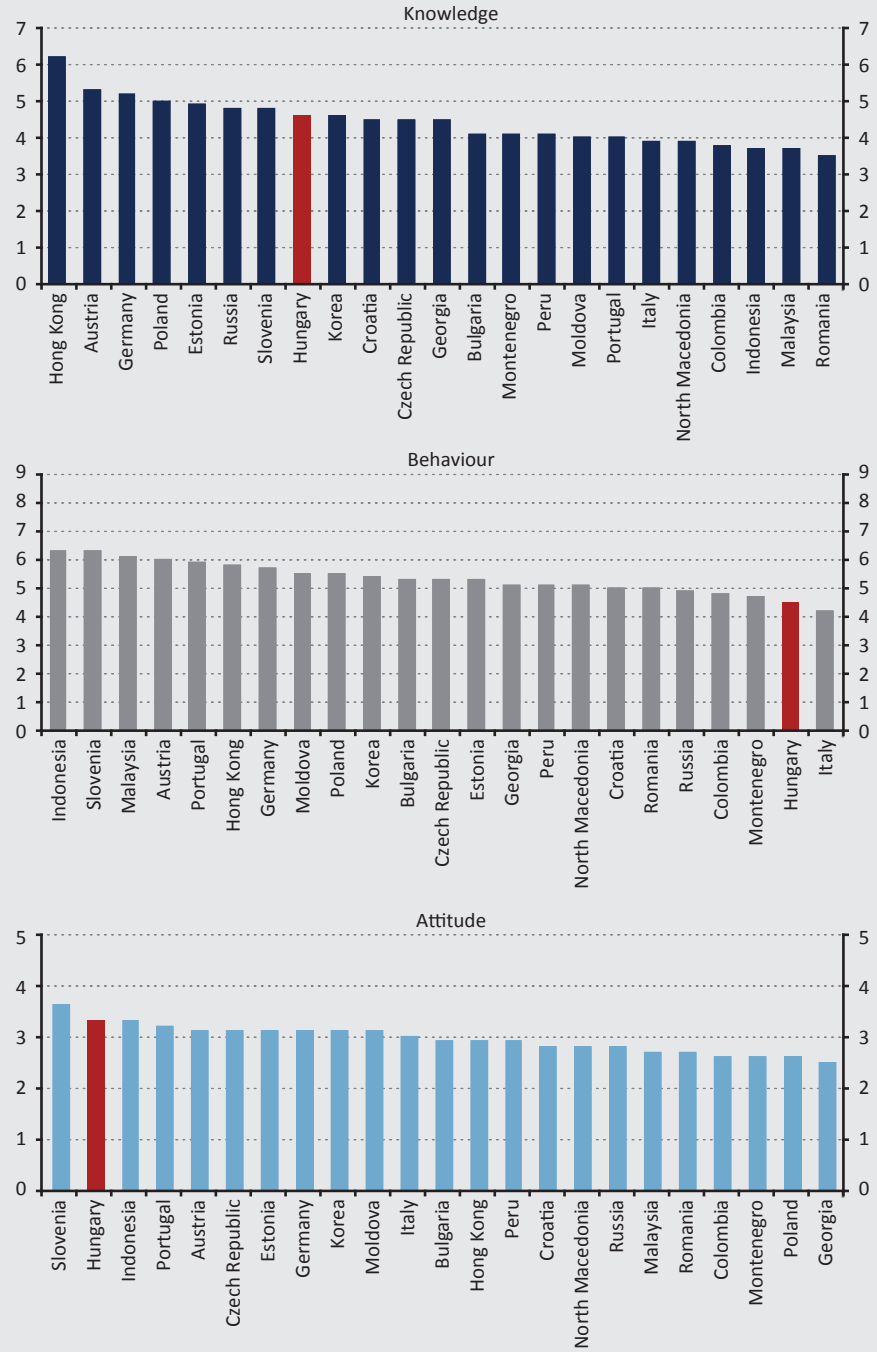
– behaviour (9 questions, values 0–9): (1) active saving; (2) borrowing at the end of the month to make ends meet; (3) setting long-term financial goals; (4) seeking independent information or advice when considering making a purchase of financial products and services; (5) considering multiple options when selecting; (6) making informed decisions by shopping around rather than purchasing the most readily available product or service; (7) keeping a watch of financial affairs; (8) paying bills on time; (9) avoiding falling into arrears.

– attitude (3 questions, values 1–5): (1) "I tend to live for today and let tomorrow take care of itself"; (2) "Money is there to be spent"; (3) "I find it more satisfying to spend money than to save it for the long-term".

The most significant researchers in the concept and research of financial literacy in the international literature are *Annamaria Lusardi and Olivia Mitchell* (their most cited works are *2008*, *2011a*, *2011b*, *2014*). In several studies, the authors have discussed international differences in financial literacy and the impact of gender, age, or environmental differences on personal finances, as well as the macroeconomic role of household financial literacy on economic growth.

In recent years, a number of studies have been published in the Hungarian literature that have performed empirical analysis of financial literacy and culture. Some of these processes the OECD results (see, for example, *Németh – Zsótér 2017; Németh et al. 2017*; *Csorba 2020*; *Kovács – Szóka 2020*). Another key direction in the Hungarian literature is the development of financial personality types (see, for example, *Luksander et al. 2016*; *Zsótér et al. 2016*; *Németh et al. 2016*). *Szobonya* (*2021*) examined the relationship with digital competencies, *Horváthné Kökény and Széles* (*2014*) in connection with savings, and *Huzdik et al.* (*2014*) researched its role in risk appetite. Numerous surveys target the financial literacy of young

Figure1
Financial knowledge, behaviour and attitude in an international comparison



Note: Based on 2018 data. Higher scores indicate higher level of knowledge, more conscious behaviour, and less carpe diem attitude respectively.

Source: OECD (2020)

people, even high school students (e.g. *Luksander et al. 2014*; *Zsótér 2018*; *Kovács et al. 2021*), and there are studies that apply to other, narrower groups in society (e.g., *Botos et al. 2012*). *Csorba* (*2020*) and *Zsótér and Nagy* (*2012*) examined financial culture in a broader context. The financial vulnerability of the population was discussed by Németh et al. 2020, and the macroeconomic effects of financial culture were discussed by *Béres and Huzdik* (*2012*).

The MNB addressed financial literacy in several previous studies. In 2015, a survey of non-performing mortgage loan debtors was conducted and confirmed that this group of debtors expected further government assistance, which justified the potential existence of a moral hazard (*Dancsik et al. 2015*). In 2018, consumer credit debtors were segmented based on credit statistics, resulting in the identification of two problematic groups in terms of stability: the "jugglers", who have several credit agreements at the same time, typically with different financial institutions; and the "over-indebted", who had undertaken relatively large debts compared to their incomes (*MNB 2018*, *Box 4*). In 2019, a survey was conducted on the perception of interest rate risk among retail borrowers, which confirmed that although they were characterised by a risk-averse attitude, i.e. a preference for instalments that were predictable over the long term, in practice they did not recognise these offers, were not really able to identify factors that influence instalments and could not assess the impact of interest rate increases (*MNB 2019, Chapter 9*).

2.3. Effects of FX debt on the individual

The effects of FX debt on individuals are mostly examined in the context of non-performing loans and debt relief measures resulting from the realisation of exchange rate risk and the increase of the instalments due to banks' unilateral interest rate increases after the crisis.

However, there is no extensive literature in a specific Hungarian context on how foreign currency credit histories affected individuals' *subsequent* behaviours and attitudes. Concerning the effect on risk perception, in their study of using the Austrian central bank's *Euro Survey* micro-level data, *Beckmann et al.* (*2011*) show that following the global economic crisis, the risk awareness of households in Central and South-Eastern European countries increased: respondents considered the foreign currency loans to be riskier, especially in the countries experiencing the devaluation of the domestic currency during the crisis. Of the countries examined, the proportion of respondents who considered FX loans to be riskier than before was the highest in Hungary, at 90 per cent. Where the respondent had acquaintances who had had negative experience with foreign currency loans, this had a significant positive effect on risk awareness in all countries. Nevertheless, in the above survey, 40 per cent of respondents in Hungary – and even higher proportions in the other countries examined – considered euro loans to be more favourable than domestic

currency loans, which, according to the authors, indicates that even after the crisis, exchange rate risk was overwritten by interest rate differentials. Overall, this does not provide a very encouraging view of how the negative consequences of foreign currency debt affect financial literacy.

By contract, *Dancsik* (*2017*) found that in Hungary, FX credit history, or more precisely a previous exchange rate loss incurred on FX loans, increases the likelihood that in the event of subsequent borrowing, the debtor will take out a loan with an interest rate fixed for at least five years. He concludes that the shock to FX debtors may therefore have had a significant effect on the uptake of fixed-rate loans following the 2008 crisis. Using *survey* data, *Banai and Vágó* (*2016*) examined the factors determining households' credit demand in Hungary and Poland, and concluded that in the case of Hungary, negative experiences with foreign currency loans had a negative effect on credit demand in the period considered.

Certainly, in exploring the effects of FX debt in Hungary on individuals, it is also important to identify the social groups where taking foreign currency loans is (or was) more common. *Pellényi and Bilek* (*2009*) found no differences in Hungary between foreign currency debtors and non-foreign currency debtors in terms of either wealth or risk aversion, arguing that foreign currency borrowing was instead driven by macroeconomic factors and a generally low level of financial literacy. By contrast, in other countries the group of credit debtors was more heterogeneous; for example, *Beer et al.* (*2010*) demonstrated that in Austria, FX loans were more likely to be taken out by more risk-seeking, older, financially educated and wealthier households.

3. Data and variables

3.1. Source of data

The results presented here are based on the MNB's survey "*Financial habits in the post-COVID era*". The survey was conducted by telephone (CATI) in September 2021, with 1,001 respondents. Quota sampling ensured the representativeness of the entire Hungarian adult population by gender, age, type of settlement, region and education based on the 2011 census data. Subsequent minimal divergences from the quotas were adjusted by weighting.

The purpose of the 20-minute questionnaire was to map the financial habits of Hungarian consumers, with particular regard to (1) the level of financial literacy; (2) the effect of the coronavirus pandemic on banking digitalisation; (3) trust in banks and financial products; and (4) familiarity with subsidised assistance and credit programmes. The data collection method (telephone) did not allow respondents to answer the questions on a more sensitive scale that is commonly used in such cases;

instead, attitude statements were typically binary (true–false; agree–disagree).[3] This methodological difference does not allow our results to be directly compared with the results of international research.

3.2. Variables of socio-demography and credit history

For modelling purposes, explanatory variables included socio-demographic variables on the one hand, and variables related to borrowing on the other, including proximity to foreign currency lending experience.

The socio-demographic characteristics included the respondent's gender, age (5 categories), size of household (continuous variable), net monthly income (4 categories) and the presence of children under 18 years of age (binary, dummy variable). We also controlled for the type of municipality (4 categories) and the county of the respondent's residence (*Tables 1* and *2*).

In addition, we used the respondent's highest educational level, where instead of the common scale of four (8 years of primary schooling or lower; vocational secondary school; secondary grammar school; college, university), we introduced a scale of five. Within tertiary attainment, we distinguished respondents who studied finance at tertiary level, assuming that financial qualifications could affect attitudes and financial literacy and could therefore lead to different results regarding the effects of proximity to foreign currency lending experience (in the sample, the share of respondents with tertiary non-financial and financial qualifications was 13 per cent and less than 6 per cent, respectively).

The relationship of a household to debt was captured with a binary variable that shows whether the respondent or a member of his/her household has any of the credit products we queried (we only asked about outstanding mortgages and consumer loans). In 39 per cent of the sample, the household has one of the products in question. This ratio is much higher than, for example, the 30-per cent credit penetration established for Hungary based on the 2020 wave of the *European Central Bank's Household Finance and Consumption Survey* (HFCS). The reason for this may be that, owing to the telephone method used in collecting data, more financially aware respondents are over-represented in the sample, which results in a higher level of estimated credit penetration. However, this does not affect our main research question.

[3] Although face-to-face interviews would have been more appropriate for the purposes of the questionnaire, it was not possible to conduct this between the waves of the coronavirus pandemic.

Table 1
Distribution of the weighted and the unweighted sample by explanatory variables (I)

Explanatory variables		Unweighted sample – distribution (%)	Weighted sample – distribution (%)
Gender	Female	53.3	53.5
	Male	46.8	46.5
Age	18–29 years	18.1	17.5
	30–39 years	19.4	19.1
	40–49 years	16.2	16.2
	50–59 years	17.7	17.6
	Over 60 years	28.7	29.6
Educational level	8 years of primary schooling or lower	25.1	28.1
	Vocational secondary school	23.4	22.4
	Secondary grammar school	32.9	31.5
	College, university – non-financial	13.1	12.6
	College, university – financial	5.6	5.4
Number of household members*	1	21.0	21.1
	2	36.4	36.6
	3	20.6	20.6
	4	12.6	12.5
	More than 4	9.3	9.3
Are there any children under the age of 18 in the household?	No	74.6	74.9
	Yes	25.4	25.1
Monthly household net income**	Below HUF 300,000	44.4	45.6
	HUF 300,000–500,000	34.0	33.4
	HUF 500,000–1,000,000	17.4	16.9
	Over HUF 1,000,000	4.2	4.1
Does the household have any loans?	No	61.4	61.9
	Yes	38.6	38.1

*Note: At the end of September, HUF/EUR exchange rate was 360.5, thus HUF 300,000 and HUF 1,000,000 was equal to EUR 832 and EUR 2,774, respectively. Sample size: 1,001 * sample size: 998, used as a continuous variable in the regression (households with more than 4 members were not merged) ** sample size: 944.*

Source: MNB survey "Financial habits in the post-COVID era"

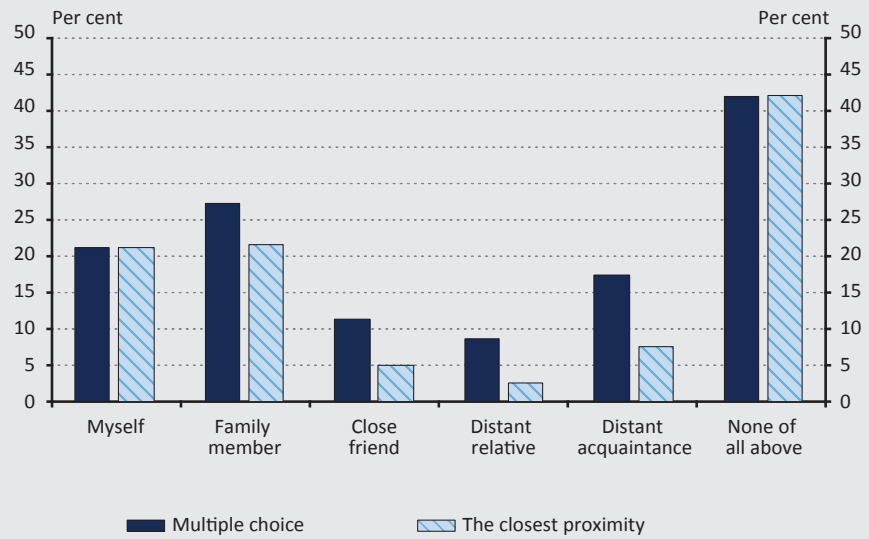
Table 2
Distribution of the weighted and the unweighted sample by explanatory variables (II)

Explanatory variables		Unweighted sample – distribution (%)	Weighted sample – distribution (%)
Type of municipality	Budapest	19.0	18.2
	County seat, city with county authority	17.1	16.8
	Other city/town	35.0	35.0
	Rural municipality	29.0	29.9
County	Budapest	18.1	17.4
	Bács-Kiskun	4.6	4.5
	Baranya	4.3	4.4
	Békés	3.2	3.2
	Borsod-Abaúj-Zemplén	7.0	7.2
	Csongrád-Csanád	5.3	5.3
	Fejér	4.2	4.1
	Győr-Moson-Sopron	3.7	3.8
	Hajdú-Bihar	4.8	4.9
	Heves	3.3	3.3
	Jász-Nagykun-Szolnok	5.0	5.1
	Komárom-Esztergom	3.3	3.3
	Nógrád	1.6	1.6
	Pest	12.0	11.7
	Somogy	4.0	4.1
	Szabolcs-Szatmár-Bereg	4.8	4.9
	Tolna	1.2	1.3
	Vas	1.8	1.8
	Veszprém	3.4	3.5
	Zala	4.5	4.5

Source: MNB survey "Financial habits in the post-COVID era"

The other explanatory variable of borrowing history, which is also the variable in focus, is the proximity to foreign currency lending experience. The multiple choice question was formulated as follows: "Did you or any of your relatives/acquaintances take out a foreign currency loan before 2010?" On this basis, 42 per cent of the population does not have (or is unaware of) any acquaintance who took out a FX loan; yet 21 per cent had themselves been foreign currency debtors (*Figure 2*).[4] For the purpose of the regression, we recoded this variable: the closest proximity was assigned to each respondent. For example, where a respondent had both a family member and a distant relative who had taken out FX loans, that closer relationship ("family member") was assigned to the respondent. This denotes the proximity to foreign currency lending experience, 5 representing the closest proximity ("myself") and 0 the most distant proximity ("None of all above") (treated as a continuous variable).[5]

Figure 2
Proximity to foreign currency lending experience



Note: n = 967

Source: MNB survey "Financial habits in the post-COVID era"

[4] The fact that 21 per cent of the respondents had foreign currency loans is in line with the micro-level administrative credit data. According to the report of the Magyar Nemzeti Bank (*MNB 2016: p. 75, Table 8.1*) almost 1.9 million FX and FX-based contracts were concluded until the FX conversion (including contracts terminated before settlement, live contracts and terminated contracts). This represents a penetration of 19 per cent of the population in 2016. In addition to the sampling error, the discrepancy may be due to the fact that a contract may have more than one debtor, so that several people may say that they have taken it on their own.

[5] Proximity to foreign currency lending experience was also added to the equations as a binary variable, and our results are robust in this regard.

3.3. Dependent variables

The effect of proximity to foreign currency lending experience was examined in terms of both trust in the banking system and components of financial literacy. The effect was quantified using a linear regression model based on OLS estimation. The explanatory variables are the same in all regression functions, except that a given component of financial literacy was not included in the regression explaining it.

Trust in the banking system was measured by five variables (*Table 3*).

Our first variable (T1) was meant to capture the general trust in the banking system, while the rest (T2 to T5) focused on the partial segments of trust in the institutions and the factors influencing them.

T1: More than 70 per cent of the respondents have overall trust in banks operating in Hungary.

T2: 58 per cent of the respondents think that there may be situations where people do not have access to their money in financial institutions, which, other than lack of trust in the banking system, may also reflect some general uncertainty over economic policy.

T3: However, a meaningful proportion of the respondents perceive some sort of bad faith on the part of banks: 55 per cent consider it common for banks to exploit legal loopholes to the respondent's disadvantage

T4: About half of the respondents reported the experience of receiving information from financial institutions that was difficult to understand, which, in our view, could also be a factor eroding trust.

T5: However, only a relatively low proportion (27 per cent) reported cases where a bank failed to provide information about specific details or risks of the products the respondent used.

For regression purposes, the statements were inverted so that a response expressing trust was assigned the value of 1 and one expressing lack of trust the value of 0. Therefore, positive coefficients indicate factors encouraging trust, whereas negative coefficients indicate factors discouraging trust.

Our methodology is based on the OECD toolkit to measure financial literacy: accordingly, we distinguished financial knowledge, attitude and behaviour. In addition to the true/false test measuring knowledge and statements measuring attitudes and behaviours, we also incorporated three statements to assess the extent to which the respondent implements good practices that reinforce financial literacy.

Table 3
Items measuring trust in the banking system

	Unweighted sample – distribution (%)			Weighted sample – distribution (%)		
Trust items	**Yes**	**No**	**Total**	**Yes**	**No**	**Total**
T1. Overall, do you trust banks operating in Hungary?	71.8	28.2	100	71.6	28.4	100
T2. Do you think that there may be a situation in Hungary where people do not have access to their money in financial institutions?	58.2	41.9	100	58.1	41.9	100
T3. Do you think it is typical for your financial institution to act to your detriment, taking advantage of legal loopholes?	54.9	45.1	100	54.7	45.3	100
T4. Have you ever found it difficult to understand the received information from financial institutions?	50.9	49.1	100	50.7	49.3	100
T5. Have you ever not been informed by financial institutions about certain details and risks of the products and services you use (e.g. credit, bank account, savings product)?	26.8	73.2	100	26.6	73.4	100

Note: When asked about trust, interviewers asked the respondents to think primarily in terms of the previous 10 years, i.e. disregard the period of foreign currency lending. Sample size: T1: 979; T2: 982; T3: 960; T4: 975; T5: 969.

Source: MNB survey "Financial habits in the post-COVID era"

The statements measuring knowledge gauged familiarity with the positive relationship between return and risk (K1, K4), inflation (K2, K5), and the effect of diversification as a risk mitigant (K3). Three of them (K1, K3, K5) are covered in the OECD survey, to which we added another two to gain a more nuanced picture. The results show that the share of correct answers was the highest in the case of questions about inflation, whereas respondents were the least familiar with the benefits of portfolio diversification (*Table 4*). This latter question also had the highest level of non-response. This can be explained by the fact that the OECD question is relevant to the developed world as a whole but less relevant in Hungary, because only a small proportion of the population exhibits demand in the security markets.

Table 4
Items measuring financial knowledge

	Unweighted sample – distribution (%)				Weighted sample – distribution (%)			
Financial knowledge items	Correct answer	Incorrect answer	Do not know / No answer	Total	Correct answer	Incorrect answer	Do not know / No answer	Total
K1. A high-return investment is likely to be high-risk.	78.7	16.4	4.9	100.0	78.5	16.5	5.0	100.0
K2. High inflation means that the cost of living is rising rapidly.	89.9	8.8	1.3	100.0	89.9	8.7	1.4	100.0
K3. In general, you can reduce the risk of stock market investments by buying many different stocks and shares.	53.5	20.5	26.0	100.0	52.8	20.6	26.6	100.0
K4. High-return investments are typically low-risk.	71.6	15.6	12.8	100.0	70.5	16.1	13.4	100.0
K5. If you put your money in the bank and inflation is higher than the annual bank interest rate for the next 1 year, your money will be worth more after 1 year.	82.2	11.5	6.3	100.0	81.3	12.0	6.7	100.0

Source: MNB survey "Financial habits in the post-COVID era"

To assess financial literacy in attitude, we also relied on three OECD statements, which capture the carpe diem attitude. While the non-response ratio was low, the proportion of respondents agreeing with each of the three statements varied greatly: half of the respondents agreed that "Money is there to be spent", while 17 and 20 per cent, respectively, agreed with the other two statements (*Table 5*). This indicates an attitude of overall consciousness, one that is not defined by a carpe diem mentality.

Table 5
Items measuring financial attitude

	Unweighted sample – distribution (%)				Weighted sample – distribution (%)			
Financial attitude items	Agree	Disagree	Do not know / no answer	Total	Agree	Disagree	Do not know / no answer	Total
A1. I tend to live for today and let tomorrow take care of itself.	19.0	80.0	1.0	100.0	19.6	79.4	1.0	100.0
A2. Money is there to be spent.	48.9	49.9	1.3	100.0	49.1	49.5	1.4	100.0
A3. I find it more satisfying to spend money than to save it for the long-term.	16.8	79.4	3.8	100.0	17.2	78.9	3.9	100.0

Note: The sum of the weights in row A2 equals 100,1 per cent due to rounding.
Source: MNB survey "Financial habits in the post-COVID era"

We tested financial behaviour with four statements, primarily concerning conscious financial planning. The overwhelming majority, between 75 and 96 per cent, agree with the statements (*Table 6*). Accordingly, in addition to daily mandatory items (payment of bills), the setting of long-term goals also appears to be a common attribute of the population.

Table 6
Items measuring financial behaviour

	Unweighted sample – distribution (%)				Weighted sample – distribution (%)			
Financial behaviour items	Agree	Disagree	Do not know / No answer	Total	Agree	Disagree	Do not know / No answer	Total
B1. I check my financial affairs regularly and thoroughly.	88.5	11.4	0.1	100.0	88.6	11.2	0.2	100.0
B2. I set long-term goals and strive to achieve them.	74.8	24.7	0.5	100.0	74.5	24.9	0.6	100.0
B3. Before I buy, I carefully consider whether I can afford it.	91.4	8.5	0.1	100.0	91.4	8.5	0.2	100.0
B4. I pay bills on time.	96.1	3.5	0.4	100.0	96.0	3.5	0.5	100.0

Note: The sum of the weights in row A2 equals 100,1 per cent due to rounding.
Source: MNB survey "Financial habits in the post-COVID era"

In addition to behaviour, we also incorporated a fourth pillar into the study of financial literacy, which focused on concrete, practical activities in addition to behavioural elements expressing general attitudes. We considered this distinction important, and thus deserving to be added to the OECD methodology, because terms describing behavioural items, such as "regular", "thorough" and "seeks", also involve subjective judgement on the part of the respondent. For that reason, we formulated three statements that indicated specific activities, i.e. drawing up shopping lists and preparing household budgets, whereas "regular" checks on financial matters was defined as a weekly activity. Introducing these items to measure practice proved to be useful: they produced lower rates of agreement (between 45 and 68 per cent) compared to the statements about behaviour (Table 7). In our survey, we found that less than half of the population prepares a budget, but more than two-thirds of them prepare a shopping list before making purchases.

Table 7
Items measuring financial practice

	Unweighted sample – distribution (%)				Weighted sample – distribution (%)			
Financial practice items	Agree	Disagree	Do not know / No answer	Total	Agree	Disagree	Do not know / No answer	Total
P1. I maintain an accurate budget for my revenues and expenditures.	45.2	54.8	0.0	100.0	45.3	54.6	0.1	100.0
P2. At least once a week I check how much disposable income I have.	66.1	33.7	0.2	100.0	66.4	33.3	0.3	100.0
P3. I write a shopping list before I make purchases.	68.4	31.5	0.1	100.0	68.3	31.5	0.2	100.0

Source: MNB survey "Financial habits in the post-COVID era"

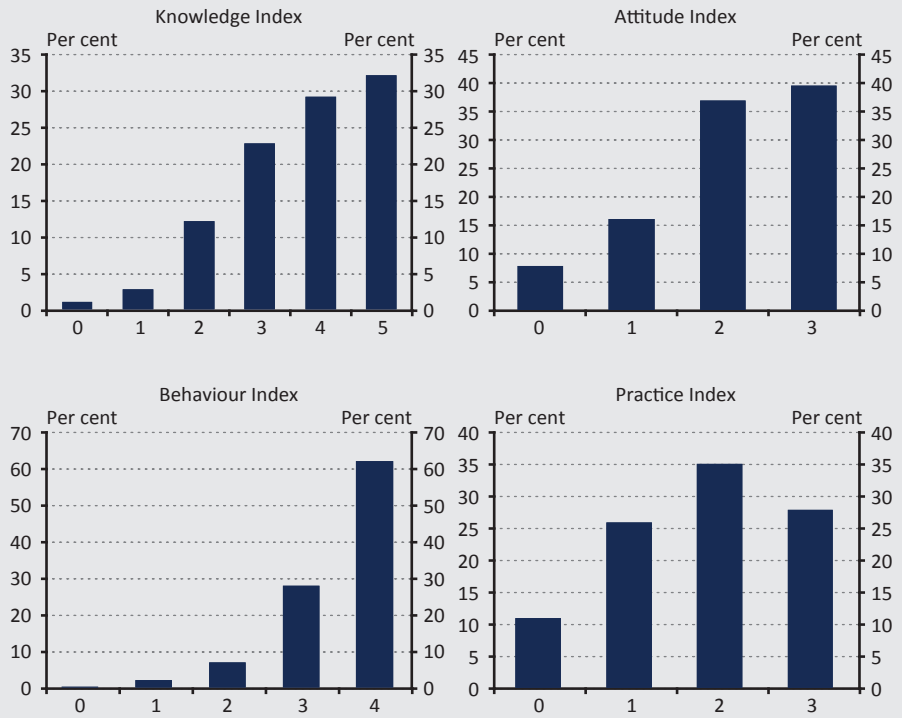
For application in regression functions, we derived indices from each literacy component by producing the unweighted aggregate of all statements associated with that component.[6] For aggregation purposes, we converted each item by assigning it the value of 1 in the case of answers showing literacy, and the value of 0 in all other cases (lack of literacy and non-response). As can be seen from the tables presenting the answers to each question, the responses indicated relatively high levels of financial literacy. Accordingly, the distribution of the four derived indices is skewed to the right, with the practice index falling the closest to symmetric distribution (*Figure 3*).

The four financial literacy indices are used in our study both as explanatory and dependent variables: in the first capacity, they are used to explain trust in the banking system, and in the second, their variance is described in relation to socio-demographic variables and each other.[7]

[6] Having attitude statements at hand, we also carried out principal component analysis on the items associated with each component. The results are robust for the method measuring latent variables (principal component analysis versus indexing).

[7] There is a complex relationship between the individual components of financial literacy, and endogeneity problems also arise. For regression purposes, our primary goal was to examine the impact of proximity to foreign currency lending experience; consequently, the relationship between the four indices is not discussed in more depth, we only establish the fact that correlations exist.

Figure 3
Distribution of each financial literacy index



Source: Calculation based on the MNB survey "Financial habits in the post-COVID era"

4. Results

We established a regression function using OLS estimation. Accordingly, the functions used for estimating the trust variables (T1, T2, T3, T4, T5) are linear probability models (the dependent variable being binary in these cases),[8] and those of models treating financial literacy components as dependent variables are linear regression models. The results in *Table 8* are evaluated at a significance level of 5 per cent.

[8] The results are robust for the estimation function: for the OLS linear probability model, patterns observed are similar to those in the logistic regression function established using maximum likelihood estimation. As we had no intention to use the regression function for prediction, in the *Appendix* we included the linear probability models for easier interpretation.

Table 8
Results of regressions explaining trust in the banking system and financial literacy

	Dependent variable:								
Explanatory variables	**Trust 1.**	**Trust 2.**	**Trust 3.**	**Trust 4.**	**Trust 5.**	**Knowledge**	**Attitude**	**Behaviour**	**Practice**
Proximity to FX lending experience			–			+			
Gender				Male –		Male +			Male –
Educational level						+	+		
Age		+				∩			U
Type of municipality									Budapest +
County									
Members of household									
Children below 18 years (dummy)									
Income	+	∩	∩	+	∩	+	HUF 300,000–500,000 +		U
Debtor (dummy)								–	+
Knowledge Index							+		
Attitude Index		+				+		+	
Behaviour Index							+		+
Practice Index								+	
R^2	8.4%	8.9%	6.9%	7.2%	5.2%	22.7%	14.4%	18.3%	16.1%
n	913	913	913	913	913	913	913	913	913

Note: ∩ means that the lower and upper values of the explanatory variable do not differ significantly, while the middle values do, and with those values the estimated coefficient is positive. U means that the lower and upper values of the explanatory variable do not differ significantly, while the middle values do, and with those values the estimated coefficient is negative.

The role of *proximity to foreign currency lending experience* is more limited than we expected.[9] Closer proximity has no apparent effect on an individual's overall trust in banks operating in Hungary (T1), or on an individual's assumption that people may not have access to their money held in a bank account (T2). Furthermore, respondents (in the post-FX lending period) had no perception of banks failing to inform them about the risks of products or services (T5), nor of difficulty in understanding the information provided by the financial institutions (T4). By contrast, more proximity implies considering it common for banks to exploit legal loopholes to the respondent's disadvantage (T3).[10] Among the components of financial literacy, it plays a significant role only in financial knowledge, i.e. controlled for other factors, closer proximity on average increases financial knowledge. It fails to influence, in any direction, the adoption of more prudent attitudes, behaviours and practices.[11]

In terms of *gender*, men on average tend to agree more that information from banks is difficult to understand; in all other respects, men and women have the same degree of trust in the banking system. Among the financial literacy components, there is no significant gender difference in attitude or behaviour, whereas men scored higher in knowledge, and women in practice, on average.

Educational level has no influence on trust in the banking system, nor on behaviour and practice. On average, however, it is true that the higher the educational level, the greater the financial knowledge and the less the carpe diem attitude.

The role of *age* in models is mixed. In trust indicators, it is significant in a single case only: compared to other age groups, respondents over 60 years are less inclined to agree that people may not have access to their bank account funds (T2). Among the literacy indices, no significant effect was found in attitude or behaviour, whereas a quadratic relationship can be observed in terms of knowledge, in that index values tend to be higher in the case of middle-aged groups. With the practice index, however, an opposite quadratic relationship is found: middle-aged people are on average less financially aware in practice compared to young and elderly groups.

[9] During the review process of the study, it was suggested that the partly counterintuitive results may be due to the high noise level in the data: some respondents were not interested in the questionnaire and responded randomly without a real opinion. We sought to address this in several ways following the reviewer's suggestions: we eliminated those who (1) gave inconsistent responses to K1 and K4 statements; (2) consider themselves as less financially aware than the average; (3) gave the same answer to all attitude, behaviour and practice statements. The regression functions did not change significantly as a result of this data cleaning, and so the number of samples used for the regression functions included in the study is smaller than the total number of respondents only due to missing data.

[10] The aggregation of the trust statements into a single index did not lead to a meaningful result: the involvement with foreign currency lending was not significant in this case either.

[11] The results are robust in terms of whether proximity to FX lending experience was added to the equations on a continuous scale of six, or as a binary variable. We examined the possibility of converting to a binary variable in two ways: (1) we considered to be affected by a foreign currency lending if the respondent, a close family member, or a close friend was involved; (2) we considered affected only if the respondent was itself a foreign currency credit debtor.

Overall, the significance of *geographical* attributes could not be demonstrated: the type of municipality was only significant in explaining of the practice index, where those living in county seats, other cities/towns or rural municipalities consistently scored lower on average than those living in the capital. There is no clear pattern in terms of counties, except for one of the trust models (T1), all could be omitted from the models.

Household size and the presence of *children under 18 years of age* in the household showed no significant effect in any of the models.

Household income was found to be a significant factor in the largest number of cases, but the direction of the relationship varied. For some of the trust indicators, higher income is associated with higher trust (T1, T4). In the other cases, however, the trust of those in the lowest and highest income categories is on average lower (T2, T3, T5) than in the middle categories between the two. A similarly heterogeneous picture emerges when it comes to explaining literacy indices: (1) the relationship with knowledge is positive; (2) in terms of attitude, consciousness tends to be characteristic only of respondents with incomes in the HUF 300,000 to 500,000 bracket, but (3) does not play a role in behaviour, and (4) literacy in practice is more characteristic in the lowest and highest income groups.

Whether a household *currently has a loan* is not related to trust in the banking system, which is also not an intuitive result. The status of being a credit debtor is negatively correlated with prudent behaviour, but positively correlated with cautious practice.

Financial knowledge, as well as *attitude, behaviour and practice*, are correlated with each other, ceteris paribus. Attitude shows a positive relationship with knowledge and with one of the trust indicators (T2), as well as with prudent behaviour.

5. Summary

In our study, we examined the effect of proximity to foreign currency lending experience on an individual's trust in the banking system and financial literacy. Given that FX indebtedness in Hungary resulted in a prolonged financial and social crisis following the onset of the 2008 crisis, an important question to ask is to what extent experiences with FX debt continue to affect the *current* behaviour of the population, in other words, whether we are "still haunted by the past experience of FX lending."

The role and importance of proximity to FX lending experience fell short of our expectations. It does not play a role in explaining the variance of most variables of trust in the banking system. Among more closely involved respondents, only one dimension is given a different treatment: the assumption that banks act in bad faith

is more common, i.e. that a bank would exploit legal loopholes to the respondent's disadvantage. Overall, FX credit history is no longer a significant mitigating force when it comes to trust in the banking system.

Controlled for other factors, closer proximity increases financial knowledge on average, implying that presumably negative experiences with FX debt may have resulted in the acquisition of some basic knowledge. Contrary to our intuitions, however, the adoption of more prudent attitude, behaviour and practices is not influenced in any direction, which raises the question of whether the population's memories of the crisis have faded. Another possible explanation, which requires further research, is that due to the high prominence of the issue FX debt has affected not only those who had a connection to a FX debtor, but also the rest of the population. In this case, it is possible that the effect cannot be estimated because trust in the banking system deteriorated in the entire population, not only for FX debtors and their close environment.

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Appendix: Estimated linear regression functions

Dependent variable: trust (1)	Estimated coefficient	p-value	Dependent variable: trust (2)	Estimated coefficient	p-value
Proximity to FX lending experience	–0.003	0.714	Proximity to FX lending experience	–0.008	0.322
Debtor (dummy)	0.010	0.777	Debtor (dummy)	–0.008	0.818
Knowledge Index	0.016	0.273	Knowledge Index	0.027	0.094
Attitude Index	0.033	0.058	Attitude Index	0.040	0.032
Behaviour Index	0.036	0.105	Behaviour Index	0.024	0.311
Practice Index	0.006	0.718	Practice Index	–0.003	0.877
Gender (reference group: female)	0.003	0.929	Gender (reference group: female)	–0.035	0.314
Income (reference group: Below HUF 300,000)			**Income (reference group: Below HUF 300,000)**		
HUF 300,000–500,000	0.064	0.093	HUF 300,000–500,000	0.111	0.007
HUF 500,000–1,000,000	0.118	0.019	HUF 500,000–1,000,000	0.145	0.008
Over HUF 1,000,000	0.192	0.020	Over HUF 1,000,000	0.098	0.270
Educational level (reference group: 8 years of primary schooling or lower)			**Educational level (reference group: 8 years of primary schooling or lower)**		
Vocational secondary school	0.032	0.480	Vocational secondary school	0.076	0.124
Secondary grammar school	0.042	0.363	Secondary grammar school	0.004	0.933
College, university – non-financial	0.084	0.162	College, university – non-financial	0.013	0.834
College, university – financial	0.147	0.059	College, university – financial	–0.054	0.517
Age (reference group: 18–29 years)			**Age (reference group: 18–29 years)**		
30–39 years	–0.069	0.171	30–39 years	–0.033	0.547
40–49 years	–0.023	0.681	40–49 years	0.059	0.319
50–59 years	0.012	0.821	50–59 years	0.065	0.261
Over 60 years	0.008	0.877	Over 60 years	0.208	0.000
Type of municipality (reference group: Budapest)			**Type of municipality (reference group: Budapest)**		
County seat, city with county authority	–0.201	0.243	County seat, city with county authority	–0.340	0.067
Other city/town	–0.186	0.265	Other city/town	–0.306	0.089
Rural municipality	–0.201	0.234	Rural municipality	–0.349	0.055
Number of HH members	–0.020	0.177	Number of HH members	0.002	0.924
Children below 18 years (dummy)	0.059	0.209	Children below 18 years (dummy)	–0.048	0.334
County (reference group: Budapest)			**County (reference group: Budapest)**		
constant	0.368	0.001	constant	0.050	0.686
Sample size: 913			Sample size: 913		
R^2: 8.4%			R^2: 8.9%		

Dependent variable: trust (3)	Estimated coefficient	p-value	Dependent variable: trust (4)	Estimated coefficient	p-value
Proximity to FX lending experience	–0.018	0.024	Proximity to FX lending experience	–0.015	0.066
Debtor (dummy)	0.008	0.838	Debtor (dummy)	–0.060	0.106
Knowledge Index	0.016	0.319	Knowledge Index	–0.030	0.069
Attitude Index	0.034	0.074	Attitude Index	0.036	0.062
Behaviour Index	0.038	0.118	Behaviour Index	0.027	0.269
Practice Index	0.008	0.675	Practice Index	–0.017	0.358
Gender (reference group: female)	–0.052	0.144	Gender (reference group: female)	–0.076	0.034
Income (reference group: Below HUF 300,000)			**Income (reference group: Below HUF 300,000)**		
HUF 300,000–500,000	0.054	0.198	HUF 300,000–500,000	0.049	0.248
HUF 500,000–1,000,000	0.123	0.026	HUF 500,000–1,000,000	0.142	0.011
Over HUF 1,000,000	0.109	0.226	Over HUF 1,000,000	0.201	0.027
Educational level (reference group: 8 years of primary schooling or lower)			**Educational level (reference group: 8 years of primary schooling or lower)**		
Vocational secondary school	–0.046	0.357	Vocational secondary school	–0.004	0.941
Secondary grammar school	–0.009	0.856	Secondary grammar school	–0.029	0.567
College, university – non-financial	–0.022	0.737	College, university – non-financial	–0.061	0.356
College, university – financial	0.107	0.205	College, university – financial	0.004	0.959
Age (reference group: 18–29 years)			**Age (reference group: 18–29 years)**		
30–39 years	–0.025	0.656	30–39 years	0.029	0.607
40–49 years	0.000	1.000	40–49 years	0.002	0.980
50–59 years	–0.076	0.198	50–59 years	0.011	0.857
Over 60 years	0.034	0.539	Over 60 years	0.066	0.230
Type of municipality (reference group: Budapest)			**Type of municipality (reference group: Budapest)**		
County seat, city with county authority	–0.320	0.089	County seat, city with county authority	–0.178	0.347
Other city/town	–0.249	0.173	Other city/town	–0.170	0.356
Rural municipality	–0.262	0.156	Rural municipality	–0.209	0.262
Number of HH members	–0.021	0.213	Number of HH members	–0.011	0.521
Children below 18 years (dummy)	0.037	0.471	Children below 18 years (dummy)	0.035	0.500
County (reference group: Budapest)			**County (reference group: Budapest)**		
constant	0.167	0.185	constant	0.420	0.001
Sample size: 913			Sample size: 913		
R^2: 6.9%			R^2: 7.2%		

Dependent variable: trust (5)	Estimated coefficient	p-value	Dependent variable: Knowledge Index	Estimated coefficient	p-value
Proximity to FX lending experience	–0.006	0.401	Proximity to FX lending experience	0.052	0.002
Debtor (dummy)	–0.038	0.261	Debtor (dummy)	–0.063	0.415
Knowledge Index	–0.013	0.379	Attitude Index	0.085	0.033
Attitude Index	0.000	0.983	Behaviour Index	–0.073	0.149
Behaviour Index	0.020	0.367	Practice Index	–0.042	0.272
Practice Index	–0.032	0.059			
Gender (reference group: female)	–0.033	0.313	Gender (reference group: female)	0.344	0.000
Income (reference group: Below HUF 300,000)			**Income (reference group: Below HUF 300,000)**		
HUF 300,000–500,000	0.033	0.401	HUF 300,000–500,000	0.250	0.004
HUF 500,000–1,000,000	0.102	0.047	HUF 500,000–1,000,000	0.470	0.000
Over HUF 1,000,000	0.113	0.176	Over HUF 1,000,000	0.697	0.000
Educational level (reference group: 8 years of primary schooling or lower)			**Educational level (reference group: 8 years of primary schooling or lower)**		
Vocational secondary school	–0.006	0.897	Vocational secondary school	0.561	0.000
Secondary grammar school	–0.040	0.392	Secondary grammar school	0.565	0.000
College, university – non-financial	–0.054	0.371	College, university – non-financial	0.808	0.000
College, university – financial	–0.123	0.117	College, university – financial	0.773	0.000
Age (reference group: 18–29 years)			**Age (reference group: 18–29 years)**		
30–39 years	0.011	0.830	30–39 years	0.095	0.411
40–49 years	–0.066	0.237	40–49 years	0.416	0.001
50–59 years	–0.096	0.078	50–59 years	0.367	0.003
Over 60 years	–0.060	0.238	Over 60 years	0.021	0.858
Type of municipality (reference group: Budapest)			**Type of municipality (reference group: Budapest)**		
County seat, city with county authority	0.132	0.448	County seat, city with county authority	–0.065	0.869
Other city/town	0.279	0.099	Other city/town	0.027	0.944
Rural municipality	0.198	0.246	Rural municipality	–0.182	0.636
Number of HH members	–0.008	0.590	Number of HH members	–0.029	0.405
Children below 18 years (dummy)	0.012	0.799	Children below 18 years (dummy)	0.019	0.859
County (reference group: Budapest)			**County (reference group: Budapest)**		
constant	0.840	0.000	constant	3.051	0.000
Sample size: 913			Sample size: 913		
R^2: 5.2%			R^2: 22.7%		

Dependent variable: Attitude Index	Estimated coefficient	p-value	Dependent variable: Behaviour Index	Estimated coefficient	p-value
Proximity to FX lending experience	–0.005	0.714	Proximity to FX lending experience	0.002	0.887
Debtor (dummy)	–0.063	0.333	Debtor (dummy)	–0.115	0.025
Knowledge Index	0.062	0.033	Knowledge Index	–0.033	0.149
Behaviour Index	0.302	0.000	Attitude Index	0.185	0.000
Practice Index	0.001	0.971	Practice Index	0.218	0.000
Gender (reference group: female)	–0.107	0.088	Gender (reference group: female)	–0.024	0.628
Income (reference group: Below HUF 300,000)			**Income (reference group: Below HUF 300,000)**		
HUF 300,000–500,000	0.169	0.024	HUF 300,000–500,000	0.023	0.690
HUF 500,000–1,000,000	0.118	0.231	HUF 500,000–1,000,000	–0.012	0.880
Over HUF 1,000,000	0.144	0.370	Over HUF 1,000,000	0.071	0.573
Educational level (reference group: 8 years of primary schooling or lower)			**Educational level (reference group: 8 years of primary schooling or lower)**		
Vocational secondary school	0.250	0.005	Vocational secondary school	0.019	0.782
Secondary grammar school	0.320	0.000	Secondary grammar school	0.014	0.839
College, university – non-financial	0.328	0.005	College, university – non-financial	0.011	0.907
College, university – financial	0.478	0.002	College, university – financial	0.210	0.076
Age (reference group: 18–29 years)			**Age (reference group: 18–29 years)**		
30–39 years	–0.055	0.575	30–39 years	0.071	0.355
40–49 years	0.077	0.472	40–49 years	–0.046	0.584
50–59 years	0.032	0.763	50–59 years	–0.030	0.713
Over 60 years	–0.167	0.089	Over 60 years	–0.007	0.926
Type of municipality (reference group: Budapest)			**Type of municipality (reference group: Budapest)**		
County seat, city with county authority	0.154	0.647	County seat, city with county authority	–0.237	0.366
Other city/town	0.196	0.548	Other city/town	–0.155	0.543
Rural municipality	0.251	0.447	Rural municipality	–0.119	0.646
Number of HH members	–0.003	0.911	Number of HH members	0.010	0.665
Children below 18 years (dummy)	0.089	0.329	Children below 18 years (dummy)	0.016	0.821
County (reference group: Budapest)			**County (reference group: Budapest)**		
constant	0.515	0.021	constant	2.738	0.000
Sample size: 913			Sample size: 913		
R^2: 14.4%			R^2: 18.3%		

Dependent variable: Practice Index	Estimated coefficient	p-value
Proximity to FX lending experience	0.012	0.412
Debtor (dummy)	0.200	0.003
Knowledge Index	–0.033	0.272
Attitude Index	0.001	0.971
Behaviour Index	0.386	0.000
Gender (reference group: female)	–0.179	0.006
Income (reference group: Below HUF 300,000)		
HUF 300,000–500,000	–0.163	0.037
HUF 500,000–1,000,000	–0.207	0.043
Over HUF 1,000,000	–0.263	0.115
Educational level (reference group: 8 years of primary schooling or lower)		
Vocational secondary school	–0.159	0.088
Secondary grammar school	–0.163	0.079
College, university – non-financial	–0.024	0.845
College, university – financial	–0.210	0.183
Age (reference group: 18–29 years)		
30–39 years	–0.213	0.037
40–49 years	–0.372	0.001
50–59 years	–0.271	0.013
Over 60 years	–0.096	0.349
Type of municipality (reference group: Budapest)		
County seat, city with county authority	–0.696	0.047
Other city/town	–0.699	0.039
Rural municipality	–0.751	0.029
Number of HH members	–0.012	0.693
Children below 18 years (dummy)	0.103	0.275
County (reference group: Budapest)		
constant	0.970	0.000
Sample size: 913		
R^2: 16.1%		

Stability versus Volatility: Hungarian Experiences with the First Five Years of Solvency II Regarding Quantitative Elements*

Zsuzsanna Bártfai-Bora – Ádám Huszárik – Norbert Holczinger

It has been more than five years since the introduction of the Solvency II framework (S2), which determines how insurers should operate in Europe, and this allows for a detailed analysis of Hungarian developments. The new approach in S2 that makes it similar to banking regulation, including the market-consistent valuation principles and the application of a risk-based capital requirement, has stood the test of time in recent years: the various shocks did not undermine the stability of the Hungarian sector. This was largely due to the recommendation of the central bank of Hungary (Magyar Nemzeti Bank, MNB) on holding a volatility capital buffer. This is because the robust capital position of the sector as a whole has been maintained in the context of 50–100-basis point reductions in capital adequacy levels in certain individual cases, which justifies the use of the capital buffer. The balanced capital position was also influenced by the conservative investment strategy, which resulted in one of the lowest market risk exposures in Europe, against the backdrop of huge government securities holdings, even by international standards.

Journal of Economic Literature (JEL) codes: G22, G29, G32

Keywords: Solvency II, capital adequacy, own funds, capital requirement, volatility capital buffer

1. Introduction

The Solvency II (S2) insurance regulation introduced on 1 January 2016 brought about several qualitative and quantitative modifications as compared to the previous Solvency I (S1) framework, and its introduction triggered changes not only for insurers but also in regulatory and supervisory practices (*Dénes et al. 2014; Szedlák 2015*). In designing the S2 framework, ensuring harmonisation with the EU financial regulation was a crucial aspect, and therefore, just like in banking, S2 rests

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on three pillars: the calculation methodology of the solvency capital requirement (SCR) and the technical provisions (Pillar 1), the quality requirements with respect to corporate governance practices and the capital add-on that may be imposed by the supervisory authority (Pillar 2), and supervisory reporting and disclosure (Pillar 3) (*Hanák 2014*). Another similarity to banking regulation is the approach based on risk management, risk-based requirements and the relationship between risk exposure and solvency requirements (*EC 2015*).

This study provides a comprehensive picture of the Hungarian experiences in the first five years of S2. The authors do not wish to comment on all Hungarian features, as that is beyond the scope of this paper. The assessment is limited to subjectively chosen phenomena that are nevertheless crucial for the study. The experiences were mainly summarised using the supervisory disclosures for the period from the so-called Day 1 reporting marking the date of the S2 transition to the end of 2020, as well as the reports of the European Insurance and Occupational Pensions Authority (EIOPA). The analyses cover the whole Hungarian insurance market, since all insurers supervised by the MNB are subject to S2, with the exception of small insurers operating as mutual associations.[1] After reviewing the development of the most important quantitative elements, special attention is paid to examining the volatility of the capital position, thereby addressing the adequacy of MNB Recommendation No 6/2016 (VI. 14.) on holding the volatility capital buffer ensuring continuous capital adequacy (VCB Recommendation).

2. A review of the first five years of Solvency II

This section presents the changes in the major quantitative elements of the S2 framework between the transition in 2016 and end-2020, based on the annual data reporting harmonised across the European Union. It details the asset composition of the Hungarian insurance sector, which is conservative even by international standards, the development of technical provisions as well as the different maturity structure of, and changes in, the assets and liabilities related to the non-linked life insurance portfolio. In the insurance sector, compliance with the quantitative requirements is ensured by the capital requirement, the size of which relative to own funds is an important indicator of the sector's resilience. Accordingly, the section focuses specifically on own funds, the capital requirement of individual risk modules and capital adequacy calculated on the basis of the risk-based SCR and the minimum capital requirement (MCR).

[1] In accordance with Section 230 (1) of Act LXXXVIII of 2014 on the Business of Insurance (Insurance Act).

2.1. Assets

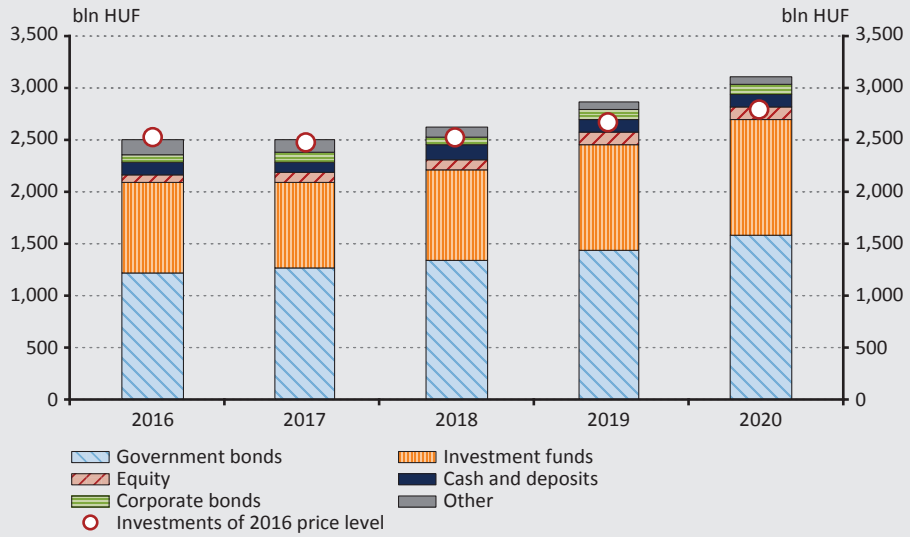
In 2016–2018, the value of insurers' investments did not change much (fluctuating between HUF 2,520 billion and HUF 2,653 billion), but in 2019 it came close to HUF 3 billion, and it exceeded that level in 2020. In 2016 prices (in real terms), the insurance sector's assets increased by 5 per cent between end-2016 and end-2020, on account of the appreciation of the government securities portfolio resulting from the drop in yields as well as the growth in the value of the collective investment funds due to favourable yields (*Figure 1*).

There was no major change in asset composition between 2016 and 2020, with 50 per cent of the assets comprising government securities and almost one third consisting of investment fund shares. Despite the prolonged low yield environment during the period, the Hungarian insurance sector was characterised by a conservative investment strategy: at end-2020, 79 per cent of non-linked investments[2] comprised government securities (fixed-rate Hungarian government bonds and discount treasury bills), which reflects the exceptionally high share of such papers, even by international standards, that has been maintained since the transition to the S2 framework (*OECD 2021*). Globally, only Montenegro and Uruguay surpass Hungary, which is ranked first in the European Union regarding the government securities exposure of non-linked assets, followed by Lithuania, Spain, Greece and Portugal. The high share of government securities is attributable to the conservative investment strategy and several other factors. First, insurers seek to manage the investment risk related to the traditional life insurance portfolio with profit share through government securities investments aligned with the maturity structure and guaranteed yield of life insurance products. Second, the Insurance Act in effect between 2003–2014[3] prescribed limits on the risky assets constituting cover for technical provisions, with the exception of funds covering the reserves of unit-linked life insurance, but this did not apply to debt securities guaranteed by the state. Although the investment limit rules were repealed with the rollout of the S2 framework, and insurers can invest in any asset complying with the prudent person principle, long-term government securities investments with a guaranteed yield, covering insurance obligations and held until maturity did not change much. This is partly attributable to the S2 framework, as it favours forint-denominated government securities investments over other investment instruments, because the former can be considered risk-free as regards the interest rate spread and market concentration risk.

The share of direct equity investments and corporate bonds remains negligible (4 and 3 per cent, respectively).

[2] Asset coverage of traditional life and non-life provisions as well as institutions' own assets and assets not allocated to any business.
[3] In accordance with Section 136 (2) of Act LX of 2003 on Insurers and the Insurance Business (old Insurance Act).

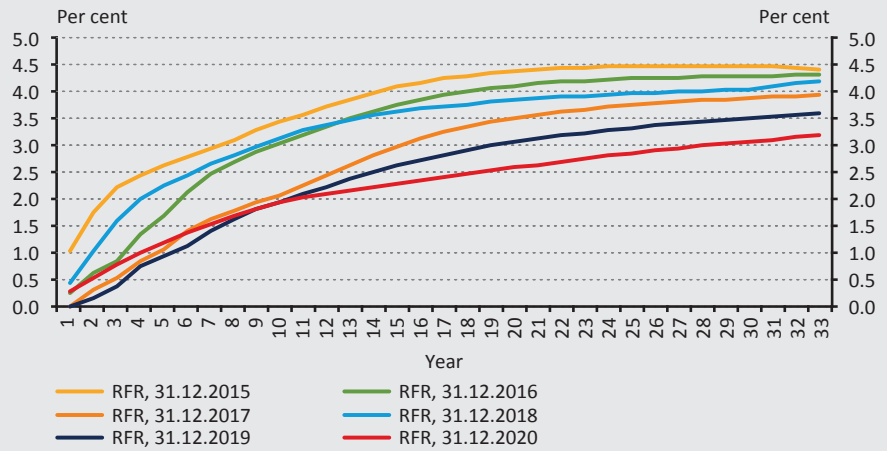
Figure 1
Changes in asset composition in 2016–2020



Note: 2016 = 100%, the data show the values as of 31 December.
Source: MNB data reporting

The low yield environment already seen during the transition to the S2 framework in early 2016 persisted throughout the period under review and even intensified as the years passed, which is exemplified by the evolution of the forint-denominated risk-free interest rate term structure (*Figure 2*). The risk-free interest rate term structure has flattened, and its level has shifted downwards considerably, as yields dropped all along the curve. This contraction in yields was much more pronounced on the long end: while the 1-year yield was 75 basis points lower at the end of 2020 than at the end of 2015, medium- and long-term yields were 120–180 basis points lower than at end-2015. These shifts in yields resulted in wide fluctuations in the market value of existing government securities portfolios, which increased the volatility of the capital position of certain Hungarian insurers. The persistently low yield environment put pressure on the Hungarian and also the international insurance sector. But whereas the search for yield, i.e. a shift towards riskier assets, appeared in several places around the globe, there was no such sector-wide trend in Hungary, and only a handful of institutions changed their practices (*MNB 2020a*).

Figure 2
Changes in the risk-free interest rate term structure in 2015–2020



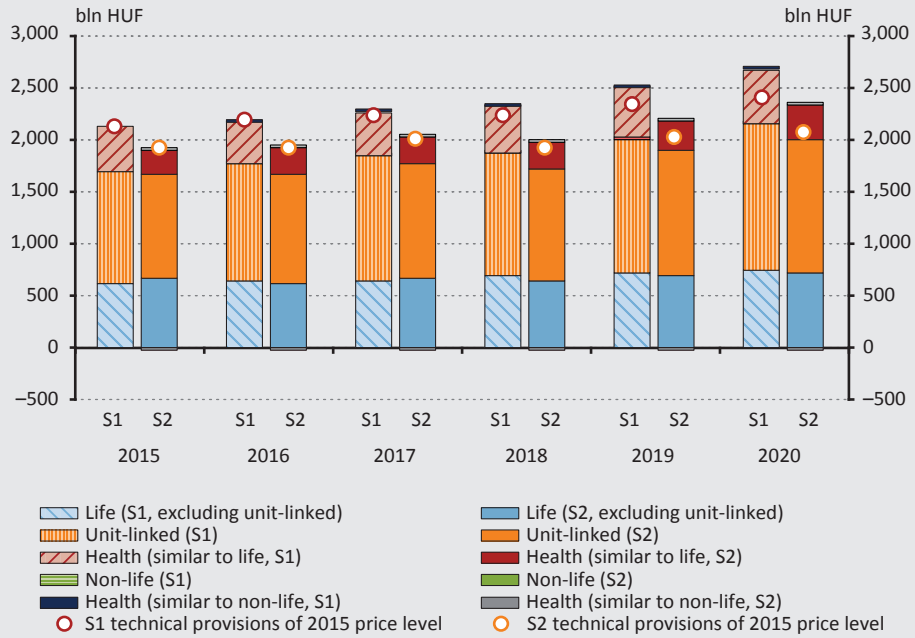
Source: EIOPA

2.2. Technical provisions

At the end of 2020, technical provisions valued in accordance with S2 amounted to HUF 2,319 billion, up by 22 per cent since the transition to the S2 framework. Growth can be observed even when adjusting for inflation: when the change in S2 provisions is examined at 2015 prices, an increase of 8 per cent can be seen between early 2016 and late 2020, due to the combined effect of several factors. In the non-life business, the rise in provisions was caused by the growth in the volume of the insurance portfolio and premiums. The slow expansion in life provisions was mainly related to unit-linked provisions: this was influenced by the increase in premium income and the average premium per contract, mainly concerning pension insurance, and to a lesser extent by yield performance. Although the latter mitigated the rise in provisions driven by premium income between the beginning of 2016 and the end of 2018, it was influenced positively by the investment yields of underlying assets in 2019–2020, except in the market turbulence in 2020 Q1. The growth in the provisions for traditional life insurance with saving elements, was negligible.

The ratio between statutory accounting and S2 technical provisions has been stable since early 2016 (87 per cent), and no major changes were seen in any individual business (*Figure 3*). The ratio of the S2 technical provisions for the life business to statutory accounting provisions was the highest, at 92–93 per cent, for the unit-linked portfolio, and around 97 per cent for non-linked life insurance. In the case of non-life insurance, the share of S2 provisions relative to accounting provisions varied around 61 per cent in the past year, resulting from discounting as well as from taking into account future profits; it is this low because of the risks that are covered with own fund rather than provisions under S2 (claims fluctuation, large claims).

Figure 3
Evolution of technical provisions between Day 1 S2 reporting and the end of 2020



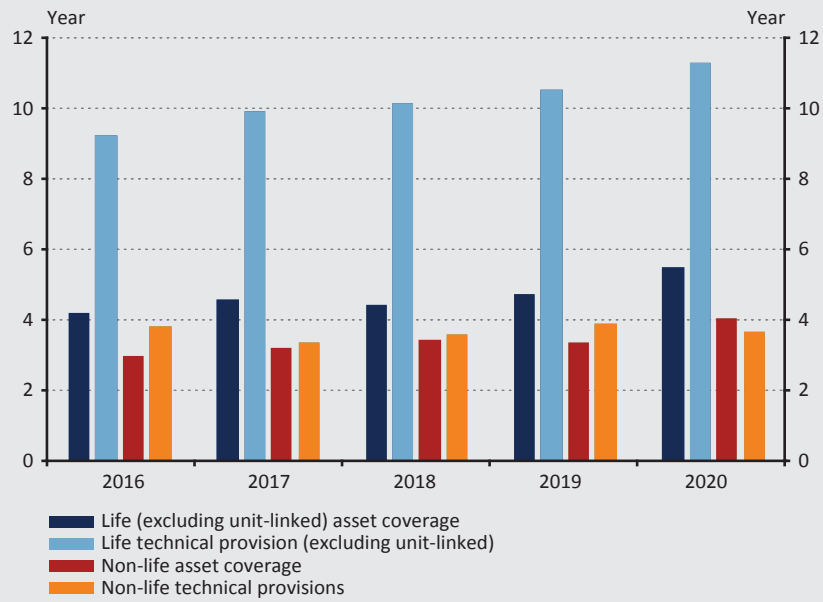
Note: 2015 = 100%, the data show the values as of 31 December.

Source: MNB data reporting

In the case of the traditional life portfolio which is not unit-linked, insurers need to manage the (reinvestment) risks arising from the maturity mismatch between assets and liabilities, and the (interest rate) risks arising from the unfavourable shifts in yield curves. The average duration of the liability side is high due to the long maturity of insurance contracts, which is contrasted with the shorter average duration of assets and the meagre yields offered in the low yield environment seen in the period under review. At the time of the transition to the S2 framework, the difference between the duration of life technical provisions with the exemption of unit-linked insurance policies and the duration of its underlying assets was almost 5 years, and the level it reached at the end of 2018 (5.7 years) has practically not changed since then (*Figure 4*). The stabilisation of the difference between the average duration of the asset and liability side cash flows was the result of the combined effect of several factors. The duration of non-linked life insurance liabilities has steadily increased since 2016, as the improved retention of insurance contracts and the popularity of pension insurance contracts lifted the average duration of the liabilities from 9.1 to 11.1 years between 2016 and 2020. In 2016–2018, the average maturity of the underlying assets for non-linked life insurance provisions fluctuated between 4.1 and 4.5 years, which rose to 4.7 years in 2019 because of the downward shift of the yield curve, with an average of 100 basis

points, and because the exposure of long-term securities increased between 2018 and end-2019. At the end of 2019, eleven Hungarian insurers had 20-year Hungarian government bonds issued in 2018 (ISIN/HU0000403555), totalling HUF 42.3 billion[4] (representing 4.8 per cent of the total non-unit-linked life assets), which meant that exposure doubled year-on-year. Besides the forint-denominated Hungarian government securities, three institutions had government bonds or credit institution bonds issued by foreign countries with a maturity of over 20 years (Italian, German, Swiss government securities and Dutch credit institution bonds) at the end of 2019, which represented a negligible share within the sector (0.32 per cent).

Figure 4
Duration of non-linked liabilities and the corresponding collateral



Note: The data show the values as of 31 December.

Source: MNB data reporting

Out of the collateral for the non-unit-linked life insurance provisions, government securities worth HUF 67 billion (ISIN/HU0000402235) matured in November 2020, and in 2022–2023 another HUF 137 billion will mature (ISIN/HU0000402383, ISIN/HU0000402524), therefore Hungarian insurers seek to extend the average duration on the assets side when reinvesting. By the end of 2020, 20-year government securities holdings (ISIN/HU0000404165, ISIN/HU0000403555) had increased to

[4] At the end of 2019, insurers held HUF 7 billion and HUF 3 billion from the 20-year Hungarian government bond series ISIN/HU0000403555 in the non-life business and the unit-linked portfolio, respectively. Furthermore, one insurer reported another HUF 370 million in own assets for end-2019.

HUF 89 billion, which was held by the insurers affected by the largest refund of the surplus yield based on mathematical provisions. Such insurers typically cover for long-term insurance liabilities offering a guaranteed yield through government securities held until maturity.

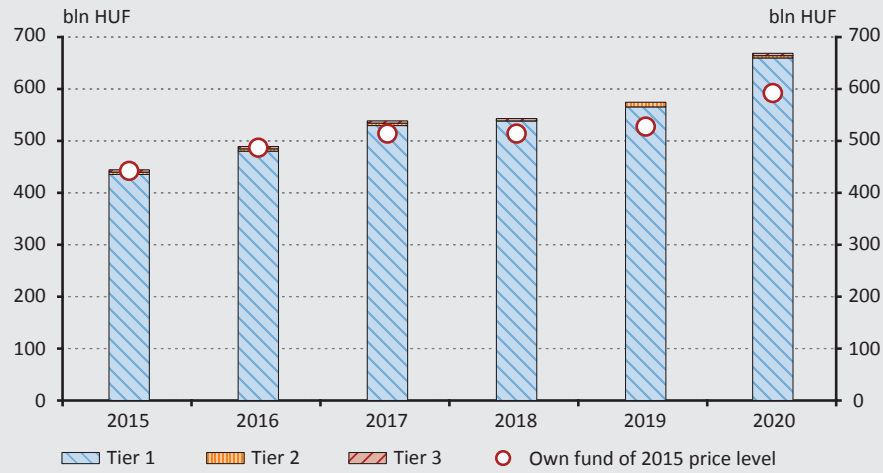
Due to the short run-off of non-life liabilities, the difference in the maturity structure of the asset and liability side does not pose much of a risk, as there is no major difference in the maturity and yield structure of assets and liabilities. The duration was stable in 2016–2020, fluctuating between 3.3 and 3.8 years. However, the average duration of the collateral exceeded the average duration of liabilities in all years but 2016, coming close to 4 years by the end of 2020.

2.3. Own funds

Insurers' S2 own funds are comprised of basic own funds and ancillary own funds. Basic own funds consist of the excess of assets over liabilities plus subordinated liabilities, less the amount of own shares held by the insurer. Ancillary own funds consist of items other than basic own funds which can be called up to absorb losses (e.g. unpaid share capital or initial funds that have not been called up, letters of credit and guarantees as well as any other legally binding commitments received by insurance and reinsurance undertakings). The amount of ancillary own-fund items to be taken into account when determining own funds is subject to supervisory approval (*EP 2009; EU 2014*). Hungarian insurers practically cover their entire capital requirement with basic own funds: in 2020 only one institution requested ancillary own funds to be taken into account, amounting to a negligible 0.004 per cent of the sector-wide own funds.

According to Day 1 reporting for 1 January 2016, own funds amounted to HUF 438 billion and increased steadily in 2016–2020, reaching HUF 662 billion by the end of 2020. This growth was significant in nominal terms (51 per cent) and in real terms (34 per cent at 2015 prices) (*Figure 5*). The largest year-on-year expansion occurred between 2019 and 2020 (16 per cent), mainly as a result of the MNB's executive circular on dividend payments issued in October 2020. In the circular, the MNB called on insurers to postpone the dividend payments planned for 2020 until 2021, when the risks caused by the pandemic had been forecast to be reduced, to maintain their resilience to crises and improve their shock-resistance. The MNB also expressed an expectation that dividends should only be paid if institutions' solvency ratio reached or exceeded the average Hungarian capital adequacy (205–243 per cent) even after the payment was made (*MNB 2020b*).

Figure 5
Evolution and distribution of own funds between Day 1 S2 reporting and the end of 2020



Note: 2015 = 100%, the data show the values as of 31 December.
Source: MNB data reporting

Own-fund items can be classified into a three-tiered system, depending on whether the individual capital elements are part of basic own funds or ancillary own funds, and whether they have permanent availability,[5] subordination[6] and sufficient duration[7] for this (*EP 2009; EU 2014*). With respect to the capital position of the Hungarian insurance sector, it is positive that basically the sector's entire own-fund holdings comprise Tier 1 items with unlimited availability, representing around 99 per cent of total own funds in 2016–2020. Accordingly, Hungary is among the leaders in the EU, as besides it only Cyprus, Estonia, Spain, Sweden, Croatia and Slovakia had 99 per cent or higher unlimited Tier 1 items at the end of 2020. In the same period, the lowest share of unlimited Tier 1 capital items was recorded in Norway (82 per cent) and Belgium (83 per cent). According to an EIOPA survey, non-life insurers have the highest Tier 1 ratio (95 per cent) in the European Union, while the average for composite insurers is around 89 per cent (*EIOPA 2021a*). Tier 1 items with limited access were only observed at the beginning of 2016, in negligible amounts (0.4 per cent of sector-wide own funds), mainly due to the uncertainties surrounding the transition to S2.

[5] The item is available, or can be called up on demand, to fully absorb losses on a going-concern basis, as well as in the case of winding-up (*EP 2009*).
[6] In the case of winding-up, the total amount of the item is available to absorb losses and the repayment of the item is refused to its holder until all other obligations, including insurance and reinsurance obligations towards policy holders and beneficiaries of insurance and reinsurance contracts, have been met (*EP 2009*).
[7] When assessing the extent to which own-fund items possess the characteristics of permanent availability and subordination, due consideration should be given to the duration and maturity of the items (*EP 2009*).

With respect to Tier 2 subordinated liabilities provided by an insurer's owner or group members, there was only one institution in the sector in 2016–2020 where the ratio of subordinated liabilities and own funds was around 10 per cent. As the capital adequacy ratio of that insurer was over 200 per cent since the end of 2016, with the exception of the S2 transition, the existence of subordinated liabilities did not pose a risk in the access to capital. Loans were taken out from the parent company by one institution in 2019 and another one in 2020 due to solvency ratio considerations. At the end of 2020, the former insurer's capital adequacy ratio rose to over 200 per cent due to the subordinated liabilities and the MNB's circular on postponing dividend payments. For the other institution, the MNB prescribed a capital add-on of HUF 500 million and at the same time authorised the borrowing of ancillary own-fund items worth HUF 500 million. By the end of 2020, Tier 2 capital items amounted to HUF 6.6 billion at these three institutions, representing merely 1 per cent of sector-wide own funds.

The volume of Tier 3 capital items was the largest at the beginning of 2016, with three institutions reporting deferred tax liabilities totalling HUF 297 million. It remained below 4 per cent of own funds at all institutions, and its sector-wide share was negligible (0.1 per cent). At the end of 2020, only one institution reported deferred tax liabilities (HUF 23 million), which is insignificant for both the institution and the sector (0.004 per cent). In Hungary, Tier 2 and Tier 3 capital items are typically held by smaller, non-composite insurers. As the overwhelming majority of Hungarian insurers are part of a foreign group, and they usually represent a small share within the group, the well-capitalised owners can quickly provide capital, which is typically of insignificant amount relative to the group's assets, and therefore Tier 2 and Tier 3 capital items do not need to be involved.

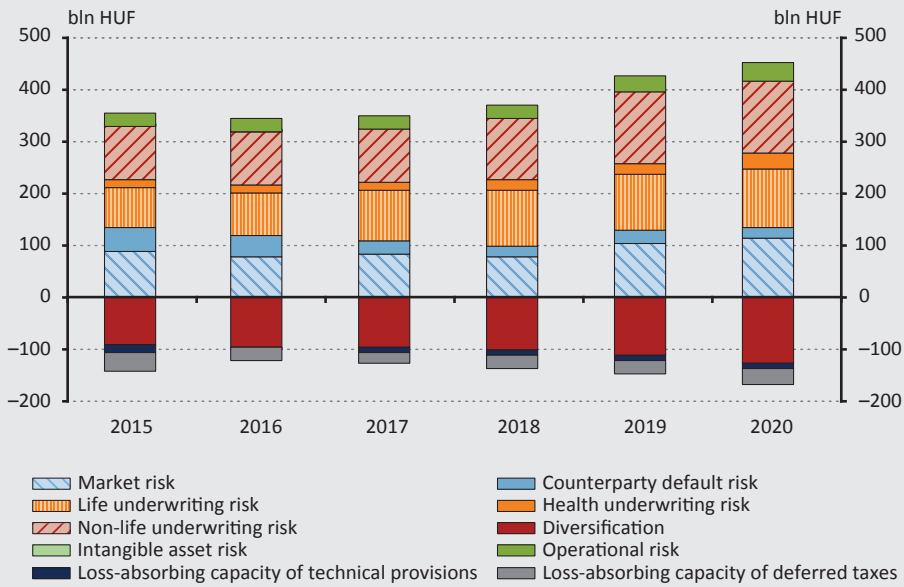
2.4. Solvency Capital Requirement

Under the S2 framework, the SCR should be calibrated so as to ensure that all quantifiable risks to which an insurer is exposed are taken into account. This calculation can be performed on the basis of the standard formula stipulated by law or with an internal model. Hungarian insurers calculate their SCR based on the standard formula, with the exception of one institution that uses a partial internal model to quantify the capital requirement for non-life risks. The number of internal models used in Hungary may seem low, but EIOPA's data suggests that this is not unique: at the end of 2020, 189 European insurers used an internal model, representing merely 7 per cent of the total sample (2,675 institutions from 31 countries).[8] Eleven countries have a higher share than the 4.5 per cent in Hungary, and in 15 countries no insurer uses internal models (*EIOPA 2021d*).

[8] The standard formula is used by 88.5 per cent of institutions, and there is no available data on the capital requirement calculation method in 4.5 per cent of the cases.

The (net) SCR calculated on the basis of the standard formula is the sum of the basic SCR and the capital requirement for operational risk, adjusted for the loss-absorbing capacity of technical provisions and deferred taxes (*Figure 6*).

Figure 6
Distribution of the SCR by risk modules, and the adjustment for the loss-absorbing capacity of technical provisions and deferred taxes



Note: The columns in the figure add up to the net SCR, but the SCR of the individual risk modules is the gross amount. The data show the values as of 31 December.

Source: MNB data reporting

Between early 2016 and end-2018, the net SCR steadily increased (5 per cent), primarily due to growth in life and non-life risk exposure. There was a 13-per cent rise between 2018 and 2019, amounting to close to HUF 280 billion, resulting from the combined effect of several factors. Owing to the growth in the volume of non-life portfolio and insurance premiums, premium and reserve risks increased within non-life risk. Moreover, the interest rate risk exposure, which had risen on account of the increase in equity risk exposure and the major downward shift in the yield curve, lifted the capital requirement for market risk between 2018 and 2019 across the sector. Although the growth rate of net own funds was lower between 2019 and 2020 (7 per cent), net own funds amounted to HUF 300 billion by the end of

2020, mainly attributable to the contraction in long-term yields and the increase in spread risk and concentration risk[9] (*EP 2009*). In addition, life and health insurance risk exposure increased due to the coronavirus pandemic. The capital requirement for health insurance risk (HUF 28 billion at the end of 2020) is still not significant compared to large risk modules, although the risk exposure grew by 26 per cent between 2019 and 2020.

The composition of the basic SCR was stable in 2016–2020, there was no significant change in the share of risk modules. The most important risk modules remained non-life (23–25 per cent), life (18–21 per cent) and market risk (16–18 per cent).[10] Across Europe, insurance (life, non-life) risk is followed by market risk. At the end of 2020, its share within the basic SCR varied between 25 and 70 per cent, which puts Hungary among the countries with the lowest market risk exposure. This is attributable to the previously described conservative investment strategy. The diversification characteristic in the Hungarian insurance sector accounts for a large share, close to 30 per cent, of the basic SCR, which is the highest in Europe, as this value varies between 15 and 25 per cent in other EU Member States. Diversification is low in the countries with a mature capital market where market risk is extremely high (*EIOPA 2021a*).

2.5. Solvency ratio

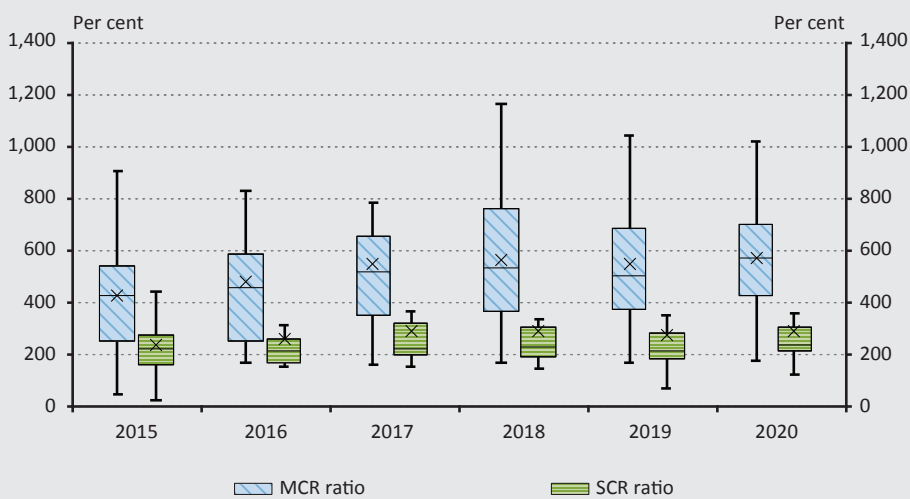
Under the S2 framework, the regulation differentiates between two types of capital requirement: the SCR comprising risk modules as described in the previous section and the MCR necessary for the operation of institutions. The capital requirement to be taken into account for capital adequacy is equivalent the maximum amount of these; therefore, the solvency ratio, otherwise known as the capital adequacy ratio, is the eligible own funds[11] divided by maximum SCR-MCR. Below, unless indicated otherwise, capital requirement is understood to mean this maximum amount, and that is used for determining solvency ratio.

The different definitions lead to considerable variation between MCR and SCR capital adequacy (*Figure 7*). While the average of the former fluctuated between 400 and 560 per cent in 2016–2020, the latter varied in a much narrower range, between 200 and 220 per cent. Looking at it in more detail, it can be clearly seen that the 25th percentile of the SCR capital adequacy ratio gradually climbed to over 200 per cent, considerably influenced by the VCB Recommendation published in 2016. In the European Union, Hungary had the highest value at the end of 2020

[9] Pursuant to the transitional measure in Article 308b (12) of Directive 2009/138/EC of the European Parliament and of the Council, as of 2018 the government bonds not issued in the domestic currency of a Member State cannot be considered 100 per cent risk-free, therefore they should be taken into account at 20, 50 and 100 per cent in 2018, 2019 and 2020, respectively while calculating interest rate spread and concentration risks.
[10] Considering the effect of diversification.
[11] It matters whether MCR or SCR is used for dividing own funds, as the eligible capital items differ.

with a 25th percentile over 200 per cent, with only Denmark and Germany having similarly high percentiles (*EIOPA 2021a*). However, the interquartile range of SCR capital adequacy is quite small in Hungary, and it continued to shrink in 2016–2020. The widest interquartile range was seen at the end of 2017 (125 percentage points), which declined to 75 per cent by 2020. It is interesting to note that the median value of the SCR capital adequacy has been stable since the end of 2017 (215–225 per cent, which is high by EU standards) and close to the 25th percentile, which suggests that the distribution stretches far to the right. This is supported by the position of the average value. According to a report by EIOPA published in 2021 (*EIOPA 2021a*), the SCR capital adequacy ratio had a skewed distribution to the left and a distribution stretching far to the right in EU Member States at the end of 2020.

Figure 7
Distribution of the capital adequacy ratio calculated on the basis of the SCR and the MCR



Note: The data show the values as of 31 December.
Source: MNB data reporting

Based on the Day 1 reporting, the distribution of SCR capital adequacy was almost symmetrical, due to the low capital adequacy of a crisis-managed institution that fell far short of the regulatory minimum. Solvency ratios below 100 per cent were rarely seen in the period under review, and the next time it was observed in 2019. With respect to the SCR capital adequacy, outliers are the smaller institutions where the capital requirement is determined by the MCR rather than the risk-based SCR. At the time of the Day 1 reporting, the interquartile range of the SCR comprised

14 institutions. This figure fell to twelve insurers by the end of 2020, due to the number of institutions that ceased operation in those five years on the one hand, and the smaller differences between individual institutions regarding the capital adequacy ratio on the other. It has to be noted though that in 2016 the figures often changed due to the calculation uncertainties caused by the transition.

However, the distribution of the MCR capital adequacy ratio has been almost symmetrical since the introduction of S2. Its median value has been steadily over 400 per cent in 2016–2020, peaking at the end of 2020 (at 564 per cent), but this still puts Hungary in the average of the EU. At the end of 2020, there were 14 EU Member States with higher median values of MCR capital adequacy than in Hungary, with Finland boasting the highest value (824 per cent) (*EIOPA 2021a*).

During the transition to S2, the MCR capital adequacy ratio of only one institution (34 per cent) violated the legally stipulated value. Other than that, the minimum MCR capitalisation was stable in the period between 2016 and end-2020, fluctuating between 150 and 160 per cent. The MCR capital adequacy ratio varies in a much wider range than SCR, which is clearly shown by the double or triple difference between the total and interquartile ranges. This is because the MCR stipulated by law results in a high capital adequacy ratio, often over 500–1,000 per cent, at large insurers due to the massive level of own funds. Since 2016, the interquartile range of the MCR capital adequacy has continuously narrowed and shifted downwards. By the end of 2020, the 25th percentile was close to 440 per cent, while the 75th percentile was below 700 per cent, similar to the end of 2017 and 2019. Since the end of 2016, out of the five largest (composite) insurers based on premium income, two had an MCR capital adequacy below the median.

During the transition to the S2 framework, the capital adequacy ratio was determined by the MCR stipulated by law in the case of 7 out of the 28 institutions. At the end of 2020, the same figure was 4, while the total number of institutions declined to 22. Therefore, the distribution of capital adequacy is similar to the distribution of SCR capital levels: skewed to the left, stretching far to the right, as the median is lower than the average (*Figure 8*). Between 2016 and 2020, the distribution became increasingly peaked, as the interquartile range narrowed: at the end of 2020, the difference between the 25th and the 75th percentile was merely 61 percentage points. The interquartile range shifted upwards over the years in this case, too, with even the bottom quartile (207 per cent) and the median (221 per cent) being over 200 per cent by the end of 2020. In addition, extremely high capitalisation levels also declined, which indicates a contraction in the total range of the capital adequacy ratio.

Figure 8
Distribution of the capital adequacy ratio

Note: Taking into account whether institutions' capital requirement is determined by the SCR or the MCR. The data show the values as of 31 December.

Source: MNB data reporting

Interestingly, the capital adequacy ratio at three out of the five largest insurers was steadily below the median in 2016–2020, and capital adequacy was also not consistently higher than the median value at the other two insurers. While in early 2016 the capital adequacy ratio of all TOP5 insurers was within the interquartile range, three of them were outside the range at the end of 2020, which suggests that the top insurers in the market sought to minimise the capital held and also comply with the VCB Recommendation. This is supported by the insurers' own risk and solvency assessment (ORSA) reports: in 2015[12] three quarters of the target capital adequacy values determined by the institutions were below 150 per cent. In 2017 this was observed only at a quarter of insurers, and in 2020 the capital adequacy target was above 150 per cent at all institutions. As *Balogh* (*2017*) describes, there are several considerations in the case of capital allocation, and the change in insurers' target capital adequacy ratio definitely shows the orienting role of the VCB recommendation.

[12] Preparatory ORSA reports, so-called FLAOR reports

All in all, the capital adequacy ratio of the Hungarian sector has been stable since 2016, partly due to the VCB Recommendation, and there is also no significant change in the distribution. However, the interquartile range is quite small, and it continued to shrink in 2016–2020. By the end of 2020, the 25th percentile of the capital adequacy ratio had gradually moved to over 200 per cent, which exceeds the European Union average (*EIOPA 2021b*). The sector-wide capital adequacy ratio was over 200 per cent in 2016–2020 and following a temporary slump in 2019 (204 per cent at the end of 2019), it was 220 per cent at the end of 2020.

3. Empirical analysis of the volatility capital buffer

After the presentation of the most important sector-wide developments, the volatility of the capital position is examined in detail. This is because the five years that passed since the VCB Recommendation was published provide an opportunity for empirical analysis.

The impact assessments prepared in preparation for the new framework (*MNB 2015; Bora et al. 2015; Bora et al. 2016a; Bora et al. 2016b; Lencsés 2015*) suggest that the new methodology could entail volatility in the capital position. Accordingly, the MNB expects insurers to hold a volatility capital buffer from 1 July 2016 to ensure continuous capital adequacy. In practice, this means that if insurers do not wish to determine the size of the buffer based on their own calculations,[13] an additional buffer amounting to 50 per cent of the last reported SCR should be held as a buffer (*MNB 2016*), which helps avoid unexpected capital losses over a one-year horizon.

The authors aim to explore the volatility of the system since its introduction, analysing data from 27 insurers between the Day 1 and end-2020 reporting. This means 21 data points for each insurer, or a total of 511 capital adequacy ratio data points, if quarterly disclosures are also taken into account. Out of the 27 insurers, 22 are still operating, while 5 ceased operation in the meantime, but they are treated separately in the analysis. 28 insurers participated in the transition to the new framework, but supervisory action was taken against one of them, and therefore no consistent reporting of sufficient amount was received from it.

[13] Pursuant to Section 2 of the VCB Recommendation, the volatility capital buffer is determined by insurers in a way that ensures that it provides at least 90-per cent protection against unexpected capital losses over a one-year horizon.

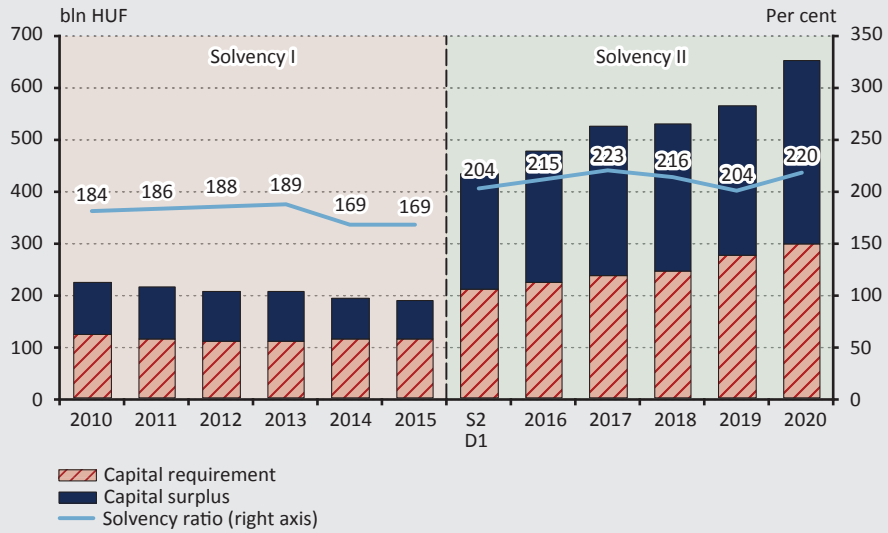
3.1. Methodological limits to the analysis

The concept of a volatility capital buffer emerged because the S2 regulation expects continuous capital adequacy; however, insurers are only required to perform a comprehensive capital requirement calculation annually, or if the risk profile changes considerably (*Zubor 2016*). This means that the interim, quarterly reports do not necessarily show accurate capital adequacy ratios, as only the available capital is required to be determined at such intervals. Since the introduction of S2, nine institutions have used the option provided by law to show the capital requirement values reported for the previous year in the quarterly reports of the subsequent year. Currently six insurers do this, and two of them use the MCR as a basis, which means that this is not relevant to them. The practices of the other insurers do not necessarily reflect the actual capital requirement values during the year, but since they recalculate at least certain risk modules in every quarter, a more accurate picture can be gained about their capital adequacy ratio. If the intra-year values were disregarded, only six datapoints would remain for each insurer; therefore, these interim period indicators were used several times during the analysis to ensure an adequate sample size. The intra-year values may skew the final result due to the heterogeneous methodologies used by the insurers, but this was always indicated.

3.2. Volatility of capital adequacy

Section 2.5 described in detail the evolution of sector-wide S2 capital adequacy. If the time series is expanded to include earlier, S1 data, the differences between the two regimes become clear: the introduction of S2 considerably increased the capital requirement and surplus capital, resulting in a roughly 30-percentage point higher capital adequacy ratio across the sector (*Figure 9*). Nonetheless, no significant variation can be observed within the sector for the institutions under review, with the exception of the contraction in 2019. This change was triggered by the combined effect of several factors, resulting in the rise of the capital requirement: the change in the yield curve, the incorporation of the insurance tax into the MTPL premiums as well as the legal amendment to the calculation of non-life catastrophe risk. The expected volatility (*Kočović et al. 2017*; *Richard 2020*) based on quantitative impact studies and market consistent valuation has not appeared at the market level.

Figure 9
Sector-wide solvency ratio under S1 and S2



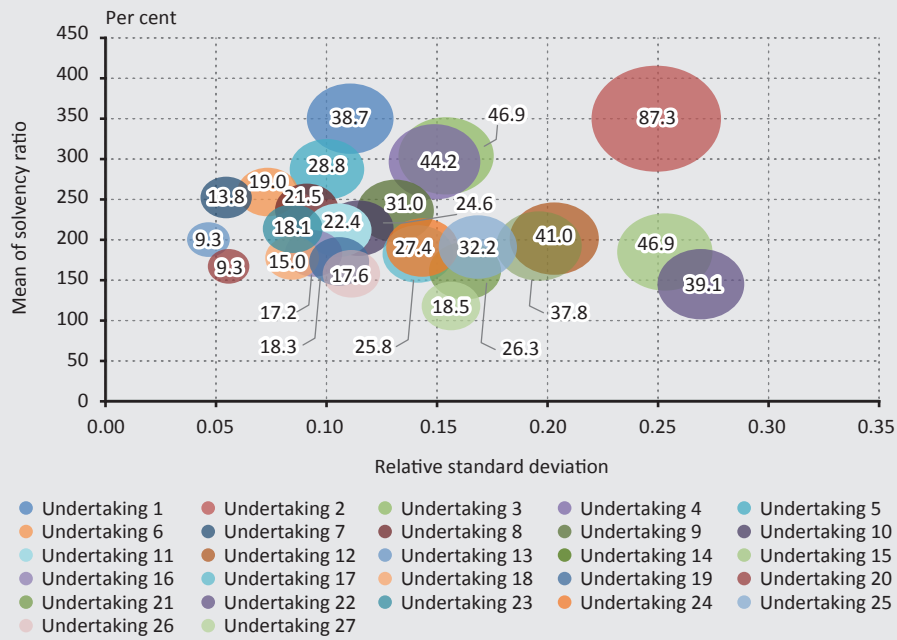
Source: MNB data reporting

In other words, capital adequacy has been stable across the sector, even if Hungarian institutions made only scarce use of the instruments for mitigating volatility permitted by the regulation. Such long-term guarantees measures (LTGs) include volatility and matching adjustment, which exert their effect by adjusting the risk-free interest rate term structure (*EIOPA 2021c*). Taking into account the so-called transitional measures, the use of LTGs has a significant effect on the SCR capital adequacy ratio in the EU, as without them the capital adequacy ratio would drop from the 259 per cent measured at the end of 2019 to 231 per cent. By contrast, the SCR capital adequacy would remain unchanged in Hungary (*EIOPA 2020*).

Still, the volatility of the capital position should mainly be examined at the institution level, as sector-wide aggregations may conceal individual outliers. This is confirmed by *JPMorgan* (*2019*), which, although it only examined volatility between 2016 and 2017, found that the solvency ratio increased by at least 50 percentage points for 10 per cent of European life and composite insurers, while it declined by 20 percentage points for another 10 per cent in one year. Meanwhile, the capital adequacy ratio rose from 229 per cent to 239 per cent in Europe as a whole (*EIOPA 2021d*). At the institution level, the dispersion indicators were examined first, during which the solvency ratios determined in quarterly reports were also taken into account. As already seen in the theoretical calibration document (*Zubor 2016*), a possible indicator for measuring volatility is relative standard deviation. Based

on the data from the insurers participating in the preliminary impact assessments, their S1 relative standard deviation was 0.179, while it was 0.260 in S2, which shows that capital adequacy is more volatile in the new regime. The practical data are summarised in *Figure 10,* where the average, the standard deviation and the relative standard deviation derived from their ratio is shown for each insurer.

Figure 10
Average and standard deviation of capital adequacy ratios



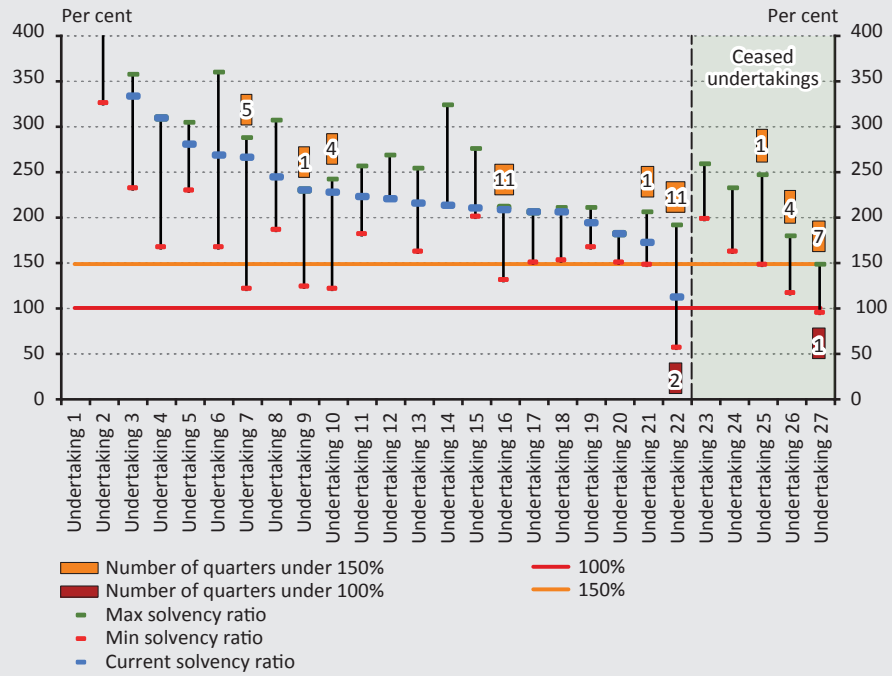
Note: The size of bubbles reflects the standard deviation.
Source: MNB data reporting

It can be seen that the average capitalisation of the 13 currently operating insurers is in, or close to, the range of 150–200 per cent, and a standard deviation of over 30 per cent can be observed in the case of several insurers. Overall, this yields a relative standard deviation of over 0.2[14] in these cases. This illustrates the point that higher volatility can occur even in the case of insurers without a particularly high level of capital adequacy. The average relative standard deviation of functioning institutions is 0.13, or 0.11 when the first year is disregarded. However, standard deviation may not be the best indicator to be used in analysis, as it takes into account not only the volatility arising from the contraction.

[14] Due to the different coverages, this is not fully comparable to the values calculated based on the impact assessments.

Figure 11 also took into account the capital adequacy ratios determined in the quarterly reports: it shows the range of capital adequacy ratios ranked by the values measured at the end of 2020. The figure also points out which insurers crossed the 150 per cent and 100 per cent capital adequacy thresholds and for how many quarters.

Figure 11
Range of capital adequacy since the introduction of S2



Note: Undertaking 1 solvency ratio: min: 446%; max: 552%; current: 521%. Undertaking 2 solvency ratio: max: 581%; current: 461%.

Source: MNB data reporting

The average range was 103 per cent, with the lowest extending for a range of 32 per cent, and the largest spanning a range of 254 per cent. It can be seen that the capital adequacy ratios of six currently functioning insurers dipped below 150 per cent, which typically lasted for several quarters. Out of these, one insurer even breached the 100 per cent threshold.

3.3. Significant contractions in the capital adequacy ratio

Below, the contractions in the capital adequacy ratio are presented over a one-year horizon. Based on the VCB Recommendation, the analysis focused on the number of cases with a drop of over, or close to, 50 percentage points within a year.

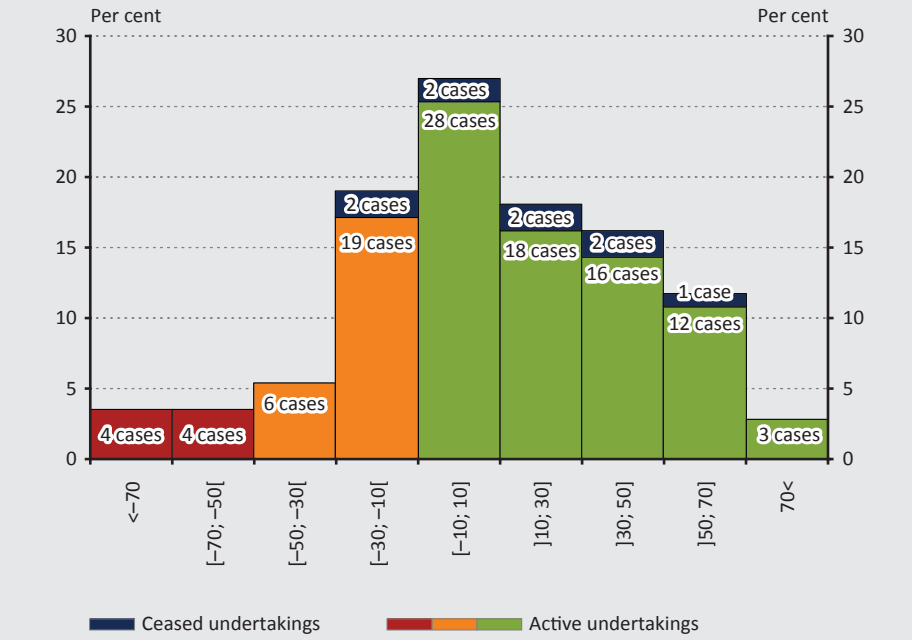
It should be noted that the capital adequacy ratio is also influenced by dividend payments. Insurers subtract the expected dividends for the next 12 months from the surplus of assets in excess of liabilities, and therefore the capital adequacy ratio already shows the situation after the expected dividend payments. If the actual dividends differ from the anticipated value, capital adequacy declines with higher payments and increases with lower payments. However, the contractions detailed below are not related to this, because insurers typically do not deviate much from the planned values. As mentioned in Section 2.3, the MNB's executive circular had a positive effect on the capital adequacy ratio for 2020.

The percentage point drop was analysed at the different insurers since the introduction of the S2 regime over a horizon of no more than 1 year. When determining this, the quarterly capital adequacy ratios were taken into account here as well. The maximum contraction values show the maximum decline over a 1-year horizon, regardless of whether there was any growth in the interim periods. If the time periods of the two maximum contractions overlapped, the larger one was taken into account, and the continued decline was determined on the part not covered by the other. Therefore, every contraction was taken into account, and thus the whole period was covered for all insurers.

Contraction of over 50 percentage points occurred in 19 cases, which is 14 per cent of 139 observations, at the currently functioning insurers, of which five occurred in the first year. These massive reductions affected 13 insurers, but it has to be added that this decline typically did not lead to a violation of the 150 per cent threshold, because it occurred at insurers with high capital adequacy. There were a large number of contractions (43 cases which is 31 per cent of all observations) in the 20–50 per cent range, which also illustrates the volatility of capital adequacy.

The changes on a 1-year time horizon were also analysed using another approach, based on annual data reporting. The results are shown in *Figure 12* which presents the distribution of the change in the capital adequacy ratio, i.e. the percentage point difference from the previous year-end value. These were classified into symmetrical, 20-percentage point ranges, illustrating the percentage changes in capital adequacy ratios in the given ranges within all the annual changes recorded so far. For clarity, the actual number of cases is also shown in the figure, and the insurers that ceased operation are denoted separately.

Figure 12
Distribution of the annual change in the capital adequacy ratio



Source: MNB data reporting

Based on the annual disclosures, there were eight contractions of over 50 percentage points, and it can also be seen that the currently operating insurers experienced even larger growth in 15 cases, which also illustrates the volatility of the system. A more detailed analysis revealed that outliers were more likely to be observed in the year of introduction. It is argued that this is because the calculation methodology and model calibration had not been solidified in the first period of the transition, and those were gradually developed by the insurers. In the first year, seven of the 27 insurers experienced a change of over 50 percentage points (with three cases of decline), while this occurred in 17 of the 92 cases after the first year, of which only five were cases of decline.

The identified large capital adequacy ratio reductions of over 50 percentage points were typically triggered by an external shock, which suddenly increased the SCR and/or reduced the available capital. These shocks can be classified into the following categories:

1. *Growth in SCR with unchanged available capital, typically attributable to two reasons:*

   – *A major increase in holdings:* The growth in holdings generates an SCR, the sudden surge of which is not followed by a rise in the available capital. This was typically caused by the dynamic expansion of the non-life portfolio.

   – *Realignment of the investment portfolio:* As mentioned in Section 2.1 in connection with the investment portfolio, sector-wide asset composition did not change much, but there were several significant shifts at the individual institution level. In the case of a few insurers, the share of corporate bonds and investment fund shares, which are riskier assets than government securities, increased, even if only temporarily, which was attributable to diversification considerations as well as the low yield environment. However, the riskier exposures entailed a higher SCR, which reduced the capital adequacy ratio. Similar consequences ensued in several cases when the amount from the government securities investments maturing right before the end of the reporting period (quarter) was not immediately reinvested but instead kept on the bank account of the insurers. This is because according to the regulations, Hungarian forint-denominated government securities are free from counterparty risk, while provisions need to be provided for the amounts held on bank accounts. Further considerable volatility can be caused by changes in the yield curve and the regulation, such as in the case of natural catastrophe risks.

2. *Growth in SCR with declining available capital:* As mentioned in the previous point, the growth in holdings entails a rise in the capital requirement. In the case of non-life insurance, this has a limited effect on the value of own funds, unlike in the case of life insurance for saving purposes. This is because selling these products entails heavy costs, mainly an outflow of commissions. The payment of sales commissions appears immediately on the S2 balance sheet, as the collateral of the paid amount disappears from assets. Therefore, capital adequacy may come under pressure from both directions, from own funds as well as the SCR. In the period under review, this happened at one of the Hungarian insurers. The impact was exacerbated by the fact that the institutions' acquisitions were well over the expected amount, and therefore capital adequacy eroded quickly for several quarters.

3. *Change in economic circumstances/assumptions* (*e.g. impact of Covid-19*)*:* The sudden changes in the external environment may have an enormous impact on insurers' capital position, including through their effect on business planning, the market value of assets and the assumptions used for calculating technical provisions. A typical example is capital market turbulence and the quick change in the yield environment. However, these are typically short-term effects, which may

abate after one or two quarters. The pandemic that started in 2020 will be felt for longer, because even though the position of the Hungarian insurance sector remained stable (*MNB 2021*), the profitability of certain businesses changed considerably relative to earlier periods, which exerted a huge impact at the insurers specialising in such businesses.

However, the events causing a contraction of over 50 per cent in capital adequacy typically did not pose a problem, because the capital adequacy of insurers was still well over 150 per cent, with the exception of two cases. In one of those cases, the capital adequacy ratio dropped to below 150 per cent, and in the other case the 100 per cent threshold was even breached, but capital adequacy was restored in the meantime. Even so, it can be argued based on empirical data that as a result of the market-consistent assessment and risk-based capital requirement calculation stipulated by S2, a change in the environment or its development diverging from expectations makes the capital position volatile, which may jeopardise continuous capital adequacy.

4. Summary

Since the transition to the S2 framework, the Hungarian insurance sector's position has been stable and ranked highly in several respects by European standards. In 2016–2020, the average capital adequacy ratio was steadily over 200 per cent. No major change can be observed in the distribution of capital adequacy, the interquartile range is quite small, and it continued to shrink in 2016–2020, partly owing to the VCB Recommendation. By the end of 2020, the 25th percentile of the capital adequacy ratio had gradually moved to over 200 per cent, which is the highest value in Europe. Since 2016, the capital requirement of 75–80 per cent of institutions is determined on the basis of the SCR, the composition of which can be considered stable: within the sector insurance risk is still followed by market risk exposure. Compliance with the capital requirement is facilitated by the fact that the own funds of the Hungarian sector comprise almost exclusively Tier 1 capital items with unlimited access, which has been an exceptionally high value among European Union countries since the introduction of S2.

There was no significant change in the composition of assets held by insurers in 2016–2020, as the Hungarian insurance sector continues to be characterised by a conservative investment strategy. Almost 80 per cent of the collateral of non-linked insurance comprise government securities, which continues to be an outstanding share by international standards. In the case of the non-linked, traditional life insurance portfolio, the difference between the average duration of assets and liabilities side cash flows stabilised in 2018–2020, on account of the growing share of long-term government securities in collateral, and the improving retention of

insurance contracts and the popularity of pension insurance on the liabilities side. Since 2016, technical provisions have been slowly expanding, due to the growing premium income from unit-linked products, mainly pension insurance products, in the life business, as well as growth in the non-life portfolio and insurance premiums.

Based on the impact assessments prepared before the introduction of market-consistent assessment and risk-based capital requirement calculation in 2016, the capital adequacy ratio was expected to be volatile under the new regime. The paper examined this hypothesis while reviewing the capital adequacy ratios of insurers at the institution level in the period until now, with a special attention to the impact of the recommendation on the volatility capital buffer from 2016. While exploring this, the capital adequacy ratios reported on a quarterly basis were also taken into account, and the data available at year-end were analysed separately.

All in all, empirical data also confirm the volatility of the S2 framework, as high standard deviation was seen in the capital adequacy ratios of several insurers, which fluctuated in a wide range. This occurred even in the case of insurers whose average capital adequacy was not particularly high in the past period; in other words, volatility affects not only the insurers with high capital adequacy. Furthermore, the examination of major contractions showed that a decline of over 50 percentage points occurred in the capital adequacy ratio at 13 insurers over a 1-year horizon, and six insurers had capital adequacy levels below 150 per cent, of which one insurer's capital adequacy dipped below 100 per cent. Based on the experiences so far, the capital buffer has served its purpose well: the sector has proven to be resilient to external shocks, while without it capital shortfalls or situations close to that could have emerged in several cases.

Due to the short time series, the data available at the time of writing were insufficient to conduct more comprehensive analyses. Nevertheless, the examination should be repeated later, when more year-end data are available, to gain a more accurate picture of the volatility of the S2 framework and the justification for the volatility capital buffer in practical use.

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Evaluating Part-Time and Fixed-Term Employment Schemes by Employees Using the Example of a Financial Insurance Company*

Máté Vörös – Zsófia Ásványi – Diána Ivett Fűrész

All forms of employment, part-time and fixed-term employment included, are sustainable only if they create mutually beneficial conditions both for employers and employees. While benefits for employers are more obvious in these particular forms of employment, employees' preferences are less frequently discussed. The study is a comparative analysis between employees with part-time and fixed-term and with typical employment contracts with respect to exit rate and chances of corporate career development. The data pool consisted of 4,683 employees employed by a large Hungarian corporation. In contrast to previous studies, instead of using qualitative methods, a quantitative analysis of employees' attitude towards part-time and fixed-term employment was carried out as part of the research. The focus of our investigation was to find out whether or not employees perceived atypical employment as advantageous. Based on the results obtained, it can be stated that compared to employees in typical forms of employment, the exit rate among members of the two atypical employment groups was higher, and their career development opportunities were also more limited.

Journal of Economic Literature (JEL) codes: M00, M51, M54, M55

Keywords: part-time employment, fixed-term employment, economic benefits

1. Introduction

Over the past 10–15 years, the global economy has had to grapple with a number of different challenges. Both written and unwritten economic rules were rewritten by the 2008 financial crisis, followed by an extended period of global economic growth, and

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then the emergence of the Covid-19 epidemic in 2019, which swelled to a pandemic in 2020 (*Hausmann 2020*). The economic repercussions of these phenomena are not without precedence in our history, but rarely have we seen such vast changes occurring over such a short period of time. These events may serve as a warning for economic players that the constant, rapid changes to the rules may force even the strongest and most resilient economies or organisations to their knees. Reducing operational costs and optimising operations when managing quickly changing conditions are of the utmost importance in all industries, and are thus also naturally vital in the banking sector as well (*Vörös 2020*). Increasing the operational flexibility of this sector is not only important as an action on its own, but could be of crucial significance from the perspective of the entire national economy, as recovery from a possible global recession may be hastened if the banking sector is able to maintain its effective operation (*Asztalos et al. 2017*). Consequently, increasing efficiency and optimising operations are seen as important goals by default; however, if we also take into account how working patterns have changed in the wake of the Covid-19 pandemic, it can be stated that addressing this issue is of strategic importance both at the corporate level and that of the national economy. The repercussions of the pandemic also hit Hungarian banks, as their operational conditions needed to be fundamentally redefined. In terms of customer service, the working conditions of employees underwent vast changes, e.g. in terms of the active use of medical protective equipment, while in the case of back office staff, atypical forms of employment took centre stage. The spread of home-office or remote work (*Béres Mártha – Maklári 2021*) may, in parallel, result in a number of different atypical forms of employment gaining further ground, even in the short run. Work-life balance, as such, may become even more highly valued with part-time employment playing a key role in the process; however, project-based work may also become more popular, thus shaping attitudes towards platform work or fixed-term contracts. The labour market has been transformed due to Covid-19 (*Costa Dias et al. 2020; Szellő 2020*), the question is whether these changes will persist in the long run. In finding an answer to this question, it is crucially important to consider the benefits the various forms of atypical employment have to offer for companies, individuals and, of course, the state. It is worth examining this relationship from a number of different angles. Using a corporate database of employees, the present study aims to gain an insight into individuals' attitudes toward the two most popular forms of atypical employment, i.e. part-time and fixed-term employment. It is important to note that the focus of the present study is an analysis of part-time and fixed-term employment which does not allow for drawing general conclusions with respect to atypical employment. The various forms of atypical employment should be examined individually, as – among many other factors –– the pertaining regulations, underlying motives and the sociocultural background render their uniform interpretation especially difficult.

In our view, if we are to exploit the advantages of the changes that occurred on the labour market in the longer term, the needs of both employers and employees

in atypical employment must be met. The advantages and disadvantages of part-time and fixed-term employment are discussed in detail in *Section 2*; however, beyond these factors, meeting expectations is also significantly affected by the employees' attitude toward the examined employment forms. In the study, we conducted an analysis of the impact of part-time and fixed-term employment on turnover rate and career development, in order to obtain a more accurate picture of attitudes toward these employment forms. In contrast to earlier research (e.g. *Poór et al. 2016; Clinebell – Clinebell 2007*), instead of using qualitative methods, we set out to explore exit rates and career development patterns for typical and the two atypical forms of employment. Two hypotheses were generated before conducting our research. According to the first, the attitudes of employees toward part-time and fixed-term employment was expected to be positive if the exit rate in the two atypical employment forms examined is not higher than that of their typical counterparts. This would suggest that the employees do not perceive their atypical employment status as a punishment. In our second hypothesis, we assumed that career development is equally possible both in the case of the two atypical employment forms as well as in typical ones. Therefore, we look at which group of employees (those in typical or atypical employment schemes) in our sample are more likely to be promoted or hired for certain career levels.

Prior to conducting the analysis, it was anticipated that in the case of the company examined, owing to the positive effects of the two atypical forms of employment, which are described in detail at a later point, the exit rate of the employees concerned would not be higher than that of their counterparts in typical forms of employment. Furthermore, we also expected to find identical or at the very least highly similar career development patterns for the two groups. The analysis, however, yielded results contrary to what had been expected.

In *Section 2,* we present the theoretical background of part-time and fixed-term employment. *Section 3* provides an overview of our system of hypotheses, as well as the characteristics of the database we used. In *Section 4,* we discuss the detailed description of the results, and finally, in *Section 5,* we summarise the conclusions of the study.

2. Part-time and fixed-term employment

According to the definition of the International Labour Organisation (ILO), those forms of employment are called atypical which in some way deviate from traditional forms of employment (full-time and non-fixed employment).[1] Based

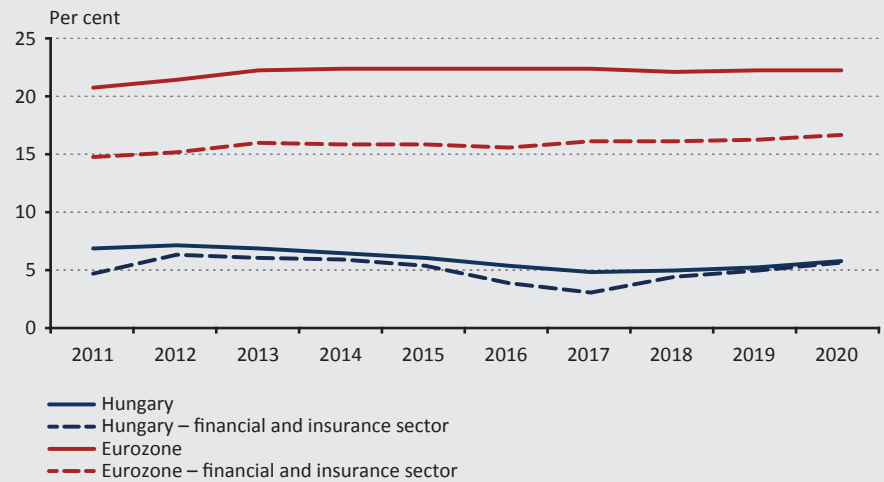
[1] Non-standard employment around the world: Understanding challenges, shaping prospects, International Labour Office – Geneva: ILO. 2016. https://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms_534326.pdf. Downloaded: 1 May 2022.

on this interpretation of the concept, part-time and fixed-term employment are also regarded as atypical forms of employment (*Kalleberg 2000*). Therefore, we consider it important to provide a background of atypical employment schemes and to briefly highlight the difficulties in formulating a definition. This multidisciplinary topic is a popular area of research, especially in legal, sociological and economic studies. On the one hand, it is a fortunate situation as the available literature covers most aspects of atypical employment (*Córdova 1986*). On the other hand, it makes the matter of providing an accurate definition of the concept more complicated (*Hovánszki 2005*). In his study, *Bankó* (*2008*) points out that atypical employment is a relative definition since in order to understand its atypical nature, it is also necessary to provide a definition of typical forms of employment. *Hárs* (*2013*) also states that any form of employment that differs from typical employment at least in one or more of its aspects can be regarded as atypical. *Ásványi et al.* (*2017*) also confirm this line of interpretation. They say that an atypical form of employment is one which in some of its aspects (time, place) is not typical. As to what counts as typical or atypical on the labour market, this is a matter that may be influenced not only by the regulatory environment, but also by social and cultural factors, which combined may result in different interpretations in various geographical locations (*Ogura 2005*). In this study, a particular form of employment is considered to be atypical, if: 1) the place of work is not the headquarters or a branch of the company; 2) the duration of work is less than eight hours daily; and 3) if the employment agreement serving as its basis was not concluded directly between the employer hiring the personnel and the employee. The dynamic development of atypical forms of employment is best illustrated by the fact that apart from its traditional variants, other forms have also emerged over the past couple of years. The former group includes, for example, the focus of our study, i.e. part-time and fixed-term employment, and for example, '*gig work'* belongs to the latter (*Woodcock – Graham 2019*). All three of the above-mentioned variants can be regarded as atypical forms of employment, but since part-time and fixed-term employment are considered to be the most general, and as such, the least atypical, gig work, which has started growing dynamically over the past several years, is atypical in all of its aspects. Gig work, in essence, is project-based work (*Bihary – Kerényi 2020*), and apart from often possessing many of the characteristics of fixed-term and part-time employment, it also has other atypical traits. As our investigation is centred on part-time and fixed-term employment, the study does not include an overview of the various atypical forms of employment. The diverse and expansive nature of the topic simply does not allow for such an overview due to present limitations, and furthermore, we are not investigating employee attitudes towards atypical employment in general.

The most widespread form of atypical employment in Europe is part-time employment. This statement is supported by *Bankó* (*2008*) as well, but is also

confirmed by the fact that the proportion of individuals between the ages of 20 and 64 in part-time employment was 19.1 per cent in 2019 in the total employment rate of the 27 member states of the European Union.[2] Concerning the definition, based on *Ásványi and Barakonyi* (*2010*), it can be stated that an individual working less than full-time hours can be considered as a part-time employee. Due to the difference in social, cultural and historical backgrounds of different countries, the regulatory framework may also show some variation (e.g. in terms of defining an upper limit for part-time employment, *Hárs 2013*), however, in general, we deem this definition as acceptable.

Figure 1
Proportion of part-time employment in Hungary and the eurozone, as well as in the financial insurance sectors



Source: Edited on the basis of Eurostat data[3]

Figure 1 shows that the proportion of individuals in part-time employment is higher in the eurozone countries than in Hungary. One possible way to explain this is that in Hungary part-time employment is predominantly perceived as a means of crisis management, rather than an opportunity to increase competitiveness (*Seres 2011*).

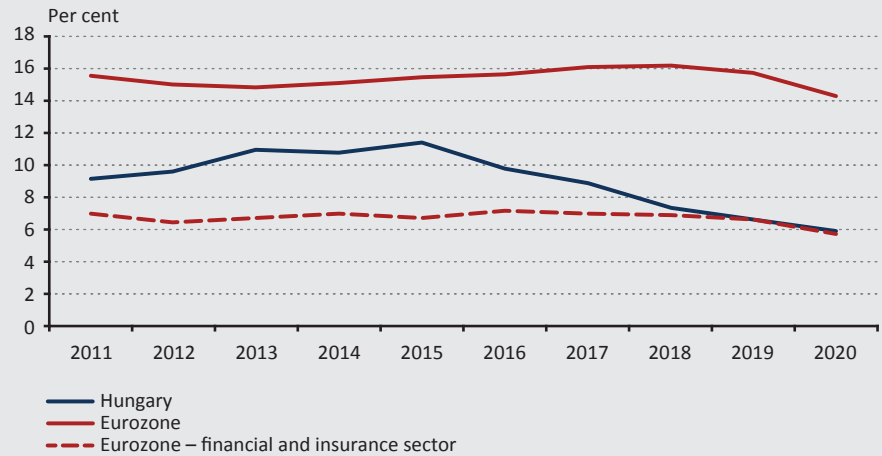
The perception of part-time employment is fairly controversial. This is not only exemplified by the variance in terms of its proportions across European countries, but also by the different approaches adopted in studies on the subject. On the one

[2] *Persons employed part-time – Total*. https://ec.europa.eu/eurostat/databrowser/view/tps00159/default/line?lang=en. Downloaded: 7 February 2022.
[3] *Persons employed part-time – Total*. https://ec.europa.eu/eurostat/databrowser/view/tps00159/default/line?lang=en. Downloaded: 7 February 2022.

hand, a number of studies address the fact that employees are more vulnerable in this form of employment (*Lang et al. 2013*), and their working conditions are also worse (*McDonald et al. 2009*). Most of the affected part-time employees have no control over these matters, the reason for which is that changes on the labour market demand (increasing flexibility in work organisation and production for the sake of competitiveness) also point in this direction (*Euwals – Hogerbrugge 2006*). On the other hand, the supply side is also changing in the labour market, which means that changes in employee preferences (e.g. due to younger generations entering the market – *Pyöriä et al. 2017* or *Cseh-Papp et al. 2017*) require employers to adopt new solutions. Of course, the emerging need from workers for shorter working hours and flexible employment is not a novelty. Finding the right work-life balance has long been a popular research subject with part-time employment also playing a key role in such investigations (*Guest 2002* or *Fleetwood 2007*). Another matter partly related to this subject, from a different perspective, is that part-time employment is a tool for facilitating women's return to the labour market after giving birth. This field also has a large body of literature, as it aims to gain insight into a very important social and economic issue (*Hill et al. 2004*). More recent studies examine the possible effects of lower working hours on the environment, individual well-being and the economy on the whole (*Antal et al. 2020*). Our previous study also shed light on the fact that in some cases the performance of part-time workers is better than that of their full-time counterparts, which clearly shows that the economic benefits of part-time employment cannot only be felt in an indirect way, but even directly as well (*Vörös – Fűrész 2021*).

Although in Europe the percentage of people in fixed-term employment is lower than that of part-time employees, in terms of atypical forms of employment the share of fixed-term contracts is rather significant. *Figure 2* highlights the fact that even though the percentage of fixed-term employees is lower in Hungary than in the eurozone countries, the difference between the two figures is smaller than in terms of part-time employment (*Figure 1*).

Figure 2
Proportion of fixed-term employment in Hungary and the eurozone as well as in the eurozone's financial and insurance sectors



Note: We do not have detailed information concerning the Hungarian financial and insurance sector.
Source: Edited on the basis of Eurostat data[4]

Similarly to part-time work, defining fixed-term employment is a fairly straightforward task, because every employment contract with a termination date agreed upon by both parties is to be regarded as a fixed-term agreement. The date of termination can be the end of a project, the return of another employee to work, or any other date agreed upon in advance. In the present study, those employees are considered as fixed-term employees who have a termination date set in their employment contract.

According to *Portugal and Varejão* (*2009*) companies typically hire employees with fixed-term contracts for three reasons: 1) Cutting back on expenses, 2) replacing/hiring staff temporarily, and 3) screening. The cost-reducing effect of fixed-term contracts becomes most apparent primarily at the termination of the employment agreements (since in these cases no further compensation is payable to the employee). Temporary involvement of resources may be an option in the case of seasonal or project-based employment, but it can also serve as an effective tool for managing temporary shortages in human resources. As regards screening, it is important to note that the agreement between the employer and the employee

[4] *Employees by sex, age and economic activity* (from 2008 onwards, NACE Rev. 2) – 1 000, https://ec.europa.eu/eurostat/databrowser/view/LFSA_EEGAN2__custom_1848902/default/table, *Temporary employees by sex, age and economic activity* (from 2008 onwards, NACE Rev. 2) – 1 000, https://ec.europa.eu/eurostat/databrowser/view/LFSA_ETGAN2__custom_1848893/default/table. Downloaded: 4 January 2022.

may not be directed at damaging the rightful interests of the employee; therefore, we cannot claim that fixed-term agreements are concluded purely because of screening. Nonetheless, it needs to be acknowledged that this factor is an added advantage for the employer.

Besides companies, employees may also benefit from fixed-term employment as it may offer them a way out of less favourable alternatives, e.g. a worse job with lower salary or a shorter employment period. Unemployment may also be among those less favourable alternatives. In their study, *Grün et al.* (*2010*) investigated the subject of whether unemployment from the perspective of subjective satisfaction may be a better alternative than a poor job opportunity. Based on their results, it can be stated that unemployment is the worst scenario, as they could find no factors that made a workplace become a less satisfactory choice than unemployment. *Beckmann et al.* (*2007*) found that in terms of job security, fixed-term employees basically have a more disadvantageous position compared to their non-fixed counterparts, but fixed-term employees are more satisfied. This can be explained by the fact that fixed-term employees typically receive their status after being unemployed, and therefore, they appreciate their position and are more motivated to work, hoping to make it into a long term job opportunity.

Analyzing a corporation, *Vörös et al.* (2021) investigated whether non-fixed or fixed-term employees are more productive in terms of certain performance rates. Their results show that, in general, non-fixed employees are more efficient, but there are cases where fixed-term employees have proven to be more productive. Younger employees, for example, to whom fixed-term contracts actually give the chance to enter the labour market, perform better in positions which require skills that can be acquired in a fast and simple way. As a result, it can be concluded that fixed-term status not only has an effect on the cost side of the company, but may also increase its revenues.

3. Background to the research

The effects of part-time and fixed-term employment are typically different, or at least significant differences can be found in the underlying processes of motivation. Therefore, it is crucial to clarify that this study does not aim to investigate the advantages of atypical employment in general: its purpose is to shed light on the advantages of part-time and fixed-term employment as the subsets of atypical employment which could stand out as separate research topics as well. As described in *Section 2*, researchers have examined the topic from several aspects, based on which they reflected on the advantages and disadvantages of these employment forms. From these studies, as well as from our own experience, we have collected the most typical advantages and disadvantages of part-time and fixed-term employment at the corporate and individual levels (*Table 1*).

Table 1
Potential advantages and disadvantages of part-time and fixed-term employment

	Part-time employment		Fixed-term employment	
	Pros	**Cons**	**Pros**	**Cons**
Corporate perspective	more flexible work organisation	lower employee engagement, if not voluntary	reducing costs	increasing costs (in certain cases)
	higher employee engagement (due to WLB*)	less attractive employer brand, if not voluntary	longer screening period	deteriorating employer brand
	more attractive employer brand	lower productivity, if not voluntary	addressing temporary resource shortages	high rate of employee turnover
	higher productivity	declining brand value (CSR), if not voluntary	increasing productivity	low loyalty
	higher brand value (e.g. due to CSR)			low engagement
	more flexible operation			
Individual perspective	finding the right work-life balance	lower salary	access to employment	insecurity
	access to employment	feeling discriminated	possibility of proving themselves	feeling discriminated, outcast
	improving well-being	more difficult career development	gaining experience	continuous compulsion to conform
	concentrated work			not being eligible for certain benefits
	increasing productivity			more difficult career development
				vulnerability

*Note: * work-life balance*

Part-time and fixed-term employment can be maintained in the long run if they create mutually beneficial conditions both for employers and employees, i.e. if the expectations of employees and employers are in compliance, and even in the individual and corporate dimension, most of the advantages listed in *Table 1* come true, but no potential disadvantages are present, or only some of them.

Empirical analysis of the advantages and disadvantages listed in *Table 1* provides a number of interesting research opportunities. In the present study, three elements were in focus, i.e. access to employment, work-life balance, and more difficult career development.

Many studies can be read on the issue of whether or not fixed-term employment can be regarded as a transition between long-term unemployment and non-fixed employment (*Güell – Petrongolo 2007; De Graaf-Zijl et al 2011*). We assume that employees working in this form of employment see fixed-term employment as an opportunity, as a transition period between unemployment and permanent employment. In Hungary, the law stipulates that the length of a fixed-term employment contract may not exceed five years, which also determines the possibilities of individuals working in this form: 1) having a fixed-term employment contract for up to five years; 2) leaving the job; 3) being transferred to non-fixed status; and 4) going on maternity leave.

Regarding part-time employment, based on the studies cited, it can be stated that if the employee voluntarily chooses reduced working time, this form of employment may stay permanent due to the work-life balance it provides. On the other hand, if part-time employment, similarly to fixed-term status, is necessary to have access to (typical) employment, but the employee could work more, the status can be regarded as a transition, except for the fact that the law does not maximise the years spent in this form of employment.

In the case of fixed-term employment, we can expect that the vast majority of employees spend a short period of time in this status and then will be transferred to non-fixed employment, or otherwise resign. We assume that fixed-term employees have a positive attitude toward their status as they use it as a stepping-stone, which will be reinforced by the career paths and turnover rate as well. As for part-time employees, we believe that work-life balance will gain higher appreciation, and more employees will opt for reduced working time, which will result in permanent part-time status. We should not overlook the fact that the examined company operates in the financial and insurance sector, where higher pay rates may have an even more significant effect on permanent part-time statuses. This is further confirmed by the fact that the average rate of part-time employees at the company was 14.3 per cent during the investigated period (the rate of fixed-term employees was 8 per cent), which is a higher value than the Hungarian average. Bearing all of this in mind, we expect that a significant proportion of part-time employees are satisfied with their situation, which means that the majority will not transfer to typical employment, and their exit rate will also be lower than of their counterparts

working in fixed-term and typical employment. Our first three hypotheses were formulated based on these assumptions:

H1: The rate of fixed-term employees changing for non-fixed status is higher than their exit rate.

H2/1: Among the part-time employees, there are more employees working part-time during the whole period examined than the ones changing for typical employment.

H2/2: The exit rate of part-time employees is not worse than that of employees in typical employment.

One of the possible fears of part-time and fixed-term employees about their job status is that they have less favourable chances for career development than employees in typical employment. Several studies detail the fact that the decision makers of a company usually work in typical employment (e.g. *Jacobsen 2000*), which in itself means that employees in atypical employment are mainly positioned at the lower levels of corporate hierarchy. However, it does not imply that employees do not wish for career development; therefore, we find it crucial to carry out an empirical analysis of the question whether part-time and fixed-term employees are always at a disadvantage with respect to career development. Furthermore, we also examine if part-time and fixed-term employees are typically placed at lower career levels compared to employees in typical employment, which may also provide insight into further aspects of career development, that is whether career development typically takes place at lower or higher levels of the career. On the whole, however, the company examined in the study has a higher rate of part-time and fixed-term employment than the Hungarian average, and therefore, in contrast to previous studies, we expected similar career development patterns regarding typical and atypical employment. Hypothesis H3 is based on our assumptions about career building:

H3: At the company examined, the career opportunities of part-time employees with fixed-term employment are not worse than that of their peers in typical employment.

To conduct the study, we collected data from a large Hungarian enterprise, which is the Hungarian unit of a multinational company operating in the financial and insurance industries, with the intention of excluding the various effects of efforts related to employee turnover and career development. The analysis is limited to one enterprise in order to have a better chance of examining the reality of the effects of part-time and fixed-term employment. However, we understand that at the same time we create a limit to the study as *general conclusions may not be drawn from the data.* As mentioned before, the total number of the primary dataset was 4,683 people. The rate of part-time employees was 14.3 per cent in the period examined,

while the rate of fixed-term employees was 8 per cent. The distribution of database variables is shown in *Table 11* in the Appendix.

Important aspects in selecting the company were to operate in the competitive sector, to offer a clear and open career path for every employee, and to be cooperative. The latter criterion may not seem to have professional significance, but it proved to be the most important aspect as data in this field of research is hardly available. This is also supported by the fact that the industry data in Figures 1 and 2 are also incomplete or less reliable in Eurostat's systems. Although no general conclusions can be drawn from the analysis of the sample of 4,683 people from one company, testing the hypotheses may lead to interesting results due to the difficult access to data.

In the selection of jobs, we paid special attention to employees working in customer service areas, as these jobs were considered standard enough to make comparisons. The database includes the monthly distribution of data retrieved between January 2017 and December 2019.

In order to examine employees in atypical employment, the categorization shown in *Table 2* was prepared.

Table 2
Employment matrix

	Part-time	Full-time
Fixed-term	A	B
Non-fixed	C	D

In the table 'A' indicates employees who are concerned with all types of atypical employment examined, i.e. they work part-time and have fixed-term employment contracts. The designation 'B' stands for full-time employees with fixed-term contracts, 'C' stands for part-time employees with non-fixed contracts, and 'D' includes employees in typical employment forms. In our study, a total of 4,683 persons were categorised as described above.

During the three years of available data, the categories of employees in *Table 2* underwent a significant number of changes: therefore, all *'employment paths'* realised were identified and categorised. This means that we identified the employment path of each employee surveyed, and based on them, all employees were listed into groups. All personnel changes of staff who were employed on 1 January 2017 were tracked during the three years of the study. As a result, not only did we receive an accurate picture of employee promotions, but also of employment

status changes and exits. Because of the latter, 52 'employment paths' were defined in total, as we set different groups for employees exiting within 3 years, and for employees staying in employment throughout the whole period. To simplify the above categorization, we identified (1) those who worked part-time or fixed-term throughout the three years (marked as atypical in the table due to simplification, but standing for only the two atypical forms examined), (2) those who stayed in typical employment all along, and also (3) those affected by both statuses. *Table 3* was created based on these, showing groups of different cardinality:

Table 3
Distribution of workers by atypical and typical employment

Form of Employment	Total (persons)	Distribution (%)
1. Atypical	1,180	25.2
2. Typical	2,363	50.5
3. Mixed	1,140	24.3
Total	4,683	100.0

With the help of the employment paths identified, we applied simple descriptive statistics to examine the transition and exit rates between the forms of atypical and typical employment.

The company analyzed provides transparent career opportunities to its employees, where different positions are listed into six distinctive career levels, with level 1 indicating the lowest career level, and level 6 indicating the highest. In our research, we also examined the movements of 4,683 employees at different career levels, which allowed us to compare the career development practices of atypical and typical employees.

4. Results

After the identification of employment paths, the exit rate of the groups indicated in *Table 3* was examined. The results are presented in *Table 4*. As a conclusion, we can say that the group of atypical employment had the highest exit rate, which means the employees that worked in part-time and/or fixed-term employment during the whole course of the three years examined. Occasionally, some employees switched between the three categories, but had atypical employment contracts throughout. Employees of typical employment came in second place. They had a typical employment contract throughout the whole period under review. The lowest exit rate of employees occurred among those who took part in both typical and atypical employment during the three years.

Table 4
Simple employment routes and exit rates

Employment type	Stayed (%)	Exited (%)
Atypical ('A', 'B', 'C')	47	53
Typical ('D')	67	33
Mixed	77	23
Total	65	35

Note: In the table 'A' refers to part-time employees with fixed-term contracts, 'B' refers to full-time employees with fixed-term contracts, 'C' to part-time employees with non-fixed contracts, and 'D' to full-time employees with non-fixed contracts.

It may serve as a possible explanation of the results that employees in the 'Mixed' category of atypical employment thought of the atypical status as a stepping-stone, while the ones whose atypical status was not voluntary and did not have chance to change it stayed in the 'atypical' category and exited the company for a more favourable job opportunity on the market. The analyses in *Tables 4 to 8* were also carried out on personnel between the ages of 26 and 55, in order to filter out the distorting effect of frequent changes of workplaces typical at retirement or the beginning of their career; however, *Tables 12 to 16 of the Appendix* show no significant differences between the two age groups. All in all, it is worth noting that the exit rate is significantly higher for employees in atypical employment. In order to conclude the significance of the difference of the ratios, we performed a χ^2 test, which confirmed ($p<0.01$) that the differences are significant (*Hunyadi et al. 2011*).

As a step forward, we analysed the typical-atypical status of certain employees in the last available month in the period examined, regardless of their employment path. A number of reasons may occur for leaving a job, one of which can be the type of employment. Therefore, we narrowed our research to one company to minimise the different effects between companies. Even after all of this, we cannot state that exits happened due to the type of employment, but we may understand that atypical employment has a significant effect on the individual's engagement (*Martin – Sinclair 2007; Omar, 2013*), which has an overall influence on the employee's decisions at work and significantly reduces other negative effects. Based on this, we accept that the employment status of the employee at the time of exit is related to the exit. Our results are summarised in *Table 5*. Looking at the ratios, we can see that most people exiting were in category 'A' (in staff overall as well, but the ratio is even higher among the employees aged 26 to 55, see *Table 13* in the Appendix), which accounts for the common subset of part-time and fixed-term status. Category 'B' including full-time but fixed-term status has a slightly lower result, which is followed by category 'C' of non-fixed part-time status. In *Table 13*

in the Appendix, we can see that the exit rate among employees aged between 26 and 55 in category 'C' is lower than in the whole sample, which can explained by the fact that work-life balance in this age group is more valuable compared to, for example, younger workers who have not started a family yet. In order to reveal the reasons for differences, further examinations would be required. The lowest number of employees exiting was found among those who spent their last month at work in typical employment. This time as well, the difference between the exit rates of the categories, similar to employment types (*Table 4*), can be claimed to be significant (p-value for test χ^2 is less than 1 per cent).

Table 5
Detailed employment routes and exit rates

Categories	Stayed (%)	Exited (%)
'A'	41	59
'B'	42	58
'C'	59	41
'D'	71	29
Total	65	35

Note: 'A' – part-time employee with a fixed-term contract, 'B' – full-time employee with a fixed-term contract, 'C' – part-time employee with a non-fixed contract, 'D' – full-time employee with a non-fixed contract.

Based on our results so far, we can see that the exit rate in typical employment is less characteristic than in the two forms of atypical employment examined. As *Table 4* shows, the lowest exit rate was in the 'Mixed' category, and – complemented with the results in *Table 5* – it can be concluded that moving from atypical employment to typical employment is more preferred in the 'Mixed' category than vice versa. If we examine not only the status of the last month for each employee, but also the *changes* in the different statuses, the above conclusion is reinforced.

Table 6
'Direction' of changes in employment types

	Stayed (%)	Exited (%)
A–B	2	2
A–C	5	2
A–D	9	2
B–A	2	2
B–C	1	1
B–D	29	8
C–A	0	0
C–B	0	0
C–D	17	5
D–A	0	0
D–B	0	0
D–C	9	4
Total	75	25

Note: 'A' – part-time employee with a fixed-term contract, 'B' – full-time employee with a fixed-term contract, 'C' – part-time employee with a non-fixed contract, 'D' – full-time employee with a non-fixed contract. The first letter indicates the type of employment registered in the starting month, and the second letter indicates the last month. There may be additional categories between the two.

Of the 4,683 people examined, 1,341 people had their employment status changed during the three years of the study, corresponding to 29 per cent. Based on *Table 6*, it can be concluded that out of 1,341 people (regardless of the fact whether they stayed at the company or exited), 70 per cent changed atypical employment for typical employment, 17 per cent changed atypical employment for atypical employment, and 13 per cent changed their typical employment for atypical employment (almost the same result was found in the age group of 26 to 55, see *Table 14* in the Appendix).

As a result, most of the changes took place in the direction of typical employment, the effect of which on the exit rate was also examined, with the results presented in *Table 7*. As we can see, 80 per cent of the employees of fixed-term and/or part-time status changing for typical employment stayed at the company during the period examined, and only 20 per cent exited, which means a considerable improvement compared to the data in *Table 4,* however, in terms of the relating χ^2 test, the difference is insignificant (p>0,10).

Table 7
Effect of switching from atypical to typical employment on exit

Category changes	Stayed (%)	Exited (%)
A–D	84	16
B–D	79	21
C–D	79	21
Total	80	20

Note: 'A' – part-time employee with a fixed-term contract, 'B' – full-time employee with a fixed-term contract, 'C' – part-time employee with a non-fixed contract, 'D' – full-time employee with a non-fixed contract.

In addition, we examined which changes were the most typical in each category. In *Table 8*, we can see that 20 per cent of the employees who started to work in part-time and fixed-term employment (category 'A) exited if their status did not change. Changing the employment contract to a non-fixed contract significantly improved the chances of staying at the company. Changing for typical employment offered the greatest chance to stay at the company for employees that had fixed-term employment, but worked in full-time positions.

Table 8
Rates of change within each category

	Stayed (%)	Exited (%)
A–A	12	20
A–B	8	5
A–C	16	5
A–D	29	5
B–A	3	3
B–B	18	27
B–C	1	1
B–D	37	10
C–A	0	0
C–B	0	0
C–C	29	27
C–D	35	9
D–A	0	0
D–B	0	0
D–C	5	2
D–D	62	31

Note: 'A' – part-time employee with a fixed-term contract, 'B' – full-time employee with a fixed-term contract, 'C' – part-time employee with a non-fixed contract, 'D' – full-time employee with a non-fixed contract.

Part-time employment with non-fixed terms had a greater likelihood of continuous employment in typical employment, and changing atypical employment for typical employment rarely happened.

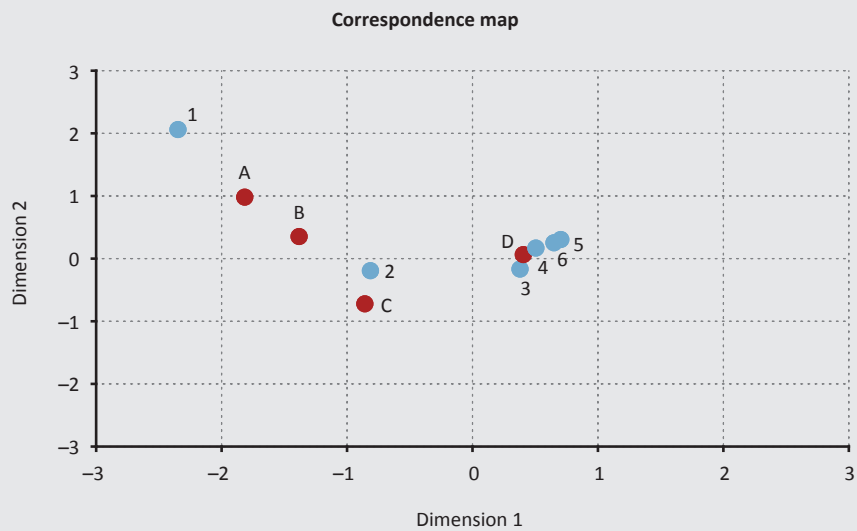
As we have already pointed out, general conclusions cannot be drawn from the results received, but in the case of the company, it can be claimed that in terms of *hypothesis H1* (i.e. *the rate of fixed-term employees changing for non-fixed status is higher than their exit rate*), many employees see fixed-term status as an opportunity; however, its acceptance is not at all as obvious as we had previously assumed. *Table 5* shows that the exit rate is the highest in fixed-term status (category 'A' and 'B'), which leads us to the conclusion that the attitude of employees is rather negative towards this category of employment. On the other hand, if we examine the changes as well, it can be concluded that the exit rate decreases significantly when employees manage to enter into a non-fixed contract (*Tables 7 and 8*). Considering that 40 per cent of the employees with a fixed-term contract at the beginning of the period examined changed for a non-fixed contract and stayed at the company, and 39 per cent exited regardless of their status received later on, we can conclude that this opportunity represented a stepping-stone roughly to same extent as it meant a dead-end. On the whole, it can be said about hypothesis H1 that while fixed-term employment proved to be a good opportunity, and so the attitude of employees could be positive, the exit rate is very high, which can result in at least the same extent of negative attitude as well. With the help of the quantitative analysis applied, we cannot make a conclusion about the attitude of employees towards fixed-term employment in the case of the company examined.

Regarding our *hypothesis H2/1* (*Among the part-time employees, there are more employees working part-time during the whole period examined than the ones changing for typical employment*), we can say that according to *Tables 6, 7 and 8*, a considerable number of employees changed part-time status for typical employment; as a result, we could not provide an objective view of the opportunities of part-time employment in the company's sample. The previous conclusion was also justified by the fact that (non-fixed, part-time) employees who worked in category 'C' at the beginning of the period examined and changed for typical employment had a 20 per cent higher rate that those who stayed in this category. Although we had expected part-time status to be attractive to many, the result of the sample examined did not confirm this hypothesis. We reject *hypothesis H2/2* (*The exit rate of part-time employees is not worse than of typical employment*) based on *Table 5*, as it was revealed that the exit rate in category 'C' was higher than in the ones in typical employment status.

In the analysis of *hypothesis H3* (*The career opportunities of part-time and fixed-term employees are not worse at the company examined than of those who worked in typical employment*), we took the following employees out of the sample: those

working for less than 6 months at the company, those at the top career levels, and those more than 50 years old. It was thought that maintaining these conditions would significantly distort the results obtained. We do not certainly claim that career development is typical for employees under 50, but we are suggesting that employees in the position examined have a good chance of reaching the highest career level by the age of 50. The data table thus obtained included the values of 2,905 persons. After filtering the database, we looked for answers to the question whether the different elements of the matrix in *Table 2* can be associated with different career levels, i.e. whether a significant relationship can be detected between certain types of employment and career levels. Based on the correspondence analysis performed (p-value<0.01 and Inertia = 0.3), it can be stated that a significant relationship was detected between the examined variables. The correspondence map below (*Figure 3*) shows that on the one hand, category 'D', i.e. typical employment, is definitely associated with career levels 3, 4, 5, and 6, i.e. the higher levels, while on the other hand, atypical employment types can only be associated with career levels 1 and 2.

Figure 3
Correspondence map showing the relationship between employment types and career levels



Note: Career levels are marked with blue, and employment types shown in Table 2 are marked with red.

This result is also suggested by the distribution of career levels and type of employment, which is also included in *Table 9*.

Table 9
Distribution of workers by career level and type of employment

	Matrix				
Career level	**A**	**B**	**C**	**D**	**Total**
1	14%	9%	3%	0%	2%
2	80%	73%	66%	24%	37%
3	4%	9%	21%	29%	25%
4	1%	6%	6%	19%	15%
5	1%	1%	2%	15%	11%
6	0%	2%	2%	13%	10%
Total	**100%**	**100%**	**100%**	**100%**	**100%**

	Matrix				
Career level	**A**	**B**	**C**	**D**	**Total**
1	26%	44%	21%	9%	100%
2	8%	18%	26%	48%	100%
3	1%	3%	12%	84%	100%
4	0%	4%	6%	90%	100%
5	0%	0%	3%	97%	100%
6	0%	2%	4%	94%	100%
Total	**4%**	**9%**	**14%**	**73%**	**100%**

Note: 'A' – part-time employee with a fixed-term contract, 'B' – full-time employee with a fixed-term contract, 'C' – part-time employee with a non-fixed contract, 'D' – full-time employee with a non-fixed contract.

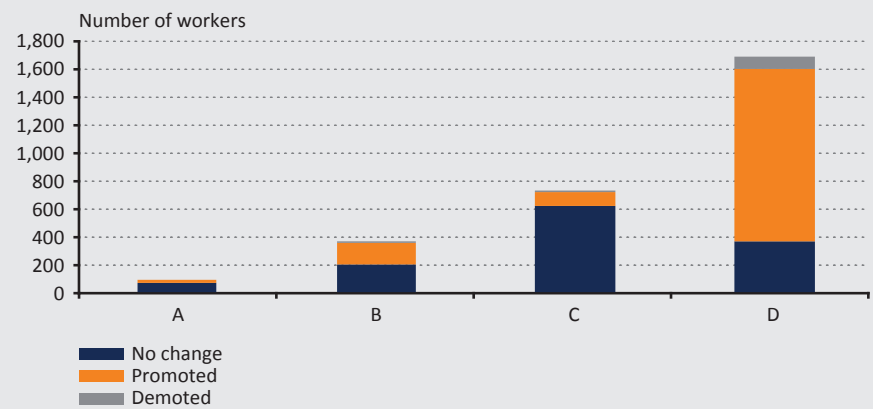
The data table incorporates the results of 2,905 persons in a monthly distribution showing whether the employees changed their career level between January 2017 and December 2019 or not, and if yes, which type of employment the employee had in that month according to the classification in *Table 2*. As not all employees worked through the entire period of the 36 months of analysis, we had a total of 75,218 records.

Table 10
Aggregation of career level changes by employee

Career level changes	Quantity (persons)
–4	1
–3	2
–2	15
–1	25
0	1,652
1	668
2	387
3	115
4	39
5	1
Total	**2,905**

1,253 employees changed their career level upwards or downwards out of 2,905 persons, altogether 1,617 times. *Table 10* also shows that 1,652 persons, i.e. more than half of the employees did not change their career level during the three years of the analysis. After identifying all career level changes in the sample and listing each employee's monthly employment type into the categories in *Table 2*, we examined the distribution of career level variables for each employment type, as shown in *Figure 4*.

Figure 4
Distribution of workers changing career levels by type of employment



Note: 'A' – part-time employee with a fixed-term contract, 'B' – full-time employee with a fixed-term contract, 'C' – part-time employee with a non-fixed contract, 'D' – full-time employee with a non-fixed contract.

Figure 4 clearly shows that, proportionately, employees in typical employment changed their career level the most often, and part-time and fixed-term employees managed to make a step forward on their career ladder less frequently.

Thus, our research also did not confirm our hypothesis H3, and taking the above mentioned limits of the database into consideration, we can state that employees in typical employment hold positions at higher levels of the organisational hierarchy and have better chance to build a career than their peers in atypical employment.

5. Summary

In our opinion, atypical employment will play a greater and greater role in the labour market. We think this is true not only because of the reorganisation of the labour market due to Covid-19, but also because of the pressure of dynamically increasing competition. In our study, we highlighted the effects on the individual, the organisation and the whole national economy by the two forms of atypical employment examined, i.e. part-time and fixed-term employment. Along with the disadvantages, both part-time and fixed-term employment are considered to be enhancing tools of competitiveness.

In our study, our assumption was based on the fact that competitive advantage can only remain in place, i.e. the labour market can only remain sustainably flexible, if both employers and employees are able to find personal advantages in atypical employment types. Although part-time employment supports work-life balance, and fixed-term employment has cost-cutting effects, wider groups of employees see part-time and fixed-term employment as rather disadvantageous. The research was conducted based on the sample of the employees of a multinational large enterprise in Hungary, including the data of a total of 4,683 persons. It was a great help in filtering out the different effects employers had on employment, but at the same time, it also was a great disadvantage that general conclusions could not be drawn from the results. In order to conduct an empirical analysis on the matter of employees' attitudes toward atypical employment, i.e. from certain perspectives they see it as a real advantage, or at least not worse than the conditions of typical employment forms, as opposed to previous studies, we carried out a quantitative analysis based on some of our assumptions, instead of making qualitative analyses. To anticipate an employee's positive attitude toward part-time and fixed-term employment, we expected a low exit rate and a low transition rate to typical employment, while career development opportunities were assumed to be an important element in job selection that would also increase employee engagement. Career-building opportunities had been previously thought to be of at least the same extent as in case of employees of typical employment. On the whole, our hypotheses regarded the attractive feature of the two atypical employment

forms examined, thus ensuring the company a possibility to create a permanent competitive advantage through flexible employment.

However, we *obtained results contrary to our hypotheses* from our study. *The highest exit rate of employees occurred in the examined atypical form, and the movement between employment forms also typically took place from atypical to typical.* This is also supported by the fact that, according to the data, the chance of exiting was further reduced if employees were able to change atypical employment for typical employment. If we accept our previous hypotheses, we can claim that employees do not see part-time and fixed-term employment as advantageous. Looking at career development opportunities, results show that part-time and fixed-term employment typically takes place at lower career levels, while employees usually work in typical employment at higher career levels. The result is further enhanced by the fact that employees in typical employment change their career levels more frequently than part-time or fixed-term employees. Based on the these facts, it can be concluded that employees in typical employment have better chances for career development, and as such, part-time and fixed-term employees involuntarily face disadvantages. The matter cannot necessarily be resolved by employers, as transition from atypical employment to typical employment is a special form of career development, employees may consider it a zero milestone, and thus perceiving the status change a reward that serves as a start for promotions to further career levels. If we accept the latter explanation, or we impute different career development opportunities to the company, the study obtains the same result, i.e. *atypical employees may feel disadvantaged against typical employees.*

We consider the results of our study to be important because – although numerous studies have addressed the effects of different forms of atypical employment on the individual and the organisation, even showing that the employees' subjective feelings are fundamentally positive – the objective corporate employment statistics we used in our study for part-time and fixed-term employment did not support these results. This does not mean that part-time and fixed-term employment are disadvantageous, or that the previous studies did not have firm bases. It rather suggests that more time and energy need to be spent on demonstrating the advantages of part-time and fixed-term employment so that their perception can be improved. Their positive effects are obvious, but our results lead to the conclusion that their negative features are more visible. In the future, we intend to expand our research by involving other economic players to provide more reliable results, and thus to be able to draw general conclusions. If the present results are reinforced in a wider scope of research, the advantages of part-time and fixed-term employment definitely deserve to be examined in detail, as, in our opinion, they provide an excellent opportunity to improve competitiveness, both at micro- and macro-economic levels.

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Appendix

Table 11
Distribution of workers by category on which the empirical study is based

Variable	Category	Ratio (%)
Age, years	19–20	0.2
	21–30	23.6
	31–40	30.8
	41–50	23.5
	51–60	16.6
	61–	5.4
Location	Balaton	1.9
	Budapest	30.2
	Other	67.9
Education	Primary school	0.1
	Vocational school	0.1
	Specialised training school	0.0
	Vocational secondary school	37.4
	Secondary school leaving certificate	27.2
	Technical school leaving certificate	0.8
	College	14.1
	University	3.4
	Postgraduate	0.1
	N/A	16.7
Gender	Male	12.8
	Female	87.2
Position	Basic task	63.2
	Complex task	36.8

Table 12
Exit rate by employees within the age range of 26–55 by simple employment routes

Employment type	Stayed (%)	Exited (%)
Atypical ('A', 'B', 'C')	46	54
Typical ('D')	69	31
Mixed	77	23
Total	66	34

Note: 'A' – part-time employee with a fixed-term contract, 'B' – full-time employee with a fixed-term contract, 'C' – part-time employee with a non-fixed contract, 'D' – full-time employee with a non-fixed contract. There are 3,740 employees in the data pool between the ages of 26 and 55.

Table 13
Exit rate by detailed employment routes among employees within the age range of 26–55

Categories	Stayed (%)	Exited (%)
'A'	35	65
'B'	38	62
'C'	63	37
'D'	72	28
Total	66	34

Note: 'A' – part-time employee with a fixed-term contract, 'B' – full-time employee with a fixed-term contract, 'C' – part-time employee with a non-fixed contract, 'D' – full-time employee with a non-fixed contract. There are 3,740 employees in the data pool between the ages of 26 and 55.

Table 14

The 'direction' of changes in employment types among employees within the age range of 26–55

	Stayed (%)	Exited (%)
A–B	2	2
A–C	5	2
A–D	9	2
B–A	2	2
B–C	1	1
B–D	31	8
C–A	0	0
C–B	0	0
C–D	18	5
D–A	0	0
D–B	0	0
D–C	8	4
Total	75	25

Note: 'A' – part-time employee with a fixed-term contract, 'B' – full-time employee with a fixed-term contract, 'C' – part-time employee with a non-fixed contract, 'D' – full-time employee with a non-fixed contract. There are 3,740 employees in the data pool between the ages of 26 and 55. The first letter indicates the type of employment registered in the starting month, and the second letter indicates the last month. There may be additional categories between the two.

Table 15

Impact of switching from atypical to typical employment within employee age range of 26–55

Category changes	Stayed (%)	Exited (%)
A–D	81	19
B–D	78	22
C–D	80	20
Total	79	21

Note: 'A' – part-time employee with a fixed-term contract, 'B' – full-time employee with a fixed-term contract, 'C' – part-time employee with a non-fixed contract, 'D' – full-time employee with a non-fixed contract. There are 3,740 employees in the data pool between the ages of 26 and 55.

Table 16
Proportions of changes within each category within employee age range 26–55

	Stayed (%)	Exited (%)
A–A	9	20
A–B	5	5
A–C	17	6
A–D	31	7
B–A	2	2
B–B	16	28
B–C	1	1
B–D	39	11
C–A	0	0
C–B	0	0
C–C	28	21
C–D	41	10
D–A	0	0
D–B	0	0
D–C	4	2
D–D	65	29

Note: 'A' – part-time employee with a fixed-term contract, 'B' – full-time employee with a fixed-term contract, 'C' – part-time employee with a non-fixed contract, 'D' – full-time employee with a non-fixed contract. There are 3,740 employees in the data pool between the ages of 26 and 55.

From University Student to Entrepreneur – Factors Influencing the Entrepreneurial Intentions of Business Development MSc Students*

Krisztofer Szabó – Márta Aranyossy – Dóra Bárczy

This study examines the entrepreneurial inclinations of young Hungarians, focusing on university students whose education and ambitions point towards entrepreneurial life. The research questions aimed to explore the career aspirations of students, their motivations for starting a business, the factors that hinder them, and how the university creates an encouraging environment. To answer these questions, a questionnaire-based survey ensuring comparability was conducted among MSc students of business development, and the data were evaluated with descriptive statistical tools and statistical tests as well as cluster analysis. It was found that the young people whose entrepreneurial inclination is higher than the Hungarian and international average mainly differ from their peers in their drive for autonomy, courage and risk perception, along with the fact that, in relation to the scarcity of capital, which was found to be a major obstacle, they would also welcome assistance from universities in financing.

Journal of Economic Literature (JEL) codes: M13, I23, I25

Keywords: starting a business, entrepreneurial intention, encouraging entrepreneurship at universities

1. Introduction

At the end of 2020, the number of economic entities registered in Hungary was close to 2 million (*HCSO*[1] *2021*). On average, this figure has risen by 1 per cent annually since 2014, and interestingly 2020, though marred by the coronavirus pandemic, was no exception (*HCSO 2021*). The rise in the number of businesses was strongly influenced by the increasing number of sole proprietors and self-employed

* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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[1] Hungarian Central Statistical Office

entrepreneurs, as the number of partnerships gradually declined in the same period (*HCSO 2020*). Although the structural shift towards sole proprietorships is partly due to changes in regulations, the emergence of smaller businesses also attracts interest in business and scientific circles. This interest is motivated by the positive associations between entrepreneurial intention, job creation, sustainable economic development and economic growth (*Carree – Thurik 2010; Meyer – Krüger 2021*).

The present study aims to understand whether young Hungarians – in particular university students, who are the most prone to starting a business in terms of motivation and education – plan on starting a business, what motivates them and what obstacles they face. Students of economics at universities spend their day-to-day lives in an environment encouraging innovation and teeming with discussions related to running a business. They think explicitly about this subject and therefore analysing this group will probably yield richer and more robust information than focusing on a broader section of society (*Borsi – Dőry 2020*). Moreover, the role that universities play in the entrepreneurial ecosystem can be better understood through these students, and it can also be established how young people are assisted in their future career as entrepreneurs by university education and extracurricular services. Analysing the population of universities and the university environment is also important when examining the broadly used hypothesis that education positively affects entrepreneurial inclination, and higher education can even influence entrepreneurs' ideas (*S. Gubik 2021*).

The paper first reviews the main theoretical models and key findings in the research on entrepreneurial intentions, after which the lessons from Hungarian studies focusing on similar topics and the literature on encouraging entrepreneurship by universities is briefly presented. Following this, the research questions along with the methodological framework of data collection and analysis used for answering them are outlined, and the most important results derived from the research are presented and interpreted. The summary contains conclusions based on the results, the constraints of the study and potential avenues for expanding it in the future.

2. Theoretical background

2.1. Some basic models of entrepreneurial intention and behaviour

According to the theory of planned behaviour by *Ajzen* (*1985*), the intention behind various actions and forms of behaviour is influenced by three principal factors: *attitudes, subjective norms* and *perceived behavioural control*, with the factor of *actual behavioural control* added later. Based on the model, the main factors influencing entrepreneurial inclination are people's *personal attitude, social perceptions* and *perceived facilitating and hindering factors* (*Ajzen 2006*).

Within the framework of the social learning theory by *Bandura* (*1977*), which has a slightly broader focus, behaviour is basically the result of the dynamic and continuous

interaction between three factors, namely *personal factors*, the *environment* and *behaviour*. Similar to Bandura's model, *Shapero and Sokol* (*1982*) chiefly looked for the behavioural drivers in the relationship between individuals and the environment, but with a narrower interpretation, focusing in particular on the development of entrepreneurial intention. The *Model of Entrepreneurial Event* proposed by the authors focuses on examining how individuals are influenced by their social and cultural environment in pursuing a career as entrepreneurs (*Jakopec et al. 2013*). According to *Shapero and Sokol* (*1982*), the three fundamental factors that influence individuals' entrepreneurial intention are *perceived desirability*, *feasibility* and the *propensity to act*.

Following similar logic, other models were also developed to structure the factors influencing entrepreneurial intention. For example, *Sánchez* (*2011*) emphasises the role of *self-efficacy, proactiveness* and *risk-taking propensity,* while *Bigos and Michalik* (*2020*) focus on *self-awareness, self-regulation, self-motivation, empathy* and *social skills.* Further approaches based on entrepreneurial personality traits will be presented in *Section 2.2*.

2.2. Entrepreneurial personality traits

In recent decades, researchers of entrepreneurial intention have started focusing on individual personal traits (*Yang – Ai 2019*), finding that an individual's personality is a major determinant in choosing a career (*Holland 1997*). Studies have also shown that personality can exert a huge impact on an individual's entrepreneurial spirit and on starting or ending a business, as well as on the success and profitability of businesses. *Caliendo et al.* (*2011*) gave a detailed account of the relationship between the five-factor personality trait model of *Goldberg* (*1971*) and entrepreneurship, analysing the dimensions of *extraversion, neuroticism/emotional stability, openness to experience, conscientiousness* and *agreeableness*.

According to *Jain and Arora* (*2020*), the examination of two more internal factors is relevant to the topic. One of these is the (internal) perceived place of control (*locus of control*), which can have a massive influence on the development of a positive entrepreneurial attitude (*Baluku et al. 2018*), while the other is individuals' *risk-taking propensity,* which has a particularly large effect on entrepreneurial intention. As attested by *Yusof et al.* (*2007*), entrepreneurs typically avoid situations where they perceive extreme risk, or, conversely, certainty.

2.3. Entrepreneurial process models

Gartner (*1985*) argues that in examining the complex and multidimensional process of starting a business, at least four important aspects need to be considered: *individual entrepreneurs,* the *organisation* created by them, the *environment* where the new business is born, and the *process and steps in starting* the entrepreneurial activities. The role of the environment and individual factors has already been outlined in the previous sections, and in terms of the process of business creation, the models of *Shane* (*2003*) and *Baron* (*2007*) are relevant. Their elements are briefly summarised in *Table 1*.

Table 1
Comparison of entrepreneurial process models

	Shane (*2003*)	*Baron* (*2007*)
Main stages/steps in starting a business	0. Existence of business opportunity 1. Perception of business opportunity 2. Utilising opportunities 3. Implementation	1. Pre-launch 2. Launch 3. Post-launch
Factors influencing the process	– Individual characteristics – Entrepreneurial environment	– Individual – Group-level – Social

Source: Based on Baron (2007) and Shane (2003)

Based on these entrepreneurial process models, a deeper understanding can only be gained if new businesses are analysed across all the stages. Potential entrepreneurs usually take similar paths, and certain steps or the main stages in the process can mostly be identified in their lives. However, the individual journeys may differ considerably in the details, depending on individual experiences (*Baron 2007*).

2.4. Ecosystem models

The past decade has seen the growing popularity of the approach that posits that if businesses and entrepreneurial intention are only analysed from an individual viewpoint, through the enterprising person, the horizon is narrowed down too much. This led to the rise of approaches focusing on the ecosystem (*Ács et al. 2018*). Entrepreneurial ecosystems can be defined as the self-organising collection of independent factors and other factors, resulting in productive entrepreneurial activities in a field (*Stam – Spigel 2016*). The entrepreneurial ecosystem is an adaptive, geographically determined community of various actors operating at different levels and in a non-linear system of relationships (*Roundy et al. 2017*). Studies focus on exploring these relationships and the reasons behind them, as well as analysing the relative importance and dynamic changes of the effects. Ecosystem models continue to be centred around individual entrepreneurs, while also taking into account interactions within the system with actors such as the government, formal institutions, the physical infrastructure, the financial sector, R&D systems, market structures and the education system (*Stam 2015; Ács et al. 2018*). In view of the importance of higher education with respect to this study, this latter element in the institutional environment has special relevance, and so the focus will be shifted to this below.

3. Encouraging entrepreneurship among university students in Hungary

3.1. Studies examining the entrepreneurial intention of Hungarian students

Hungary has participated in the GUESSS (Global University Entrepreneurial Spirit Student's Survey), coordinated by the University of St. Gallen in Switzerland, since 2006. The survey seeks to understand students' plans related to starting a business

as well as any entrepreneurial activities pursued by them (*S. Gubik – Farkas 2016*). Besides their comparability arising from their recurrent nature, GUESSS surveys involve a large number of participating countries, which allow students' entrepreneurial spirit to be compared across countries, measured using the so-called *Entrepreneurial Intentions Index* created during the research. Based on this, the index value for Hungarian students (12.3) is only slightly below the international average (12.8) (*S. Gubik – Farkas 2013*). According to research results from earlier years, the share of students planning to start a business followed a rising trend until 2008, before declining. This may be attributed to the onset of the global crisis in 2008, but in the past decade, the steadily rising compensation of employees has also contributed to making entrepreneurial life less attractive, as it is more uncertain (*Bauer – Endrész 2018*), in addition to the long-term income prospects. For example, between 2014 and 2017, the share of employees in Hungary increased by 9.5 per cent, while the proportion of entrepreneurs declined in the longer run (*HCSO 2018*). At the same time, *S. Gubik and Farkas* (*2016*) argue that the Hungarian higher education and social environment has a negative (or at best neutral) effect; in other words, the absence of facilitating tools in higher education and the relatively low social prestige of entrepreneurs are also significant factors.

Furthermore, the GUESSS survey clearly showed that in the short run, most students plan to work as employees in the corporate sector after graduation (*Imreh-Tóth et al. 2013*). The analysis by *S. Gubik and Farkas* (*2016*) also confirms that immediately after finishing their studies, around two thirds of students envision their future as employees, mostly working at large enterprises, and only a smaller share plan to work in the small and medium-sized enterprise (SME) sector or the public sector. Around this time, only a negligible proportion of students intend to start their own business. However, entrepreneurial intention increases significantly (to 35.4 per cent) five years after graduation. Presumably, students first wish to gain the necessary experience at other companies, and later, having obtained that experience, they consider it more realistic to start their own business (*S. Gubik – Farkas 2013*). Respondents believed that knowledge about business, business economics and finance were the most essential for anyone planning to embark on an entrepreneurial life (*Imreh-Tóth et al. 2013*), but the absence or existence of experience can also strongly influence the entrepreneurial spirit of the young generation (*S. Gubik – Farkas 2013*). The studies also confirmed that the role model observed in the family was more important than having an entrepreneurial education (*Szerb – Lukovszki 2013*). This is proven, for example, by the fact that the explanatory power of having an entrepreneur in the family has been growing for years, and therefore it probably plays an increasingly important part in the decision to start a business (*S. Gubik – Farkas 2016*).

The search for autonomy and self-fulfilment feature prominently among entrepreneurial motivations (*Westhead et al. 2005*). The fundamental factor of autonomy is freedom, allowing people to be in control, while self-fulfilment is mainly

determined by utilising creativity, development and realising personal dreams (*Kim et al. 2006*). These are followed by motivations related to income, such as earning higher income or the financial security that can be achieved. Nevertheless, in terms of individual personality traits and skills, it has been shown that awareness and innovation skills positively affect students' entrepreneurial intention (*S. Gubik – Farkas 2016*). Out of these, innovation skills are more important, and they include all the steps from generating new ideas to product development to launching a business. Awareness and targeted planning have also been shown to be crucial, but most students believe that excessive planning is not a desirable strategy, as starting a business requires a certain degree of spontaneity and an ability to adapt quickly to handle the continuous and unexpected changes in the environment (*Szerb – Lukovszki 2013*).

This has led to the creation of complex models that examined university students' career choices, and in particular their entrepreneurial intention, based on a broad range of influencing factors. In the model by *S. Gubik* (*2021*), career choice is influenced by personal attitude, self-efficacy, subjective norms, the perceived entrepreneurial climate and entrepreneurial role models, which are partly derived from individual personality traits, but they are also affected by the family environment, the broader social environment and the university. These environmental factors take hold through individual assets, such as knowledge, skills and experience, and the services and resources available to individuals. In the following, the particular influence of the university environment is examined.

3.2. The role of the university environment in encouraging entrepreneurship

The surveys conducted so far have consistently confirmed and emphasised the strong influence of the institutional, higher education environment on students' entrepreneurial spirit (*S. Gubik – Farkas 2016*). While examining the role of education, Hungarian studies have also found that there may be significant differences between the entrepreneurial spirit of students enrolled in programmes from the main fields in higher education: those taking economics and business programmes are more likely to think about starting their own business than their peers. There may be two reasons for this: first, as they study business, they are more likely to be exposed to knowledge about businesses and business creation, which may fuel their intention to start a business. On the other hand, they may have chosen to study this field consciously, because they already had the entrepreneurial spirit when opting for a programme (*Szerb – Márkus 2007*). With respect to students' entrepreneurial inclination, economics programmes are followed by natural sciences, while social sciences are the least likely to produce business-minded students (*S. Gubik – Farkas 2016*).

The positive correlation between participation in the business courses offered by the university and entrepreneurial intention was confirmed by *Szerb and Lukovszki* (*2013*), which suggests that besides the subjects enhancing specialised knowledge, courses specifically focusing on business skills should also be taught. There is

demand among students in Hungarian higher education for business education, but they feel that the supply is unsatisfactory (*Imreh-Tóth et al. 2013*). This was shown by *S. Gubik and Farkas* (*2013*): Hungary is lagging behind in supplying programmes that offer innovative, practical elements when compared to Western higher education. Meanwhile, the extracurricular programmes aimed at knowledge sharing, such as coaching, workshops and trainings, have been found to potentially encourage entrepreneurship (*Maresch et al. 2016; Premand et al. 2016*).

However, all of these tools that mainly seek to enhance entrepreneurial knowledge and develop skills are not necessarily sufficient to improve entrepreneurial intentions (*Nowiński et al. 2019*). Out of the framework and systemic conditions of the entrepreneurial ecosystem (*Stam 2015*), universities cannot only contribute to knowledge, they may also play a significant part in other factors:

– facilitating services: such services influencing entrepreneurial aspirations may include counselling, coaching or workshops (*Premand et al. 2016*);

– physical infrastructure: for example in the form of incubation services that provide a workspace and digital infrastructure for enterprising students;

– financing: through the financing elements of university incubation programmes and the angel investor clubs of alumni networks (*Aranyossy 2019*);

– networks and demand: the corporate and institutional partnerships and the social capital of the universities can serve new businesses in a mutually beneficial manner;

– culture: referring to students' "entrepreneurship, thinking and value system affecting the utilisation of the activities at the university and the generated knowledge" (*Kuti – Bedő 2018:48*).

Consistent with this, the latest Hungarian initiative encouraging universities in their conscious involvement in the entrepreneurial ecosystem is the *University Innovation Ecosystem programme,* which uses government engagement to stimulate universities to achieve goals such as "the presentation of the institutions' intellectual and infrastructural competencies as a transparent service" and "the establishment of active, mutually beneficial relationships with a business perspective between universities and the business sector" (*NKFI 2021*). Between 2019 and 2021, the programme was able to deliver promising results in the number of industrial property registrations (>130), the number of university–corporate partnership agreements (>1,300) and the number of supported companies (>500).[2]

[2] *Megszaporodtak az egyetemek és a vállalatok közötti együttműködések* (*Cooperation between universities and companies has intensified*). 27 October 2021. https://www.portfolio.hu/gazdasag/20211027/megszaporodtak-az-egyetemek-es-a-vallalatok-kozotti-egyuttmukodesek-506422. Downloaded: 7 January 2022.

4. Methodology

In recent decades, universities' role in the entrepreneurial ecosystem has become increasingly clear, with numerous studies and policy recommendations published on this subject (*EESC 2013*). As illustrated above, university programmes facilitating the encouragement of entrepreneurship have started. Therefore, new snapshots should be taken of the Hungarian situation from time to time, if possible using data collection methods that make the cross-sectional analyses comparable. While business education has been a popular research topic in the disciplines of economics and education, the results have not been consistent regarding the impact mechanism, components and strength of the relationship between universities and entrepreneurial intention (*Wach – Głodowska 2019*). As emphasised by *S. Gubik* (*2021*), it is still considered a novel approach in this topic if entrepreneurial intention is examined in the broader context of university students' career choices, and if intentions about starting a business are surveyed not only over the short run (right after graduation), but also over a longer horizon.

What makes the present study unique is that the authors sought to find a narrower population where many people are expected to think explicitly about starting a business, and where students may have some experience with the university environment that encourages this. Surveying this population can produce a highly reliable and rich database of students' related perceptions (*Borsi – Dőry 2020*). A large number of students start their MSc studies in business development at the Corvinus University of Budapest (CUB) with the explicit intention to prepare for their future career as entrepreneurs. The goals of the MSc programme include imparting to "students the necessary theoretical and methodological business knowledge in business development (innovation) and consciously developed leaderships skills and competencies for establishing small and medium-sized enterprises".[3] This makes the students in this programme perfect for the analysis. Out of the universities offering such a programme[4], the CUB tops the list of scholarly excellence in business economics,[5] and therefore it makes sense to examine the students in this programme in more detail.

[3] *18/2016. (VIII. 5.) EMMI rendelet a felsőoktatási szakképzések, az alap- és mesterképzések képzési és kimeneti követelményeiről, valamint a tanári felkészítés közös követelményeiről és az egyes tanárszakok képzési és kimeneti követelményeiről szóló 8/2013. (I. 30.) EMMI rendelet módosításáról* (*18/2016 (VIII. 5.) EMMI regulation on the amendment of 8/2013. (I.30.) EMMI regulation on the training and output requirements of the higher education vocational training, the basic and masters programs, and the common requirements of teacher training. (I. 30.) amendment of EMMI regulation*). https://net.jogtar.hu/jogszabaly?docid=A1600018.EMM&timeshift=20160813&txtreferer=00000001.txt. Downloaded: 24 August 2021.

[4] Over the last five academic years, starting in 2017–2021, 14 universities in Hungary have launched Master's degrees in Business Development: Corvinus University of Budapest, University of Debrecen, Eszterházy Károly Catholic University, International Business School, Kodolányi János University, University of Miskolc, Budapest Metropolitan University, Óbuda University, University of Pécs, University of Sopron, University of Szeged, Budapest Business School, Hungarian University of Agriculture and Life Sciences – MATE Economy, John von Neumann University.

[5] *Friss felsőoktatási rangsor: itt van a legjobb gazdasági egyetemek listája* (*The latest higher education rankings: The list of the best universities in economics*). https://eduline.hu/felsooktatas/20201128_gazdasagi_egyetemek_hvg_rangsor. Downloaded: 16 February 2021.

In the study, the following research questions were analysed:

Q1: Do business development MSc students at CUB differ from the more general population surveyed in Hungarian studies in terms of the following aspects:

(a) Do their plans include an entrepreneurial career path right after graduation?

(b) Do their plans include an entrepreneurial career path in the longer run?

(c) What do they perceive as obstacles to starting a business?

(d) What areas of knowledge do they consider important for starting a business, and how much support do they receive in acquiring this knowledge in the MSc programme?

(e) What other support do they receive from the university environment?

Q2: What distinguishes business development MSc students at CUB, who have a strong entrepreneurial inclination, from their peers who are not preparing for a career as entrepreneurs, in terms of the aspects in points (a)–(e)?

The data were collected using a questionnaire-based survey, mainly including questions from earlier studies, which were sometimes supplemented with new questions aligned with the special focus of the analysis. The most important points of reference were *Szerb – Márkus* (*2007*), *S. Gubik* (*2013*)*, Imreh-Tóth et al.* (*2013*) and *S. Gubik – Farkas* (*2016*). The inclusion of the questions already present in the literature not only ensured the comparability of the results, but also guaranteed that the wording of the questions had already been tried and tested. The survey can be found, with references to the sources from which the questions were taken, in *Table 4 of the Appendix*. To ensure comparability, the answer options were aligned with the scales of previous surveys: thus, respondents gave their answers for the different questions using Likert scales with a varying number of points (4, 5, 6 or 7). This means that, placing more significance on Hungarian and international comparability, the clarity ensured by a harmonised, uniform scale was sacrificed, but of course only one type of scale was used for each question's answer options.

The survey was conducted in the spring of 2021, not involving teachers and not related to any subject or assessment, and in an anonymous manner, thereby reducing the distortion arising from data collection in a university environment. The questionnaire reached the entire population through electronic channels. During the time of the data collection, the number of students in the business development MSc programme of CUB was estimated to be 247 based on admissions data, out of whom 65 people participated in the survey, resulting in a coverage of over 25 per cent overall. Although the sample size may seem small at first glance, it does represent a large share compared to the entire population, and the statistical analysis methods employed can also be used well for such a sample size. The average age of the 65 respondents

was 24 years, with 55.6 per cent of them being female. 41.3 per cent of the students in the sample were from Budapest, 17.5 per cent were from other large cities, while the rest were from smaller rural towns and communities. Subsequently, statistical indicators, tests (e.g. ANOVA), correlation coefficients (Pearson's *r*, Spearman's rho and Kendall's tau) and hierarchical cluster analysis were used to examine the research questions. Although the ANOVA test analysing the significant differences in group averages assumes variables measured at an interval or ratio scale, if the Likert scale is symmetrical and equidistant, it can be presumed that it behaves as an interval scale (*Carifio – Perla 2007*), making it suitable for the present analysis.

5. Results

5.1. Career plans and entrepreneurial intention

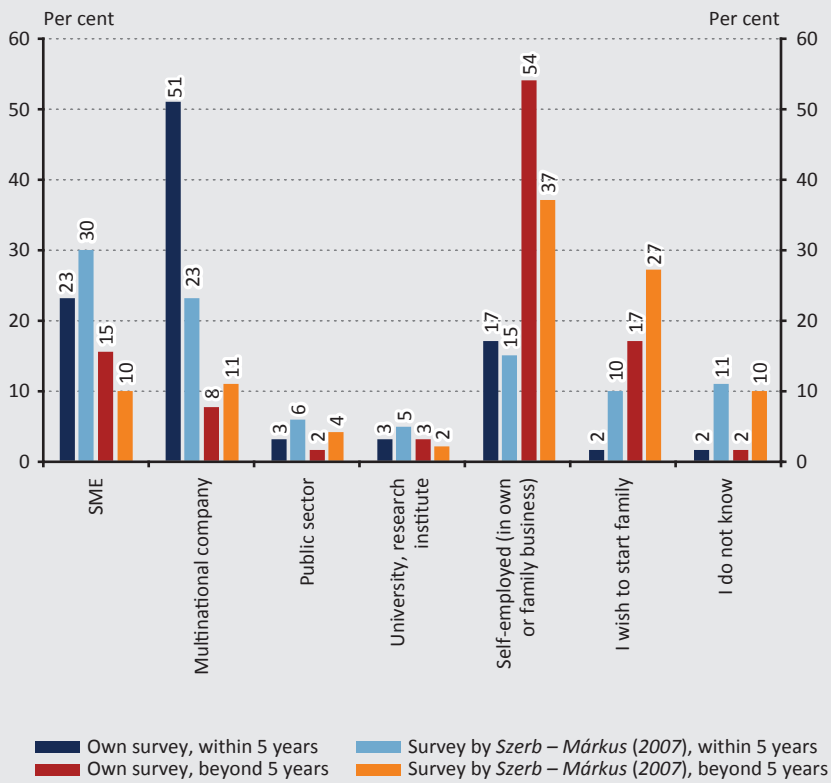
Students' career plans should be examined at various points along a horizon, as there may naturally be large variation, depending on whether the focus is on the period right after graduation or a longer term. The study shows (*Figure 1*) that most students of business development wish to be employed by a large enterprise after graduation (51 per cent), followed by SMEs (23 per cent). Then, within five years of graduation, the third most popular option is to work independently, in a family- or self-owned business (17 per cent). The public sector, research fields and starting a family is planned by a very small share of students over this horizon (3, 3 and 2 per cent, respectively). Although students do gain some experience during their internship while studying at the university, it is understandable that most of them do not dare to start a business as fresh graduates, right after finishing their studies, even if they know the necessary theoretical basics and have an intention to do so, as they have no real market experience. This is also confirmed by the data: the shares realign considerably in the plans beyond the 5-year mark. At this point, an independent career path is ranked first, with more than half of business development students wishing to pursue some kind of entrepreneurial activity (54 per cent). Accordingly, the popularity of working at large enterprises (8 per cent) or SMEs (15 per cent) declines by that time.

Four of the respondents (6 per cent) had already established their own business and were working in it, another 13 MSc students had a concrete business idea, five were working on obtaining the necessary resources, while three of them were engaged in marketing their product/service.

Figure 1 shows the results compared to the findings of *Szerb and Márkus* (*2007*), indicating that even in the short run an entrepreneurial life is slightly more popular among MSc students of business development, and in the long run the positive difference grows even larger. Even though the option of making it on their own is also ranked first among the students of general economics programmes five years after graduation, the share of such students is much smaller (37 per cent) than those

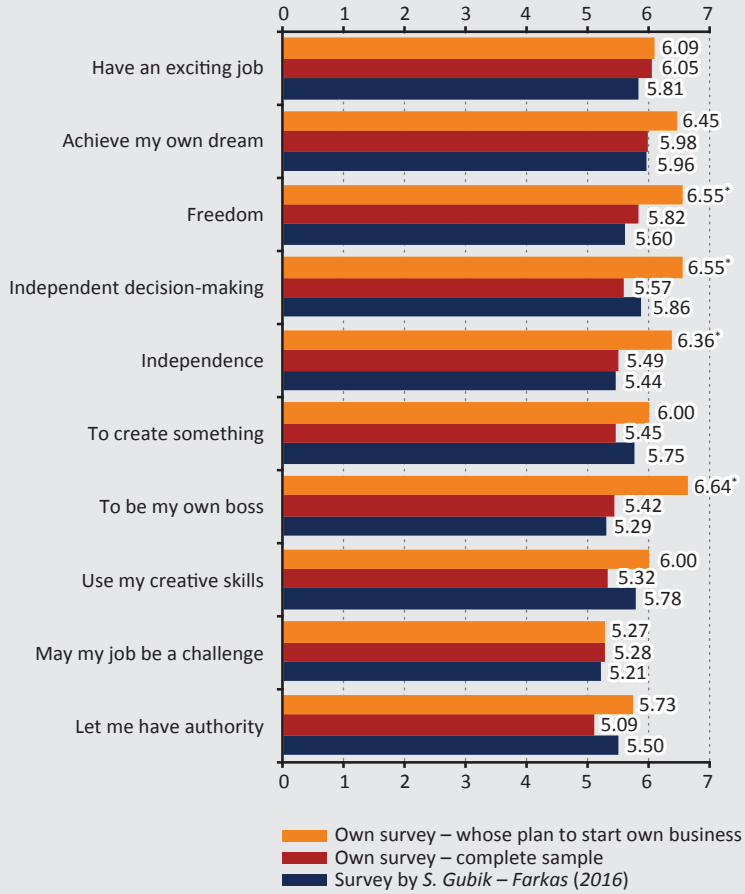
at the business development programme of CUB (54 per cent). According to the latest international study measuring the results with the same scale (*Fueglistaller et al. 2006*), the international share of students who become independent in the five years following graduation is 17.6 per cent, while in the period beyond those five years 48.1 per cent of students plan their future in a family- or self-run business. In other words, the entrepreneurial spirit of the MSc students under review (with 54 per cent planning to start a business) surpasses even the international average based on their long-term plans. This confirms the hypothesis that among business development students the share of those preparing for an entrepreneurial career is higher than average, and the analysis below can utilise this information. The special nature of the sample is also supported by the fact that 32 per cent of the respondents chose the business development MSc programme during application entirely because of their future entrepreneurial intentions, while 27 per cent did so partly for this reason.

Figure 1
Students' general career plans and changes in those plans (% of respondents)



Source: Based on the survey and the results of Szerb – Márkus (2007)

Figure 2
Importance of the aspects considered by students while planning their future career



*Note: Averages on a 7-point Likert scale; * denotes values differing from the global average of the present study at a significance level of p<5%.*

Source: Based on the survey and the results of S. Gubik – Farkas (2016)

Taking a glance at the factors MSc students base their decisions on regarding their career plans, it was examined whether there was any meaningful difference between those choosing an entrepreneurial career path and those avoiding it. *Figure 2* illustrates that the motivational factors of the entire sample are similar to the more general results of *S. Gubik and Farkas* (*2016*), but the respondents with an entrepreneurial spirit differ considerably from this overall trend. Based on the results of the ANOVA test evaluating the identical nature of the averages ($p<0.05$), there was no significant difference between the groups of students planning different career paths in terms of realising dreams, creating something, having an exciting job with challenges and the desire for gaining authority, but there was significant variation in how they rated the importance of the following motivational factors (shown together with the importance score on a seven-point scale measured among those with entrepreneurial intentions and the global averages in brackets):

– autonomy: 6.64 (5.42)

– freedom: 6.55 (5.82)

– independent decision-making: 6.55 (5.57)

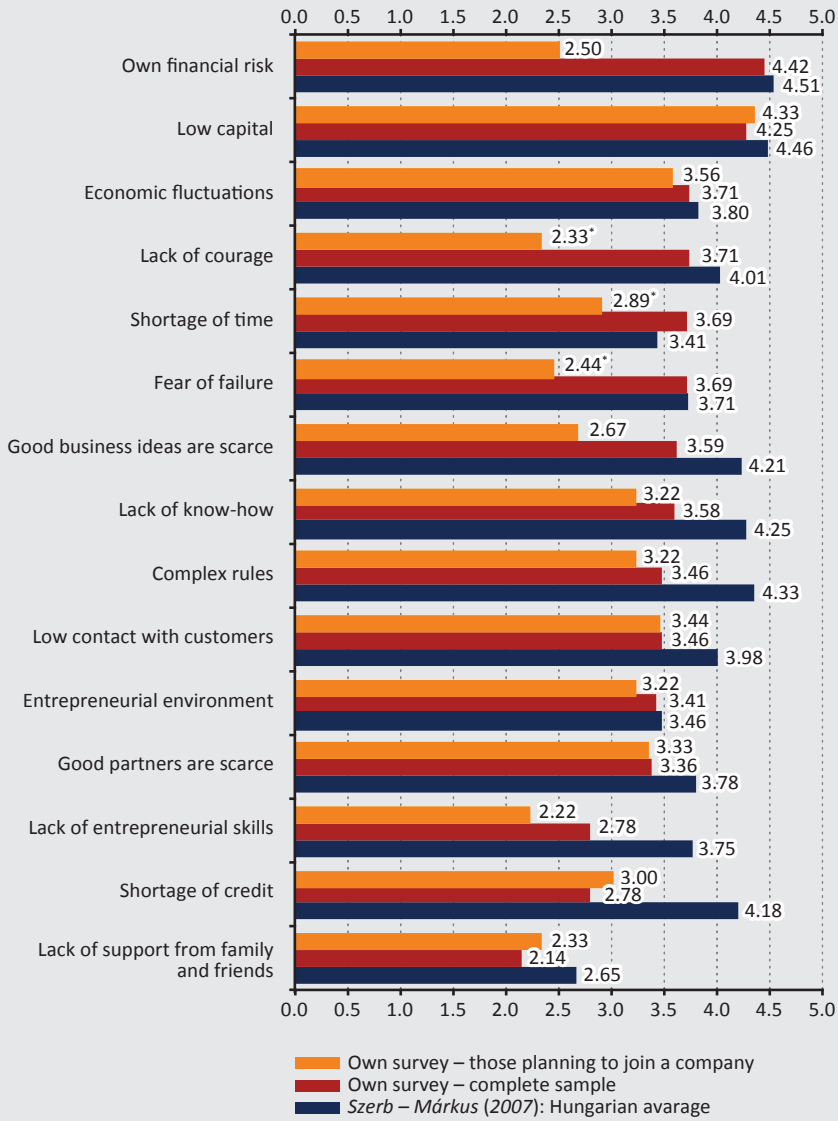
– independence: 6.36 (5.49)

It seems clear that the main motivation of the students planning to start a business is their drive for autonomy, while they differ less from their peers in their efforts at self-fulfilment.

5.2. Perceived obstacles to starting a business

The studies analysing this topic pay special attention to the factors that represent the biggest obstacle for individuals in truly embarking on a journey of business creation. *Figure 3* shows the present paper's results visually distinguishing students already engaged in a business from those not yet pursuing an entrepreneurial career, and also including the results of *Szerb – Márkus* (*2007*) as a point of reference.

Figure 3
Factors hindering students in launching a business



*Note: Averages on a 5-point Likert scale; * denotes values differing from the global average of the present study at a significance level of p<5%.*

Source: Based on the survey and the results of Szerb – Márkus (2007)

As shown in *Figure 3*, the students in the present sample perceive the hindering effect of the above-listed factors less than the international average. One of the explanatory factors behind this may be that, thanks to their studies, they may feel that they have an adequate overview of economic and market developments, which increases their perceived behavioural control known from the theory of planned behaviour by *Ajzen* (*1985*). Therefore, even though they also experience the effect of certain hindering factors, this is less pronounced than in the case of others. It is interesting to observe that while too few good business ideas, the lack of know-how and the complicated regulatory framework have a much larger impact for most people, these factors are ranked somewhat lower by students of business development. It can be assumed then that the students enrolled in this programme are more prepared from a business perspective and they are better informed about the conditions in the environment, therefore they do not see them as hindrances. Compared to the Hungarian average, but also to the results of the international study using the same question (*Fueglistaller et al. 2006*), they perceive the lack of ideas (3.59 vs the international 4.21) and know-how (3.58 vs 3.95) to be much less of an issue. Nonetheless, they also view the lack of capital as the biggest obstacle, which was ranked first in the international survey as well (4.46), along with financial risk-taking (4.51) (*Fueglistaller et al. 2006*). This is understandable as most people have limited capital at this age and in such a situation, and there is a great risk of losing it all when starting a business.

Shortage of capital is the obstacle that is ranked similarly high by the smaller group of those planning to start a business as by the global average of the sample, but there are significant differences in their perception of other hindrances. Based on the results of the ANOVA test evaluating the identical nature of the averages ($p<0.05$), students with entrepreneurial plans are more courageous, meaning that they consider the fear of failure or too little courage to be a significantly smaller hindrance. This represents an important difference in the perception of, and tolerance for, risks. Furthermore, they do not consider the lack of time a hindrance, which suggests that they are happy to devote time to something that is important to them. These are the factors that truly set apart the young people embarking on an entrepreneurial life from their peers. This means that encouraging entrepreneurship by building on knowledge and skills may not be enough, young people's deeper motivations, uncertainty and their attitude towards devoting time to something should also be influenced to exert an impact.

In order to explore deeper correlations, correlation coefficients and exploratory cluster analysis were used to analyse the covariance in the perception of individual obstacles. As evident from the wording of the reasons, the strongest statistically significant correlation ($p<0.01$; based on the Pearson correlation and the non-parametric correlation coefficients) was seen between the lack of courage and the

fear of failure (Pearson correlation: 0.771). Nevertheless, even more interestingly, less courageous students also considered the continuous change in the business environment to be a hindrance (Pearson correlation: 0.677), which was closely correlated with the hindering nature of the business environment, and using somewhat lower correlation coefficients that were nonetheless over 0.5, this was in covariance with the perception of the shortage of loans and capital as well as financial risk. In other words, risk-averse students saw these financing factors as major obstacles. These findings are reflected in the results of the cluster analysis. Based on the exploratory, hierarchical cluster analysis of the factors hindering business creation (see *Figure 3*) as variables employing the average-distance chain method, the variable groups most closely correlated with each other are as follows:

– Too little courage; Fear of failure

– Too little contact with buyers; Lack of know-how; Too few good partners

– Complicated rules; Economic fluctuations; Business environment

– Too few options for borrowing; Lack of entrepreneurial skills

– Own financial risk; Too little capital

The perceptions related to entrepreneurial courage, the business environment and financial constraints are clearly clustered together.

5.3. The role of the higher education environment in entrepreneurial career plans

The constraining role of the business environment was discussed in the previous section. After this, a deeper examination was conducted to see the potential effect of the higher education environment on entrepreneurial plans. First, similar to other studies (*Imreh-Tóth et al. 2013*), it was evaluated what knowledge students considered essential for starting their own business, and to what extent the present education covers this according to their own perception. This is summarised in *Table 2,* showing a comparison of their answers on a 4-point Likert scale and the results of *Imreh-Tóth et al*.

As evident from the averages, students considered almost every listed skill important to some extent, with only innovation management standing out. According to the respondents, entrepreneurial and business plan creation skills are (understandably) the most crucial in starting a business, and they are followed by financial and marketing skills. This differs only marginally from the results of the survey conducted by *Imreh-Tóth et al.* (*2013*). When adding to this how much students believe the university education covers these skills, the ranking slightly differs. Fortunately, respondents claim that their education in business skills is good. They also feel that education is efficient in financial competencies (financial and business planning

skills), which clearly reflects the typical focus of the programme development at Corvinus University. The relevance of this strong financial focus is attested by students' feedback, namely that out of the five MSc subjects considered the most useful, three deal with finance (Venture Capital Financing, Corporate Financing and Financial Strategy, Financial Analysis and Default Forecasting). The course considered to be the most useful by students is Company Law (48 mentions), which is directly related to the first, practical steps in business creation. At the same time, marketing skills were seen as less significant based on the responses. Interestingly, marketing education is the only field where the opinion of enterprising students is statistically significantly ($p<0.05$) different: the students planning to start a business within five years rated the level of marketing skills acquired at the university 3.09, which is higher than the global average of the sample (2.52). The students planning to start a business either better utilised the opportunities offered by the university's education portfolio, or they are simply more optimistic about their preparedness.

Table 2
Entrepreneurial skills

	Survey by *Imreh-Tóth et al.* (*2013*)	Authors' survey: How important is it?	Authors' survey: To what extent is it covered by the education?
Entrepreneurial skills	3.69	3.75	3.33
Marketing skills	3.56	3.20	2.45
Financial skills	3.68	3.23	2.93
Business plan creation skills	3.53	3.53	2.9
Innovation management skills	3.37	2.43	2.58
Tendering and project management skills	3.56	3.13	2.53

Note: Averages on a 4-point Likert scale

Source: Compiled based on the present survey and the results of Imreh-Tóth et al. (2013)

The university environment can support entrepreneurial careers not only through classes, imparting knowledge and skills development. *Table 3* summarises the opinion of the students asked about this. There was no significant difference in the perception of the various environmental factors between the people planning different career paths. The respondents considered the teachers in the MSc programme to be the biggest asset, but they are only moderately sure that the subjects taught at the university cover the skills necessary for starting a business. This unsatisfactory feeling related to skills has already been discussed in detail. At the same time, students consider that the functions of the university, as an important element in the entrepreneurial ecosystem, going beyond imparting

knowledge is, or would be, found useful by students. Facilitating services and the provision of networking opportunities can be realised at universities in either a formal setting (university incubator, accelerator) or with grassroots methods (e.g. student organisations or the loosely structured matching of supply and demand). Students are generally satisfied with the opportunities offered by CUB in this regard. Beyond this, an important new expectation in connection with the university environment is that students would find it most useful if universities provided an opportunity that helped find financing for their business. This tallies with the earlier finding that the respondents planning to start their own business considered the shortage of capital to be the biggest obstacle, even though they examine the opportunities offered by the venture capital market and crowdfunding in class (*Bethlendi – Végh 2014*). The fact that students feel that this is realised the least within universities' walls may point out the way forward to decision-makers with respect to the development of the entrepreneurial ecosystem. Accordingly, if the factors influencing business creation are considered from the perspective of the university students concerned, the university should not only have a knowledge imparting, networking and service function, it may also engage in, or facilitate, financing in the ecosystem. A model for this which is efficient and aligned with universities' goals should be examined going forward.

Table 3
Perception of the university as an environment facilitating business

Statement	How important is it? (number of respondents ranking the given factor the most important, n=65)	How supportive is the university in this regard? (averages on a 6-point Likert scale)	Cluster
Guest lecturers in the classes offer an adequate glimpse into entrepreneurial life.	4	5.08	1
Teachers are credible when teaching about businesses.	7	4.50	2
The university environment offers an opportunity to forge corporate and business relationships.	9	4.23	1
In the university environment, I have access to adequate professional support and advice related to my business (e.g. financial planning, legal issues surrounding business creation).	8	4.15	1
The knowledge acquired at university covers the skills necessary for starting a business.	17	3.70	2
The university provides opportunities that help me find financing for my business.	18	3.58	1

It should be noted, however, that although most respondents ranked business skills and financing opportunities first, the hierarchical cluster analysis of the variables shows that respondents' perception is fundamentally divided when it comes to the university's business-facilitating factors under review. Based on the exploratory, hierarchical cluster analysis of the factors facilitating business creation (see *Table 3*) as variables employing the average-distance chain method, some students consider imparting knowledge and the credible teachers representing it to be important (Cluster 2), while others focus on other factors outside the purview of traditional university education (Cluster 1).

6. Summary and outlook

The study sought to contribute to the empirical evidence exploring the entrepreneurial spirit and motivation of young Hungarians, and to paint a more nuanced picture about the overall Hungarian situation by examining university students whose ambitions and education clearly point towards entrepreneurial life.

The questionnaire-based survey aimed at ensuring comparability with similar Hungarian studies confirmed the assumption that students in the business development MSc programme are much more inclined to start a business than the average. Although they would typically like to gain experience at large enterprises in the first years after graduation, regarding their plans for the period beginning five years after graduation half of the students claimed that starting an independent (family- or self-run) business was their career plan. These enterprising students are looking for exciting jobs and self-fulfilment, just like their peers, but they are significantly more interested in autonomy and independent decision-making. The entrepreneurs of the near future also perceive obstacles somewhat differently: they are more courageous and do not believe that a lack of time is such an issue. In other words, the most distinguishing features of the determined students in this programme who plan to start their own business are their drive for autonomy, risk perception and attitude to time sacrifice. This also suggests that the traditional tools of universities for facilitating business creation based on imparting knowledge, with which the respondents in the sample were generally satisfied, may prove to be insufficient for creating effective motivation, as they can hardly shape students' attitude towards risks and investments. Yet entrepreneurial role models and mentors could play a bigger role in shaping these attitudes in the future, if they can credibly represent the entrepreneurial mindset.

What makes business development MSc students and particularly those with entrepreneurial ambitions similar to their peers graduating from other universities is that they see the lack of capital and the extent of their own financial risk as the greatest obstacles to business creation. It is no coincidence that they believe

that the facilitating nature of the university environment could be best enhanced through the provision of financing opportunities. Such services are not uncommon at American and Western European universities, implemented either through university incubators or the involvement of investors in the alumni community. There are also examples of university programmes providing funding in Hungary as well, but Hungarian higher education institutions still have a long way to go in this regard. In this context, various solutions can be used in practice. To name but a few:

– the university gives advice or process support in financing questions;

– the university utilises its existing financing partnerships for the benefit of students' businesses;

– the university operates a formalised incubator, the service portfolio of which also includes financing elements;

– the university and university stakeholders (alumni, corporate and institutional partners) operate an investment fund.

The Hungarian University Innovation Ecosystem programme already encourages corporate partnerships, with banks and investors, and the Hungarian Startup University Program[6] also includes financing elements (albeit only in the form of a few individual scholarships) that may contribute to the early-stage financing of innovative start-ups with huge growth potential (*Fazekas 2016*). But there is still much to be learned from the international examples, such as the alumni business angel network of the ESADE university in Barcelona, ESADE BAN, which has provided funds to over 235 firms, investing over EUR 35 million (*ESADE 2021*). The Hungarian entrepreneurial spirit, which lags behind the international average, could be lifted by universities by going beyond their traditional roles in the ecosystem and being engaged more actively in business financing as intermediaries, organisers or even investors. This not only eliminates the obstacles to business creation faced by current university students, it would create new opportunities for other university citizens, such as teachers, researchers and alumni members as well.

In order to gain a better understanding of the overall Hungarian situation and provide more support to institutional and policy decisions, the present research should be expanded in two directions in the future. First, the motivations and perceptions of students studying at other universities' programmes focusing on entrepreneurship should also be assessed to gain a more representative picture of the young generation most open to this idea. Second, examining the young entrepreneurs at more mature stages in their entrepreneurial life would allow

[6] *Introduction*. Hungarian Startup University Program. https://hsup.nkfih.gov.hu/. Downloaded: 10 January 2022.

conclusions to be drawn in an area where the present sample offered very little information, namely how motivations and perceived obstacles change while implementing entrepreneurial plans.

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Appendix

Table 4
Structure of the questionnaire

Group of questions	Question (source) *required answer	Response type
1. Target group filtering	Do you currently study in the business development programme of the Corvinus University of Budapest?* *(authors' question)* – *Yes* (–» go to Section 2) – *No* (–» end of questionnaire)	Multiple choice
2. Career plans	Where do you plan to pursue a career in the five years after graduation?* (*Szerb – Márkus 2007*)	Multiple choice
	Where do you plan to pursue a career in more than five years after graduation?* (*Szerb – Márkus 2007*)	Multiple choice
	Rate the importance of the below factors when considering your own career.* (*S. Gubik – Farkas 2016*)	Likert scale *(1=not important at all; 7=very important)*
	Does your family have a business?* *(authors' question)*	Multiple choice
	Have you ever considered starting your own business?* (*S. Gubik 2013*)	Multiple choice
3. Planning business creation (for those who do not have a business yet)	Where are you currently at in the entrepreneurial process?* *(authors' question)*	Multiple choice
	Have you taken any steps to create your own business?* (*S. Gubik 2013*)	Multiple answer
	When would you start your business?* (*Szerb – Márkus 2007*)	Multiple choice
	Where would you start your business?* *(authors' question)*	Multiple choice
	*In your view, how much do the following factors hinder you in starting your business?** (*Szerb – Márkus 2007*)	Likert scale (*1=not at all; 6=very much)*
	Did your entrepreneurial intention play a part in your application to the MSc programme?* *(authors' question)*(–» go to Section 5)	Multiple choice
4. Entrepreneurial activity (for those already in business)	When did you start your business?* *(authors' question)*	Multiple choice
	If you started your business during your BSc studies, did this play a part in your application to the MSc programme? *(authors' question)*	Multiple choice
	How did you start your business? *(authors' question)*	Multiple choice
	If you started it with others, how many of you are there in the business? *(authors' question)*	Free response
	What is your business engaged in?* *(authors' question)*	Free response
	Where did you start your business?* *(authors' question)*	Multiple choice
	In your view, how much did the following factors hinder you before starting your business?* (*Szerb – Márkus 2007*) (–» go to Section 5)	Likert scale (*1=not at all; 6=very much)*

Table 4
Structure of the questionnaire

Group of questions	Question (source) *required answer	Response type
5. Business and education	How important do you think the following skills are in starting a business?* (*Imreh-Tóth et al. 2013*)	Likert scale *(1=not important at all; 4=very important)*
	With respect to the below skills, how adequately do you think the MSc programme teaches them to you?**(authors' question)*	Likert scale *(1=not important at all; 4=very important)*
	In your view, what does education in the programme focus more on in its present form?* *(authors' question)*	Multiple choice
	Rate the following statements.* *(authors' question)*	Likert scale (*1=completely disagree; 6=completely agree)*
	Rank the below factors according to their importance.* *(authors' question)*	Ranking *(1=most important; 6=least important)*
	Which are the classes in the MSc programme that you believe offer concrete knowledge that can be utilised when starting a business?* *(authors' question)*	Multiple answer
	Are there any specific classes related to business that you miss from the current curriculum? *(authors' question)*	Free response
	What extra opportunities are you aware of at the university that help students who plan to start their own business beyond classes? *(authors' question)*	Free response
	Do you have any other ideas (either about teaching or regarding extracurricular activities) on how the university could better support those with entrepreneurial ambitions? *(authors' question)* (–» go to Section 6)	Free response
6. Demography	Sex* *(authors' question)*	Multiple choice
	Age* *(authors' question)*	Free response
	Where do you live?* *(authors' question)* (–» end of questionnaire)	Multiple choice

Growth or Development Trap*

Magdolna Csath

In this essay, we explore how to obtain a more accurate picture not only of the growth situation as measured by traditional economic indicators, but also of the level of development, which also raises the possibility of becoming trapped. We distinguish between development and growth, pointing out that Hungary has good growth figures, but lags behind in terms of development indicators. This discrepancy requires further, more detailed analysis in order to define desirable targets for development indicators that are independent of growth indicators, and to avoid the development trap by achieving them. This is also justified because, in the longer term, the evolution of development indicators also affects the chances of sustainable growth and allows for more general, systemic qualitative progress. Based on the statistical data presented in relation to the issues raised, we conclude that it would be necessary to construct a mathematical model of growth and development to illustrate and econometrically analyse the dynamic relationship. But this is not undertaken in the context of this essay.

Journal of Economic Literature (JEL) codes: E22, I15, I25, J24, O11, P52

Keywords: middle-income trap, middle development trap, resilience, adaptability, intangible investment, growth models

1. Introduction

Middle-income trap theories examine why many countries experience slowing or even stagnation in growth when they reach a middle-income level. When this situation persists for a longer period of time, it is said that the country is caught in a middle-income trap.[1] However, there are weaknesses in the studies that make their recommendations insufficient to avoid the trap in general.

The main theme of the essay is to distinguish between the growth trap and the development trap, and to demonstrate that avoiding the growth trap does not

* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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[1] Middle-income trap

necessarily mean avoiding the development trap as well. The *second chapter* presents the main findings of the literature on the growth trap and analyses their methodological weaknesses, while acknowledging, of course, the validity of growth analysis. It goes on to propose a new kind of development modelling, whereby the level of development indicators can be used to make judgements about a country's level of development. The term development is usually used to describe a process, while level of development generally means a state, but we may use the two terms interchangeably in the following. A development trap is a situation where a country's development indicators are deteriorating or stagnating. In this essay, we draw on statistical data to select a few key indicators and examine the positions of Hungary and the V4 countries,[2] and for further comparison we also analyse data from Austria. The reason for this is that it is reasonable to compare the Hungarian results first with the countries that are in closer historical, cultural and economic relations with Hungary. In the future, it will be worthwhile to extend the studies to more countries such as those in Asia that have successfully avoided the trap. The essay concludes by arguing that, given the weaknesses of growth models based on measuring the GDP, a more objective assessment could be achieved by extending the middle-income trap analysis to include middle development studies, and by setting targets not only for GDP and GDP per capita, but also for development indicators separately from the economic ones. This would allow systemic thinking, which in the longer term would be beneficial not only for growth, but also for social development.

2. Income trap research: a literature review

Researchers in development economics have long investigated the reasons why countries that start from similar economic situations show different patterns of economic development over the longer term. Initially, progress was measured in terms of gross domestic product (GDP) or GDP per capita. They analysed how GDP per capita in some countries evolves over time, whether there is a steady increase or the value starts to stagnate or decline at some point. If stagnation or deceleration occurs, we talk about a trap situation. Researchers from the World Bank were the first to carry out wide-ranging analyses in this topic. They also introduced the concept of the middle-income trap. *Gill et al.* (*2007*) compared the growth potential of countries in East Asia. They found that to avoid the middle-income trap, one should not linger in the successful production-based economic position, but the share of the knowledge-based innovative economy must be increased. South Korea is cited as an example, where the economy started to grow rapidly as a result of significant investment in the creation of high value-added domestic sectors that are competitive in international markets and in the innovation and knowledge needed

[2] V4 countries: Czechia, Poland, Hungary and Slovakia.

to do so. One result of this is that while the average annual number of patents registered per 100,000 inhabitants was 1.44 in the period 1990–1994, it increased to 8.67 in 2000–2004, representing a six-fold increase.[3] Referring to growth theories, this meant a shift from the neoclassical growth model to the new endogenous growth model, according to which growth can be expected from internal forces, knowledge, innovation, advanced technologies and entrepreneurship. Increasing innovation and knowledge levels have also contributed to improving total factor productivity,[4] which is important for improving competitiveness. In a later analysis, *Gill and Kharas* (*2015*) also suggested that several countries, such as Ukraine, were likely to become trapped. They also warned that a country can find itself in a trap even after long years of success. This may be because, for example, changes in the economic structure do not keep pace with changes in environmental opportunities and threats, or because the structure of export products also becomes rigid and not flexible enough to respond to market changes. But poorly targeted, inefficient public economic incentives with a low increase in value-added can also lead to a trap situation. For public economic stimulus to be effective, it needs high-quality universities, well-trained professionals and an innovation-friendly environment that encourages entrepreneurial, innovative firms, the authors argue.

They also point to another important feature: the risk of regional economic and overall development disparities. Because these can also prevent a country from avoiding a trap. *Garrett* (*2004*) draws attention to the common simplification that democratisation also brings economic success. He gives examples to show that this is not borne out by practice. He says that countries that are otherwise democratised, but where only the assembly units of value chains are present, could easily find themselves in a trap if they do not move up the value chain towards higher value-added activities. Assembly operations are a "natural limit to progress," says Garrett. Similar ideas are expressed by *Ohno* (*2013*), who warns that the gap between winners and losers is increasingly based on the amount of knowledge and skills accumulated. A middle-income level can be achieved through market liberalisation and foreign capital investment, but in order to move to a higher level, a system of continuous human capital development needs to be built. Importing knowledge is not enough, local knowledge creation is needed. The trap, he says, occurs when the initial benefits – be they mineral or other natural resources or cheap labour for investors – are exhausted, and in the meantime, a new, high value-added, knowledge-based economic structure and institutional framework that encourages local knowledge creation are not developed. This line of thought is also emphasised by *Spence* (*2022*).

[3] *Gill et al. 2007:155, Table 3.6*.
[4] Total factor productivity: an indicator that takes into account the productivity effects of technological progress, knowledge, innovation and management efficiency, as well.

Huang et al. (*2017*) draw attention to another risk factor of becoming trapped: low or declining productivity. The example of China is used to examine how long China can remain the "factory of the world", relying on low investor costs without being trapped. The authors argue that, although the Chinese economy is growing strongly, low productivity levels, one of the causes of which is a deterioration in the efficiency of capital investment, could pose a risk of a trap. They propose a shift from investment-led to innovation-led industrial development, as this would lead to higher value-added and higher productivity levels.

This idea is also underlined by *Rippel* (*2017*), when he mentions the importance of investing in innovation and moving up the value chain as a condition for China's catching-up. A report by the *EBRD* (*2019*) identifies the productivity problem as a trap risk for the countries financed, including those in Eastern Europe, where productivity is low, despite a high investment-to-GDP ratio and strong GDP growth. The reason for this, according to the report, is that the more a country modernises technically and technologically, the more it needs well-educated and highly capable human capital. It is also a condition for productivity gains. The EBRD concludes that the slowdown in growth is mainly attributable to low levels of total factor productivity (TFP). Fast-growing economies exhaust their growth resources after a decade or two, so a new growth model is needed, based not on knowledge and technology imports but on local innovation and knowledge creation. This requires flexibility and future-oriented thinking. This is what South Korea did when it switched to a knowledge-based economic development model. Thanks to substantial human capital investment, TFP has grown rapidly, which has contributed to the optimal use of physical capital. Innovation as a way to avoid the middle-income trap is also emphasised in other studies.

Matolcsy and Palotai (*2019*) also draw attention to productivity problems. They point out that there are now limits to increasing growth quantitatively by bringing more people into work. There is therefore a need to increase productivity, to attract workers to higher productivity sectors and to modernise the economic structure in general.

Paus (*2017*) puts it this way: innovate or perish. The author examines the countries of Latin America and draws conclusions for Asia. She points out that several Latin American countries have been in a growth trap for some time. This is because the international competitiveness of previously labour-intensive, low-productivity products has deteriorated and they failed to switch to more innovative, higher-productivity, more competitive products, i.e. the structure of the economy has not modernised fast enough. Among other things, this is due to low levels of investment in human capital. Economic growth is also constrained by high inequalities in South America, which hinders the accumulation of human capital.

Finally, it is worth quoting the findings of two analyses that also looked at the V4 countries. The European Commission's study (*EC 2020*) analyses regional income traps using economic, productivity and employment data. It finds that there are a number of regions in the EU that are in a trap situation, although this occurs at GDP per capita levels higher than those generally reported in the literature. This is a big problem because these lagging regions undermine the potential for economic growth, while – as national macro indicators hide these regional weaknesses – little attention is paid to them. Researchers divide European regions into 3 groups: regions stalling at high, middle and low income level. Some V4 regions are also in the third group, but are not included in the case studies presented in detail. The reasons for this lag are identified as low value-added production, weak innovation and low productivity levels. It can be noted that these factors are not independent of each other, as it is just the higher value-added economic activities with more innovation that would allow productivity to increase. Researchers see the way out of the trap leading through investment in knowledge, more R&D investment and more competent local leadership. They note that more physical investment without investment in knowledge is not enough, as this is what would contribute to productivity growth.

An analysis by the European Central Bank (ECB) (*Żuk – Savelin 2018*) looks at the speed of convergence, measured by GDP per capita, over the years 2000–2016. This analysis, which covers 17 countries, already mentions the historical fact that the countries under review have had to make the transition from a "command-based economy" to a market economy. The average annual growth rate (at purchasing power parity) between 2000 and 2016 was the highest in Lithuania and the lowest in Slovenia, according to World Bank data. The Hungarian score was the third lowest, but we must immediately mention the weakness of the comparison: it is obviously harder to make a big jump from a higher level. A better indicator is a comparison with the EU average. In terms of real GDP per capita (at purchasing power parity) in 2016, Czechia was in the lead and Hungary was 7th out of 17 countries. Based on 2017 data, Hungary would need to grow by more than 5 per cent per year to reach the EU average GDP per capita by 2025, according to the authors. Czechia can achieve this even with growth below 3 per cent. Interestingly, the study already touches on the shortcomings of the GDP per capita indicator, pointing out that an increase in the value of the indicator does not necessarily translate into an improvement in educational standards or general health. It therefore proposes to examine the UN Human Development Index (HDI) alongside the growth indicator. The HDI indicator takes into account life expectancy at birth, the number of years spent in schooling, the length of schooling in years and the change in real gross national income measured at purchasing power parity. More recently, it has also analysed sustainability, including the environmental impact of economies as measured by various indicators. Finally, the study warns that the economic structure

has a significant impact on the avoidability of trap situations. Increasing the share of more innovation- and knowledge-intensive, more competitive sectors, and increasing the share of domestic value added in exports will reduce the chances of falling into a trap. This would require, for example, an increase in the number of patents granted per million inhabitants.

Over the period under review, this value decreased in only three of the 17 countries analysed, Hungary, Croatia and North Macedonia, but increased significantly in Poland and Czechia. However, it should be noted that intellectual property achievements can only contribute to economic performance if they translate into marketable products and services. The situation is similar for educational outcomes. There is no point in having more highly skilled workers if the economic structure does not offer them jobs that make use of their knowledge and skills. This is also a question of efficiency, as not only unused machines but also unused knowledge is a loss.

3. Main shortcomings of the middle growth trap analysis

As we have seen, the literature on the middle-income trap is abundant. What the studies have in common is that they are looking for the causes of growth stagnation. The reasons generally cited include the low value-creating capacity of the economic structure, poor innovation and knowledge levels, and slowly improving productivity. Other potential problems include the quality of governance, high levels of corruption, excessive regional disparities and a poor level of management. Researches are in search of a new growth model as opposed to the original Solow model, in which the main external, exogenous source of growth is investment. They also warn that technological progress cannot be fast enough if we only invest in infrastructure, in tangible things.[5] The gap between technology and knowledge hinders the effective use of technologies. This is why so-called intangible investments are important to raise knowledge and skills to the necessary level, i.e. to strengthen human capital, the importance of which is highlighted in particular by endogenous growth models. However, these indicators are only examined as conditions for growth. Another weakness of the research is that there is no consensus on what the GDP per capita value is which indicates a trap situation if a country's growth is stagnant around it. *Spence (2011)* puts this at USD 10,000.[6] *Felipe* (*2012a; b*) identifies two middle bands: one between USD 2,000 and USD 7,500 and the other between USD 7,500 and USD 11,500.[7] This means that if a country stays in the first band for more than 28 years or in the second band

[5] Tangible investment
[6] At 2005 purchasing power parity
[7] At 1990 purchasing power parity

for more than 14 years, it is already in the middle-income trap. The authors found entrapment in 35 of the 52 countries studied.

In a recent analysis mentioned above, the risk of a trap is predicted for a GDP per capita of USD 10,000–11,000 and 15,000–16,000 (*EC 2020*). Others give a growth percentage rather than an absolute value. *Eichengreen et al.* (*2013*) define this as a slowdown of at least 2 percentage points relative to a 7-year moving average.

There are also authors who measure a country's long-term economic growth against that of a benchmark country, such as the USA, looking at whether there is perceptible convergence over time (*Im – Rosenblatt 2013; Agénor – Canuto 2012*). This also points to a major gap in the question of whether GDP or GDP per capita is sufficient to be selected as the main indicator for comparison. Indeed, growth measured by GDP can be "bad growth", with investments that do not create significant new value but harm the environment. Therefore, an important question is whether it is enough to set growth as an objective. Is it sure that quantitative growth also brings progress? Is it even possible to compare and assess the real results of individual countries based on the GDP indicator? They are likely to have different historical, cultural and social situations, for example. On the other hand, in an increasingly complex and unpredictable economic and political environment, is it not reasonable to measure the effectiveness of a country's performance by other indicators? Obviously, there is no single economic indicator that can be used to describe whether it responds well to crisis situations or how quickly and successfully it can adapt to changes. Resilience and adaptability are not a question of economic growth. Rather, it depends on the characteristics of the population and society, on historical and cultural traditions, and on the abilities to cooperate. Therefore, the speed of catching up with the most advanced economies in rapidly changing circumstances also depends on these characteristics. It is not enough even to have new values, factories and schools. They also need to perform efficiently and cost-effectively. We must therefore move beyond the "input" approach and reporting how much we have spent on certain investments as results. The really important thing is how much result or outcome is achieved with the input, and how much new value is created. It is therefore advisable to conduct development studies that are not input-oriented but result-oriented, i.e. that consider the efficiency of resource utilisation as an important factor in avoiding traps.

Finally, given the weaknesses of the middle-income trap theories and the necessary conditions for successful adaptation to a rapidly changing environment, it is advisable to extend income-growth research with development analysis. There have also been experiments in this area, the three best known of which are presented here.

4. Analyses including also development indicators

Deciding how to describe development well is not an easy task. Country-specific characteristics would probably also make it difficult to produce a coherent model. Nevertheless, there are initiatives to compare basic development indicators. One example is the UN analysis of human development, mentioned earlier. *Table 1* shows the evolution of the HDI index between 1990 and 2019.

Table 1
Changes in the value of the Human Development Index in international comparison (1990–2019)

Country	1990	2000	2010	2014	2015	2017	2018	2019	Value change from 1990 to 2019	Annual average growth rate (%)
Hungary	0.708	0.772	0.831	0.838	0.842	0.846	0.850	0.854	0.146	0.650
Czechia	0.738	0.804	0.870	0.888	0.891	0.896	0.898	0.900	0.162	0.690
Poland	0.718	0.790	0.840	0.858	0.863	0.873	0.877	0.880	0.162	0.700
Slovakia	0.741	0.765	0.831	0.847	0.850	0.855	0.858	0.860	0.119	0.510
Austria	0.803	0.847	0.904	0.913	0.915	0.919	0.921	0.922	0.119	0.480

Source: UNDP (2020)

In *Table 1* we see that the biggest changes in HDI values and average annual growth rate occurred in Czechia and Poland. This is followed by the Hungarian data. If we also look at GDP per capita figures, we see that again Poland and Czechia have made the greatest progress in this respect. This may be related to the fact that one component of the HDI indicator is the national income indicator. Austria also improved its position moderately in terms of both the HDI and GDP per capita indicators, which is, on the one hand, understandable as it started from a much higher level, but, on the other, this also points to a weakness in measuring against a given basis value. In 2019, the highest HDI index was found in Norway (at 0.957). Among the 189 countries reviewed, Austria ranks 18th, Czechia 27th, Poland 36th, Slovakia 39th and Hungary 40th. So for this development indicator, which also takes life expectancy and knowledge levels as human development indicators into account, Hungary ranks last among the countries surveyed here, though not far behind Slovakia.

Another study analysing development indicators has been carried out by the Legatum Institute for 15 years (*Legatum 2021*). They assess the prosperity of 167 countries using 300 indicators most of which are human and social development indicators, but economic data is also taken into account. Rankings are made not only on the basis of composite indicators, but also on the basis of indicators by territories. The Legatum Prosperity Index research draws attention to the fact

that a nation's prosperity cannot be measured only by its economic and material performance. It is also important whether there is progress at the individual and societal level. Development means improving health, raising knowledge and preventing deterioration in the state of the natural environment, such as air quality. In their view, transparent and effective governance is needed to improve development indicators. Hungary is ranked 44th out of 167 countries in the 2021 ranking. This is two places better than in 2020, but still behind the 27th Czechia, 35th Slovakia and 36th Poland. Hungary ranks the worst in terms of government efficiency (82) and transparency of the market environment (78), but also in terms of health, it is ranked only 51st, with only Poland ranking worse in the V4 Group. However, Hungary's position based on economic data is much better, ahead of both Slovakia and Poland, in 33rd place. The economic position is measured, for example, by financial and macroeconomic stability and employment, while the health care situation is described in terms of life expectancy, physical and mental health, and the development of the disease prevention system. The research demonstrates that even when economic performance is good, a country can still have poor development indicators, which may justify setting a target to improve the value of these indicators. The analysis has the merit of also looking at human and social development indicators, in addition to economic ones. It is also a good idea to produce rankings for each of the main themes. But 300 indicators are a lot. Obviously, not all of them affect development with the same weight, so an unfavourable score in many low-weight factors may have a greater impact on the final ranking than good scores in a few indicators that are more important for development.

It is also worth mentioning an interesting social progress indicator research conducted by a Washington-based non-profit organisation with a global network of experts. The researchers look at countries' performance in three areas. These are: the satisfaction of basic human needs, the foundations of well-being and the opportunities available to people. This research primarily assesses access to development and not the level of development achieved. It examines access to adequate health care and different levels of education, freedom of access to information, the freedom of individuals to shape their lives and the cohesiveness of society. In the 2021 study (*Social Progress Imperative 2021*), which looks at 168 countries using 52 indicators, Czechia is ranked 22nd, Slovakia 33rd, Poland 35th and Hungary 42nd. Hungary received its worst rankings for access to health and access to higher levels of knowledge, which are clearly indicators of progress. The study also examines environmental characteristics and civil liberties. It is interesting for its comprehensive approach and multi-directional interest, but it does not draw a picture of the level of development of the countries under study. Therefore, it also does not give an opinion on whether some of them are in a middle development trap. However, an international comparison of the possibilities of

access to development can give some ideas about what indicators to use to assess development. One common feature of the three analytical studies is that they go beyond economic outcomes to assess human and social development and development potential. The indicators used allow for separate measurement of results in several areas. The researchers make no attempt to describe the overall level of development of countries, their economic, human and social development and their interaction with each other in a systemic way. The final conclusion from the analysis of the three development indicators is that countries with good economic indicators may have much weaker development indicators than growth indicators. This could also be a warning that a country not threatened by a growth trap may be in a development trap situation, which could also bring it closer to a growth trap situation in the future.

In the following, we focus on several domestic studies and publications that analyse the relationship between the economy, competitiveness, development and trap situations.

5. Growth, competitiveness, development and trap situation: domestic reflections

The growth trap situation is also addressed in the domestic literature. To avoid this trap, *Palotai and Virág* (*2016*) suggest strengthening value-creating capabilities. This also requires improving innovation capabilities. The authors also point out that without this it will not be possible to strengthen competitiveness. They highlight that the results of economic growth and competitiveness improvements must be reflected in the fulfilment of human development potential, good education and health. They put it this way: *"The quality and quantity of human capital are key issues for economic competitiveness and convergence. Human capital is one of the key determinants of long-term growth potential: countries with more human capital are able to achieve more powerful economic growth. The quality of human capital can be improved by raising the performance of the education system and the health care system."* (*Palotai – Virág 2016:701*).

The authors rightly stress the importance of development characteristics and point to their effects in improving competitiveness and stimulating economic growth. Ultimately, however, the collection of papers looks for sources of growth and identifies development factors primarily as sources of growth. This is why it stresses the importance of avoiding the middle growth level trap. Nevertheless, the listed indicators for measuring development can also be used in a methodology that focuses on avoiding the development trap. *Virág* (*2016; 2017*) considers it important to create the qualitative conditions for improving competitiveness and to move up the value chain towards higher value added in order to avoid the trap.

He also stresses the importance of new investment and productivity improvements. *Csáki* (*2018*) *and Boda* (*2022*) stress the role of education and human investment in general in avoiding trap situations. *Csath* (*2019; 2021*) looks at development indicators and highlights innovation outcomes and the reduction of regional development differences as particularly important conditions for avoiding the trap. Various reports by the Magyar Nemzeti Bank (MNB) also mention the risk of a trap. A report by the *MNB* (*2021*) identifies the quantity and quality of human resources, social and environmental sustainability and productivity, among others, as important elements for improving competitiveness. The report examines the opportunities for catching-up in terms of the potential for increasing economic growth, noting that *"a long-term growth surplus of at least 2–3 percentage points per year is essential for successful catching-up with developed countries."* (*MNB 2021:7*).

The report looks for reserves for growth. Particularly noteworthy are the findings on the size of local value added affecting economic development, the analysis of weaknesses in the economic structure and the knowledge and health status of human capital. The presentation of the effects of territorial disparities in slowing down development is also outstanding. All of the indicators used provide important information, although a breakdown of indicators into input and outcome, i.e. investment and impact-based indicators, especially for development levels, would provide further valuable analysis. For example, the relationship between education expenditures as a share of GDP as inputs and educational attainment rates and knowledge levels as impact/outcome measures could be assessed. Similarly, the relationships between investment in IT infrastructure as inputs and the proportion of people with IT skills and the proportion of firms using IT systems as outputs could be examined. The scale of results/impacts achieved with inputs is an important issue not only in terms of competitiveness, but also in respect of development. Such an analysis can be found in the study on the relationship between R&D resources as inputs and the number of patents as outcome/result measures.

The MNB's report does not, of course, examine the trap situation, but analyses whether growth conditions can be improved. Nevertheless, its results can also be used to study how to avoid the development trap. A key issue for the development process and for higher level of development is the evolution of productivity. The MNB's other report on productivity (*MNB 2020*) shows that, on the one hand, the innovation process, which is an important condition for growth, is not efficient enough in Hungary, and, on the other hand, the effectiveness of digitalisation inputs to support productivity growth is also not convincing. The latter is also highlighted in a recent analysis by the *EBRD* (*2021*). According to the EBRD study, Hungary's overall digital literacy score is 72.5 out of 100, not far behind Slovakia (72.8) and the worst in the V4. At the same time, Hungary leads the V4 in terms of physical

inputs and infrastructure (89.8), but lags behind in terms of skills: the Hungarian figure is 50.9, the Czech 78.5, the Polish 69.2 and the Slovak 64.4. But Hungary is only slightly ahead of Slovakia when it comes to online government services. These values, in line with the findings of the MNB study, indicate an efficiency problem. Hungary ranks much better in quantitative terms than in qualitative ones, which in turn makes it less efficient to run physical investments.

With its multidirectional approach to productivity, the *MNB* (*2020*) report paints a clear picture of how productivity growth would also bring development gains in terms of the elements examined. It argues as follows: "improving development can be achieved primarily through raising productivity" (*MNB 2020:8*). The findings on untapped human resource potential are also noteworthy. However, it is not only the untapped economic potential that is worth looking at in this potential. Maslow's pyramid (*Maslow 1943*) also highlights the importance of human development, maximising the use of abilities and knowledge, i.e. self-actualisation. This contributes not only to material well-being, but also to improving quality of life and well-being. From a productivity perspective, unused knowledge is a waste of resources and is therefore considered a factor that reduces productivity.

Overall, the report defines innovation, digitalisation and knowledge as development, which is a good direction to look at when researching how to avoid a development trap.

Finally, ecological sustainability and green growth in general are important with respect to the level of development. In this context, another MNB publication, a study by *Barnabás Virág* (*2019*), makes striking observations, referring to the importance of human development which is more than economic growth (p. 33): *"as modern economies develop, GDP increasingly neglects several elements of subjective well-being and sustainability, while incorporating a number of outputs whose welfare impact is questionable."* And on page 49 he states: *"this is why more indicators can and should be used alongside GDP."*

One could add to this last idea by saying that it is not only because of the problems with GDP that more indicators should be used, but also because in our time it is increasingly appropriate to set development, sustainability and the strengthening of crisis resilience as the goal. Moreover, as growth and development are different factors, since one is a quantitative and the other is a qualitative factor – which can of course be in a causal relationship – we must also bear in mind that without adequate development, the sources of growth will eventually be exhausted, and it would therefore be worth working with two different models. In addition to the middle growth approach, there may be a rationale for a model to assess the state of development and the process, which would indicate whether there is a risk of a development trap.

6. The goal should be progress!

Middle-income trap studies are useful and valuable. The domestic results are particularly noteworthy. But what if the argument was reversed, and human and social development, rather than economic growth, was the objective function? What if we were to look for development indicators that would not only make the economy larger, but also make the country better and more developed, based primarily on its own endowments, historical traditions and the challenges of the future? What if Hungary could ensure that in an accelerating and increasingly uncertain environment it could keep up with and catch up with more developed countries in terms of development indicators – avoiding the development trap – at least as fast as in terms of GDP per capita? A more human and socially developed country can be more resilient to crises, more adaptable to changes, and the internal, endogenous development would also lead to sustainable economic growth. This would mean selecting a few indicators describing development as a state or a process of development, and examining how a country, in this case Hungary, performs in terms of these indicators. Such a study would shed light on how far apart the countries in question are in terms of qualitative characteristics, which go beyond the mainly quantitative indicators of the economy. This approach differs from the growth trap approach because it does not consider growth indicators at all. It seeks to answer the question of whether there is progress, primarily human, social and, increasingly, environmental progress. With this in mind, development objectives could be set, the achievement of which could be given at least as much emphasis as the pursuit of growth objectives. Of course, putting together such a development model requires considerable research. Interesting mathematical analyses could also be performed by examining the relationship between the development and growth model over time. In the framework of this essay, starting from the current Hungarian situation and building on the results of previous Hungarian research, one can only outline the areas where development goals should be set. One of these areas is the state of knowledge and health of the population, which has a major impact on the ability to improve competitiveness and the economic situation in general, but also on national resilience in the face of great uncertainty. The quality of education is important not only because it affects an individual's standard of living and quality of life, but also because it is an important source of future economic growth. Research shows that higher levels of education can be associated with healthier lifestyles and therefore longer life expectancy, and a healthier society means less pressure on the health system (*Picker 2007; Raghupathi – Raghupathi 2020*).

Economic structure and the related productivity and efficiency can also be considered as indicators of development. It is important to address weaknesses in the economic structure and improve the efficiency of spending in the case of economic indicators. In this approach, we do not start from the size of the

input amounts, but from the results, the effects, which we want to improve. The necessary steps for improvement are iteratively decomposed from this, paying close attention to the efficiency of the inputs. This is a shift from the growth approach based on one objective function to a whole-system approach, i.e. one that looks at the economy, people, society and the environment in a coherent way, and we can achieve balanced economic growth and social development by improving the value of selected indicators. Below, we analyse some examples of development indicators for which setting targets would probably avoid falling into the development trap and ensure sustainable economic growth. The economic indicators are included in order to compare Hungary's international position in terms of such and for selected development indicators. In *Table 2*, I summarise the 16 economic, human, social and environmental objectives that I consider most important. Statistical data on selected development indicators show that Hungary is not well placed in the V4 and lags far behind Austria. The ratio of physical to intangible investments is particularly important among the proposed indicators. As we see in the national and international analyses cited, Hungary is in a leading position in terms of physical investment, but lags behind in terms of the human investment, especially knowledge investment, that ensures its utilisation. One could say that Hungary's growth data is good, but its development data is weak. Of course, the selection of mutually agreed indicators and the definition of the value of the targets to be set require further professional discussions and research, and the benchmark could be primarily the development compared to Hungary itself and the other V4 countries, and convergence to Austria.

Table 2
Proposed development indicators and targets

Economic	Economic structure	Knowledge	Health and environmental
goals			
Reducing regional disparities in GDP per capita Increasing the share of intangible/knowledge investment within total investment Progress from development: improving the efficiency of public spending (R&D, digitalisation spending)	Increasing the share of innovative firms Increasing value added / employee value in all sectors Increasing the share of high value-added firms in the economy as a whole Reducing the share of imports in exports Digital development	Increasing the share of tertiary education in the working age population Reducing the share of people with lower education in all age groups Increasing the share of technical/scientific and IT graduates Increasing the share of adult education in the total population	Increasing life expectancy and healthy life expectancy Reducing population loss Reducing air pollution Expansion of green areas, afforestation

Let us look at the average for the V4 and Austria for some key indicators, and for the EU27 if available. The share of innovative firms is an important indicator of development (*Table 3*), since without innovation it is impossible to improve competitiveness, and innovation is a prerequisite for increasing productivity as well.

Table 3
Innovative or continuously innovating firms as a percentage of all firms

Country	Innovative	Continuously innovating
	firms (%)	
Hungary	28.7	9.4
Czechia	46.8	22.3
Poland	23.7	8.0
Slovakia	30.5	13.4
Austria	62.6	19.3
EU average	50.3	26.2

Source: Eurostat, Community Innovation Survey, 2021

Hungary has a low share of firms rated as innovative at the time of the survey. Continuous renewal is more important than innovation connected to a given moment. It is also essential for survival in the longer term in the ever-changing environment. The Hungarian figure exceeds only that of Poland, but is significantly below the EU average. Appropriate education is also an important development indicator for improving competitiveness and innovation (*Table 4*). According to Eurostat, the number of science and engineering graduates per 1,000 inhabitants in Hungary in 2019 was 12.3, not far behind the Slovak figure of 12.9, but more significantly behind the Czech (16.1) and Polish (20.1) figures. The Austrian figure is even higher at 23.4 and the EU average is 20.8. The number and proportion of PhDs in science and engineering is also important. According to Eurostat, in 2019, the Hungarian and Polish values per 1,000 inhabitants were the lowest (0.2 and 0.3 respectively), while the Czech rate was 1.1 and the Slovak 0.8. The Austrian figure was 0.9 and the EU average 0.8.

This figure, however, is also poor for the 25–34-year age group, which is particularly important for employment. The Hungarian value is 0.6, which is slightly better than the Polish value of 0.5, but worse than the Czech (1.1) and Slovak (1.3) numbers. The Austrian figure is 1.3, and the EU average is 1.2. In Hungary's case, these values may indicate a problem with the level of development. High levels of knowledge can be particularly important in avoiding the development trap, and also that the proportion of low-skilled workers should be reduced steadily and strongly. Hungary does not score very well in terms of the share of tertiary education in the two age groups surveyed. The share of 25–34-year olds with tertiary education is low, while the improvement trend is also below that of the other V4 countries.

Table 4
Change from 2011 to 2020 in the share of tertiary graduates aged 25–34 and 25–74 year (%)

Country	Age group 25–34 year			Age group 25–74 year		
	2011	2020	Change (percentage points)	2011	2020	Change (percentage points)
Hungary	28.2	30.7	+2.5	20.0	26.0	+6.0
Czechia	25.1	33.0	+7.9	17.3	22.7	+5.4
Poland	39.0	42.4	+3.4	22.0	29.7	+7.7
Slovakia	25.5	39.0	+13.5	17.7	24.9	+7.2
Austria	20.9	41.4	+20.5	18.3	32.1	+13.8
EU average	33.0	40.5	+7.5	23.7	30.6	+6.9

Source: Eurostat (2021)

On the other hand, despite the positive Hungarian trends, the proportion of low-qualified people (at most 8 years of primary schooling) in both age groups is still too high compared to the other V4 countries, while regional differences are also large (*Table 5*).

Table 5
Share of low-qualified people in the 25–34 and 25–74 year age groups (%)

Country	Age group 25–34 year			Age group 25–74 year		
	2011	2020	Change (percentage points)	2011	2020	Change (percentage points)
Hungary	12.9	12.4	–0.5	23.6	15.9	–7.7
Czechia	5.7	7.6	+1.9	9.4	7.3	–2.1
Poland	6.0	6.2	+0.2	14.6	9.0	–5.6
Slovakia	6.0	7.3	+1.3	11.3	8.6	–2.7
Austria	12.0	10.9	–1.1	20.3	16.1	–4.2
EU average	19.1	14.7	–4.4	30.7	24.0	–6.7

Source: Eurostat

The data presented confirm that Hungary needs to make significant progress in areas that are particularly important for competitiveness, sustainable growth and avoiding the development trap, i.e. it would be reasonable to set targets for these indicators.

It is worth looking at Hungary's digital performance in a bit more detail because digital maturity is one of the most important indicators of development for adapting to the rapid changes underway and improving productivity. The current times are

characterised by rapid technological change. Among them, digitalisation is of paramount importance. But it is not enough to invest in digital infrastructure and networks. Without investment in knowledge, advanced technologies cannot operate effectively. The speed at which countries develop will therefore be influenced by the speed at which exponential technological changes are followed by the diffusion of their use at individual, societal, firm and public-governmental levels. The EU measures digital development with the DESI[8] index, which measures technological advances, knowledge levels and the propagation of use. According to the 2021 DESI study (*DESI 2021*), the V4 and Austria were ranked according to the four examined dimensions as shown in *Table 6*.

Table 6
Rankings of the V4 and Austria along 4 dimensions (DESI index 2021)

Country	General ranking	Digital infrastructure	Digital skills of human capital	Adoption of digital technologies	Level of digitalisation of public services
Hungary	23	12	22	26	25
Czechia	18	22	15	15	20
Poland	24	21	24	24	22
Slovakia	22	19	19	21	23
Austria	10	11	9	11	9

Source: DESI (2021)

In the area of human capital, it is striking that the share of firms offering ICT training to their employees is only 16 per cent of all firms, putting Hungary in 21st place. This is in line with the IMD's Digital Competitiveness Report (*IMD 2021*), which shows that the future orientation and adaptability of enterprises, one indicator of which is whether they prepare their employees for future challenges through training, is weak. In the IMD Digital Competitiveness Ranking, Hungary is ranked 62nd out of the 64 countries surveyed in terms of the future orientation and agility of enterprises (this may be linked to the low level of innovation shown in *Table 3*), with Austria ranked 18th, Czechia 32nd, Poland 44th and Slovakia 60th. This indicates a serious development problem. It should be noted that Hungary is in a better position for digital public services to businesses than for digital services to the public. For the former, Hungary is ranked 22nd, the second best ranking in the V4 behind the 20th ranked Slovaks, while for the latter Hungary is 25th, which is the worst ranking within the V4.

[8] Digital Economy and Society Index

Hungary's poor position in terms of services provided to the population may also be linked to user skills, national level knowledge and personal interest. But it can also be influenced by how user-friendly the systems are. It should be noted that the DESI rankings for 2021 cannot be compared to those of previous years due to methodological changes.

In addition to the knowledge indicators, one could cite weaknesses in the structure of the economy, the high share of low value-added enterprises, cost-based competition rather than knowledge and innovation competition in the export markets, and the high share of imports in exports. These also point to development problems.

Obviously, as a consequence of all these factors together, Hungary's economic convergence is not fast enough. From 2009 to 2020, the GDP per capita at purchasing power parity in Hungary improved from 65 to 74, taking the EU average as 100. At the same time, the Czech score went from 87 to 94 (an improvement of 7 points), the Polish score from 60 to 78 (an improvement of 18 points) and the Slovak score from 72 to 71 (a decrease of one point). Despite the 9-point improvement in the Hungarian score, the pace of convergence in Poland is remarkable, as is the 7-point improvement in Czechia, as it is clear that it is harder to advance from an already high level. Overall, the Czechs are the closest to the EU average, with the Poles outpacing Hungary with faster growth. The Slovak backlog obviously requires further analysis, as Slovakia steadily improved from 72 in 2009 to 78 in 2013, before stagnating and remaining stable until 2015. In 2016, however, it started on a downward trend, falling to 70 in 2019. From there it improved to 71 in 2020. In the case of Slovakia, this may raise the possibility of a trap situation.

In Hungary's case, faster convergence could be supported by improving the value of development indicators. Finally, let us summarise Hungary's performance in some macro indicators and development indicators.

Table 7
Economic and development data: positions within the EU

Goals	Hungary	Czechia	Poland	Slovakia	Austria
GDP/capita growth	7	12	4	13	22
Investment/GDP	2	3	23	14	5
Employment (20–64 years)	13	4	16	19	12
Health status	23	20	22	19	11
Avoidable mortality	25	18	19	22	13
Early school leavers	22	10	5	11	14
Neither in employment, nor in education (15–29 years)	20	11	15	21	7
Share of people with tertiary education	25	24	16	20	18
Adult education	20	19	23	25	8
Basic digital skills	21	8	23	16	6

Source: EU (2021)

Table 7 confirms that, despite Hungary's excellent position in terms of economic indicators, the country is still lagging behind in some cases even within the V4, but behind Austria significantly in terms of development indicators. In the case of Austria, however, the rankings for economic and development indicators are more balanced, which is likely to be reflected also in Austria's better ranking in competitiveness. Of course, this does not mean yet that Hungary finds itself in a development trap. It does, however, highlight the need for further analysis and a change of approach that puts more emphasis on development indicators.

7. Summary

The aim of the essay was to draw attention to the fact that in today's rapidly changing circumstances, characterised by technological revolution, it is no longer sufficient to examine the development path and growth model of a country on the basis of economic indicators alone, mainly if it is GDP, whose shortcomings can even disorient decision-making. Progress in development, catching up with more developed countries and thus avoiding the development trap, should be measured by development indicators, and the aim should be to improve the value of these indicators, stressing that growth, which is a quantitative element, does not necessarily mean development, but that improving the level of development is a qualitative element that can have a positive impact on growth, i.e. on the quantitative element.

There are already references to this in the domestic literature, where the internal reasons and ways to avoid the growth trap are sought behind growth outcomes. Development can be measured, for example, by the level of knowledge and health, the capacity of the economic structure to create and use knowledge, and the level of productivity and efficiency. Raising the overall level of knowledge and skills is a prerequisite for increasing knowledge and innovation-based added value, which also strengthens the economy's and society's resilience and adaptability to crisis and, through them, its competitiveness. Together, these are the conditions for sustainable growth and avoiding the middle-income trap. It is therefore useful to change also the paradigm of measurement, because as Albert Einstein (1879–1955) famously said, *"we can't solve problems by using the same kind of thinking we used when we created them."* A paradigm shift would also mean looking at qualitative factors not only as conditions for growth, but for their own importance, in the context of a stand-alone model. The essay also draws attention to the importance of a systemic approach: to the fact that the economy is part of a larger system, where if one subsystem overstretches the framework of the whole system, it will cause imbalances. In addition to the economy, the whole system also includes society and, in particular, human wealth, the state and development of which also have an impact on economic opportunities. This is why the essay proposes that, after a proper professional debate, a model should be developed to analyse the level of development of countries on the basis of the values of the most important development indicators and to set targets to be achieved. This would ensure a socio-economic and human state dynamically creating the harmony of the whole system and its continuous improvement. A future research task is to define more precisely the development status and process, to further investigate indicators to measure the avoidability of the development trap and to build a model that summarises them.

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What Can Posterity Learn from Irving Fisher?*

Katalin Botos

This essay draws attention to some of the important aspects of, and learnings from, Irving Fisher's work. Fisher was the first economist to subject big volumes of data to analysis. He was one of the founders and first president of the Econometric Society. His name is associated with the quantity theory of money. He researched the purchasing power of money, index numbers, created the so-called Fisher index, wrote about the theory of interest rates, economic cycles, dwelled upon debt deflation and the theory of the Great Depression. He was one of the first advocates of abandoning the gold standard. He also drew attention to the psychological motives of the behaviours of economic actors, so the theories of Thalerian behavioural economics can regard him as their predecessor. His insight was used in managing the financial crisis of 2008. The steps towards reforming bank regulation can specifically be regarded as such measures, while Modern Monetary Theory stretched back as far as his thoughts on the regulation of the creation of money, i.e. the Chicago plan.

Journal of Economic Literature (JEL) codes: E31, E32, B31, C58, D91, G28, E12, B52

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1. Introduction

All economics students are familiar with one of the outcomes of Irving Fisher's work, since undergraduate students of economics usually receive thorough training in statistics. Price indices form an important part of this course material. And the Fisher index (that is, the geometric average or mean of the Laspeyres index and the Paasche index) is part of that. His significance in statistics is unquestionable. The importance of his work is also marked by the fact that BIS, the bank of central banks, established a committee named the Irving Fisher Committee on Central Bank Statistics (IFC), which is a forum of economists and statisticians at central banks, and its aim is to discuss statistical issues concerning central banks.[1]

* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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[1] In the IFC Reports, IFC Bulletins and IFC Working Papers, the Irving Fisher Committee shares various analyses and recommendations with central banks (https://www.bis.org/ifc/publications.htm).

He was the first to rely on macroeconomic data to prove his theories. Financial professionals encounter his work in relation to the quantity theory of money. However, his work is much richer than that. Several modern economic trends also identify Irving Fisher as an early pioneer of their theories[2].

2. Professional career

In 1891, Fisher received his PhD in economics at Yale. His thesis, in which he outlined the development of the theory of general equilibrium, was praised. (Léon Walras arrived at similar findings at the same time.) He became a professor at Yale in 1898, and after 1935 he remained at his university as professor emeritus. He edited the Yale Review for fifteen years at the turn of the 20th century, and was active in many learned societies. He was president of the American Economic Association in 1918. The American Mathematical Society selected him as its Gibbs Lecturer for 1929, which is the highest accolade of the Society intended for mathematicians and others who apply mathematics. In 1930, with Ragnar Frisch and Charles F. Roos, he founded the Econometric Society, also being its first president.

His major works include *The Nature of Capital and Income*, published in 1906, *The Purchasing Power of Money* from 1911, *The Making of Index Numbers* from 1922, and the *Theory of Interest* from 1930, as well as his work entitled *The Debt-Deflation Theory of Great Depressions*, published in 1933.

His inventions had made him a wealthy man by the late 1920s. However, he lost everything he had in the Great Depression between 1929 and 1933. Until the end of his life, he believed that markets would recover based on their own principles, and the economy would overcome the Great Depression. He did not live to see the economic recovery, which came after World War II, though not in the way he had expected: the normalisation was a result of the state's actions based on Keynesian policy, and not the monetary policy which he had advocated. In fact, the effect of the war on the economy played a significant role in that context. He died in 1947.

In the late 1930s, many of Fisher's – otherwise correct – insights were largely ignored in academia in favour of Keynesian economics and the liquidity preference theory. His real values were only recognised by some decades later. For example, in 1973, the Journal of Political Economy reprinted his article (written almost 50 years earlier, in 1926!) about the relation between inflation and unemployment. The journal retitled it as '*I Discovered the Phillips Curve*...' (*Fisher 1973*). After the crisis in 2008, his views were quoted with great appreciation by many.[3]

[2] For example, see the article on behavioural economics by *Richard Thaler* (*1997*).
[3] In Hungarian literature, *Szentmihályi – Világi* (*2015*) were among those who referred to Irving Fisher and the Phillips curve.

In this essay I have examined some of his original works, but my findings are primarily based on reference papers analysing Fisher's work. We could also say that my writing concerns what economists thought about this – in no way ordinary – economist.

3. The quantity theory of money and the money illusion

Fisher was an important representative of the quantity theory of money. The quantity theory of money states that, just like other commodities, the price (exchange value) of money is also determined by the relation between demand and supply. (This is included in all textbooks on economics and finance today.) If there is relatively a lot of money, it means a high demand for goods and causes an increase in prices. In his work published in 1911, Fisher formulated his theory, according to which the increase in the quantity of money raises prices in a direct proportion. This equation is also called the *Fisher equation:*

$$P = MV/T,$$

where P is prices, M is the quantity of money, V is the velocity of money, and T is the total amount of goods, which is most often captured by the GDP.

Naturally, this equality is barely a logical theorem, of which Fisher was well aware. It is true only *ceteris paribus*, that is, if other things remain unchanged, when velocity and the amount of goods are constant. Yet this not the case in real life, therefore the equation is only partly valid in practice. The effect exerted by the changes in factors, which can be enormous nowadays due to modern technology, must be added to the effect brought about by the changes in the quantity of money (*Humphrey 1997*).

Fisher believed that people were afflicted by *money illusion*. They cannot see the amount of goods they can buy in the future for their money. Money illusion can be captured very well by a quotation – the words of an Israeli diplomat (based on the above-referred work by Thaler), "That dollar is an extremely unstable currency; one month it is worth 100 Israeli pounds the next month 200..." (*Thaler 1997:440*). Therefore, he was thinking about creating a "stable" currency that retains its value, its purchasing power, compared to a certain basket of goods. We should not forget that the monetary system of the time was the gold standard. According to his proposal, *the gold content of the currency should have been modified in order to mirror the price changes on a basket of goo*ds. This was a revolutionary idea. However, the world of finance firmly insisted on a fixed weight in gold of the currency. Bankers believed that Fisher's proposal might cause a loss of confidence in the dollar. They worried about the stability of the banking system. For many decades, financial governments resisted abandoning the gold standard, despite the fact that the convertibility of currencies into gold had practically ceased to

exist domestically in every country after World War I, and remained present only in international settlements (*Antalóczy – Botos 1990*). Then the devaluation competition of the 1930s made it utterly formal. Finally, in 1944, the Bretton Woods Agreement brought about the fall of the gold standard: the convertibility of currencies to gold ended, only the dollar remained pegged to gold, and only for central banks. (Later it had to be abandoned too, since at the beginning of the 1970s the French tried to exchange their dollar reserves for gold at the Fed at the level of central banks. The USA, however, did not want to lose its gold reserves.) Under the Jamaica Accords, theoretically no currency has been pegged to gold since 1976. The monetary policies of central banks are obliged to provide the value and purchasing power of the money created. In recent decades, combating inflation has been the main task of central banks.

On monetary policy, *Knut Wicksell* (*2010*) was Fisher's major theoretical rival. They are usually contrasted, as Fisher placed the emphasis on changes in the quantity of money and its influence in the relationship between money and prices, while Wicksell began with the real economy. However – as explained by an American central banking expert, *Humphrey* (*1997*) – their models may not have been as dissimilar as often thought. Humphrey highlights that both of them *regarded an increase in the quantity of money indispensable* for price level changes. And this is their common ground. To put it in another way, demand must be "monetised" by all means.

The main point of Fisher's *theory of interest* is that since real and nominal interest rates are different, the real interest rate equals the nominal interest rate minus the expected inflation rate, provided the latter is not too high. According to Fisher's concept, the notion of a natural (neutral) rate is important in inflation-adjusted schemes. In inflation expectations, efforts must be made to keep the real interest rates stable in order to promote savings and investments. His theory constitutes the basis for regarding the management of inflation expectations as the main – although not exclusive – goal of monetary policy. However, some opinions argue that – in the light of Schumpeter's and Keynes' works based on a monetary approach (*Ábel – Lehmann 2020*) – this idea based on real analysis must be treated with reservations. Analysts (such as *Tymoigne 2006*) point out that this perception of the real rate is irrelevant when resolving current macroeconomic and microeconomic problems as market players are much more motivated by nominal factors including financial power, liquidity and solvency than by purchasing power in their decision-making.

4. 'Debt deflation'

Fisher was right to see that inflation was not the only risk. Deflation is just as dangerous as inflation. In his theory of "debt deflation" he explained that *recessions and depressions are due to the overall level of debt rising in real value because of deflation.* In that case, people default on their debts, mortgages, and consumer loans. They are struggling in the endless rat-race of the debt trap. Bank assets fall because of bankruptcies, and the value of their collateral decreases. There is a *reduction in lending* as well as in spending, thus demand also declines. The economy sinks into depression.

Fisher focused on *the phenomenon of the crash of financial markets* and how devastating the effect of contracting markets and the ensuing downward spiral is. This is because neither households nor businesses resort to lending, and thus activity in the economy as a whole declines.

In recent decades, Fisher's ideas have enjoyed a resurgence among economists, both in mainstream economics and in the heterodox school. Special mention must be made here of the work of *Hyman Minsky*[4] and *Ben Bernanke*[5], who drew from Fisher's ideas.

Hyman Minsky (*1986*) held that, over a prolonged period of prosperity, investors take on more and more risk until lending exceeds what borrowers can pay off from their incoming revenues. At that point, they are forced to sell even their non-speculative positions. A severe demand for cash is created, a spiral process starts, which leads to an event that has come to be known as a "Minsky moment", when the volatile economy is heading for a crisis. This is a process leading to bubbles, and *Fisher* also presented how they burst. This is why Minsky emphasised the necessity of state intervention and regulation, as well as the strengthening of the Federal Reserve System's role as a lender of last resort. But he did so in the 1980s, in the era of deregulation! So he suffered a similar fate as Fisher did in his time: his proposal was not timely, and nobody listened to him. Minsky's truth was only acknowledged afterwards, following the crisis of 2008.

When he was an academic researcher, *Ben Bernanke* wrote an article in 1983 on the explanation of the Great Depression. In this article, he created the missing link between Fisher's theory of *debt deflation* and the dramatic drop in nominal income revenues, i.e. the crisis. The explanation is the *credit crunch*, a sudden decline in lending activities. Theoretically, a drop in prices channels funds to lenders; but

[4] For more details on Minsky, see *Desmendt et al.* (*2010*)
[5] *Deflation: Making Sure "It" Doesn't Happen Here*. Before the National Economists Club, Washington, D.C., 21 November 2002. https://www.federalreserve.gov/boarddocs/speeches/2002/20021121/default.htm. Downloaded: 15 November 2021.

instead of benefiting from it, this process harms lenders, i.e. banks. Bankruptcies erode the value of receivables in banks' balance sheets; the riskiness of collateral reduces the willingness to lend, and a credit crunch – a cash crunch – emerges. This leads to a contraction of aggregate demand, and the reduction of consumption and investments.

Later, as Chair of the Federal Reserve, Ben Bernanke took this theory into account when managing the 2008 crisis. He has most definitely used Fisher's theses in practice.

5. The Chicago plan

Fisher was one of the first and most significant advocates of *a banking system based on the* so-called *100 per cent reserve plan*. This was the so-called *Chicago plan.* Under the plan, creating money through commercial banks would be impossible as it would require 100 per cent reserves on deposits at the central bank (*Allen 1993*). Today, the Modern Monetary Theory is also based on this idea (*Botos 2020*).

The truth, however, is that this practice "had already been invented". After World War II, in socialist planned economies (including Hungary) *only the central bank was allowed to create money.* The central bank did actually create money, showing the amounts required by the plan of the people's economy simultaneously on the asset side and on the liability side of its balance sheet. It was not a 100 per cent reserve of course, since commercial banks did not even exist. A two-level banking system was not established in former socialist countries until the regime change. (In Hungary, it was established a bit earlier, in 1987.) After the regime change, former socialist countries adopted the western model as part of the market economy transition, and after 1990, they restored the two-level banking system, in which money is created by commercial banks through credit (which is followed – if necessary – by the creation of high-powered money by central banks.) In countries where there are developed financial and capital markets, banks always acquire the necessary central bank money. (The better rating a bank's assets have, and the better capitalised a bank is relatively speaking, the cheaper it is for it to raise funds from the financial market if necessary.)

The fundamental argument for money creation by commercial banks was that banks could provide a flexible supply of money for the economy due to their interest alignment frameworks. They have an interest in creating money for reasonable projects that turn out to be profitable. So money does not get stuck in circulation, there will not be more of it than the required amount, and it does not trigger inflation, since created money is withdrawn from circulation when credit is repaid. However, central banks were supposed to *be able to regulate* the amount of money that can be created.

Unfortunately, the global financial crisis of 2008 proved worldwide that this was not the case. The decision-making mechanism of banks is not a perfect guarantee that reasonable decisions are made at all times and the amount of money actually required is created. Banks have given money to finance a lot of speculative transactions as well. Central banks were unable to effectively limit the amount of the money created (*Turner 2015*). Excess money inflated the real estate bubble, i.e. asset prices.

Finally, a massive recession emerged in 2008, similar to the great Depression of 1929–1933. When the real estate bubble burst, "debt deflation" occurred, a contraction of demand to such an extent that the USA could only prevent its crisis-generating effect via rampant money creation by the Fed (and with heavy fiscal assistance). This focused attention on Fisher's work again.

6. Fisher's relevance

After the crisis of 2008, the number of references to Fisher and the articles dwelling upon his theories increased[6]. *M. H. Wolfson*, who teaches economics at the University of Notre Dame, Indiana and was formerly an economist at the Federal Reserve Board, wrote an article on the current relevance of Fisher's theory even earlier, in 1996 (*Wolfson 1996*). (His comprehensive work on the history of crises was published two years before writing the article, in 1994.) He indicated how dangerous debt deflation was as early as the mid-1990s). It means that the prices of real estate (apartments, houses) serving as collateral for credit also fall when there is a general decrease in the price level. If this is prolonged, after a while the collateral will not be sufficient to cover the outstanding loan amount and borrowers will become unable to repay their debt. They go bankrupt, so banks start to sell the real estate serving as collateral. This further reduces prices in the housing market. The economic consequences of this self-reinforcing process can lead to a crisis. Even as early as the 1990s (during the bailout of Savings and Loan banks) only state intervention could prevent the signs of the crisis deepening, which had appeared according to Wolfson.

In 2013, A. O. *Nakamura* (*2013*), a Professor at the University of Alberta, said Irving Fisher's 1911 book can help us understand *the leading up to the crash*, especially on the supply side. In the 1960s and 1970s, when Fannie Mae and Freddie Mac, two enormous, federally backed home mortgage companies, could not unload their long-term fixed mortgages on investors, government officials created mortgage-backed securities (CDOs) with financial innovation. These led to CDSs, which ultimately had a disastrous effect on the financial markets. *The root of the problem*

[6] Google Scholar found only a few citations in 2002, while in 2013 there were almost 330 referring to Fisher (*Quiviger 2019*).

was that the system of financial institutions had become less and less transparent for supervisory bodies. The issuances of securities admittedly had to comply with the requirements of rating companies recognised by the state but – since formal requirements were met – the permission was ultimately always granted by the large rating institutions.

Actually, this latter fact, i.e. a certain laxity of supervision, can be seen on a wide scale. For example, *Brooksley Born*, the head of the Commodity Futures Trading Commission (CFTC), fought an epic battle pushing for the regulation of the derivatives market (*Carney 2009*), but former Fed Chairman *Alan Greenspan*, did not stand by her, saying there was adequate regulation in place. Born was repeatedly shut down by policymakers in her struggle with financial lobbyists, and she resigned from office in 1999. A couple of years later, the financial crash, foreseen in due time by Born (together with prominent financial economist and scientist *Raghuram Rajan*[7]), ensued. Thus, Nakamura is right.

R. Shiller (*2011*), a Nobel laurate economist, has also referred recently to Fisher's significance, particularly, in his findings about the purchasing power of money. Fisher advocated indexing so market players could avoid the *money illusion*. Shiller (and others) pointed out that not only *explicitly deflation*, i.e. falling prices, leads to the emergence of a crisis – as explained by Fisher –, but *disinflation*, i.e. the *slowing pace* of inflation also has similar consequences. And that is what happened in the crisis of 2008 too.

What conclusions can we draw from the works of Fisher and his analysts for today's crisis-stricken age?

The most comprehensive analysis of Fisher's legacy and how it can be used in interpreting crises today was written by *Enrique Mendoza*. He began his article on the topic with a Fisher quote[8]. In that, Fisher referred to the fact that all factors causing a crisis, i.e. overproduction, overconsumption, excess capacities, price distortions, overconfidence, overinvestment and over saving are of *secondary significance* compared to the *initial excessive level of indebtedness* and post-crisis *deflation*. *Mendoza* (*2009*) considered it important that the economy had incurred massive debts *before* the emergence of the crisis.

[7] *When Raghuram Rajan proved giant Alan Greenspan wrong*. The Economic Times, 18 September 2018. https://economictimes.indiatimes.com/news/international/business/when-raghuram-rajan-proved-giant-alan-greenspan-wrong/articleshow/65821471.cms?from=mdr. Downloaded: 15 November 2021.

[8] *"In the great booms and depressions, each of the above named factors (over production, over capacity, price dislocation, over confidence, over investment, over saving, etc.) has played a subordinate role as compared with two dominant factors, namely, over indebtedness to start with and deflation following soon after; … where any of the other factors do become conspicuous, they are often merely effects or symptoms of these two."* (*Irving Fisher 1933:341*)

Gauti Eggerston also introduced an interesting notion into crisis analysis. In 2009, when the impact of the financial crisis that erupted in the USA began to be felt, the Fed – learning from the experience of the Great Depression of 1929–1933 – tried to help the economy recover by reducing the interest rate. At that point, Eggertsson came up with the notion of the *paradox of toil*). This wording is similar to the well-known Keynesian notion, the *paradox of thrift.* In fact, we are talking about the case of the Masurian Lakes, that is, the more you struggle, the deeper you sink into the swamp. The more we save, the less we thrive. (That is why Keynes said that the traditional wisdom to save became harmful in the Great Depression.) The more we toil and try to find work *at any cost*, the higher the unemployment rate will be. This view is based on the fact that w*hat is true of the part is not true of the whole.* (If someone stands up in a stadium, they have a better view. But what if everybody stands up?) Thus, the structure, the composition of phenomena is important (*Eggertsson – Krugman 2010*).

Keynes's crisis management was based on the increase of aggregate demand even at the price of the government becoming indebted. Many refer to the fact that the government's overspending cannot be a key to success in tackling a crisis, because how could a crisis stemming from indebtedness be remedied by even higher indebtedness? Krugman, however, points out that different groups of debtors are in different situations and cannot be handled equally. Namely, it is possible that some must save while others must overspend. He believes that a crisis starting from private-sector debts can be halted by a deficit-financed government (*Eggertsson – Krugman 2010*).

Nonetheless, fiscal policy may only be a band-aid. It is more important to identify the causes leading to the crisis, and to manage them via regulation, as Fisher – and later, referring to him, Minsky – also said.

Immediately after the outbreak of the 2008 crisis*, Mendoza* (*2009*) drew attention to the fact that state bailouts alone are not at all sufficient! No one should think that a trillion dollars of fiscal stimulus means back to business as usual. He said, '*trade protection and other similarly "brilliant" ideas floating around need to be opposed',* and '*spending will not stimulate anything, and it has nothing to do with the causes of the crisis or with putting an end to it'.* He pointed out that neglecting regulation had led to the current situation. Changes should not mean general stringency but the unique inspection of specific, innovative financial products. Mendoza referred to the fact that had the wisdom of Mrs. Brooksley Born prevailed, catastrophic CDSs would not have emerged and the crisis of 2008 would not have arisen. In his opinion, the second huge mistake the government made was instituting and enlarging the implicit government guarantee backing the fast expansion of mortgage giants Fannie Mae and Freddie Mac. This made low-quality sub-prime mortgages

a mass phenomenon without transparency, eventually resulting in a disaster. It led to casino-like lending and, as a result, a global financial crisis.

After the crisis of 2008, it was considered that a protracted recession must be prevented by all means. The Dodd–Frank Act, passed into U.S. law in 2010, introduced specific regulatory changes and restrictions to protect consumers and the economy from the consequences of the risky activities of banks and insurance companies, partly by imposing higher capital adequacy requirements and liquidity norms, and partly by authorising the government to take over failing financial institutions, to avoid panic. However, banks received a lot of criticism in the USA for "sitting" on the money granted by the state. In fact, since demand for credit had stagnated in the economy, it was difficult to lend the money provided by the state. Nonetheless, fiscal stimulus and guarantees of the federal deposit insurance corporation (FDIC) constituted the most important measures preventing the deepening of the crisis. The regulatory response to 2008 may be open to criticism, but it did in the end forestall a meltdown of the global financial system, albeit at a considerable and unequally distributed cost (*Schenk 2021*).

The question as to what will be implemented of Fisher's ideas about the banking system – restricting money creation – in the future is still open today. The strengthening regulation of money creation through supervisory methods, however, proves that in this respect his thoughts were forward-looking and feasible. In a lecture in 2009, *Janet Yellen* (referring to Minsky, but indirectly also to Fisher), said, *'It seems plain that supervisory and regulatory policies could help prevent the kinds of problems we now face'*[9]. Today the *limit* to the *quantity of money* that can be created by banks is not constituted by traditional central banking methods but mostly by micro- and macro-prudential regulations.[10]

7. Thaler's opinion

Nowadays *Fisher* is cited not only because of crisis management but also because of other re-discovered theorems of his diverse work. For example, *Richard Thaler*[11] (*1997*) – who was already referred to in the introduction – considered Fisher one of the pioneers of behavioural economics. He pointed out that in his book *Theory of Interest*, published in 1930, Fisher dwelled upon intertemporal decisions. Decisions made in the present affect our future opportunities, since reducing consumption today may increase our consumption in the future. He deduced his theory from *time preference*, i.e. the category of *impatience*. (He used these two

[9] Yellen, J. (2009): *A Minsky Meltdown: Lesson for Central Bankers.* https://www.frbsf.org/our-district/press/presidents-speeches/yellen-speeches/2009/april/yellen-minsky-meltdown-central-bankers/. Downloaded: 15 November 2021.
[10] Exactly the same conclusion was drawn also by *Ábel et al.* (*2019*).
[11] *Neszveda* (*2018*) was also deeply involved in Thaler's work.

terms synonymously.) Fisher outlined a life-cycle model, in which he presented the role of borrowing and lending in "smoothing" consumption. With this, however, Thaler thinks he also anticipated a critique of this model. The savings rate indeed grows as incomes increase. Yet Fisher thinks that the decisions of individuals are also influenced by certain special personal factors. Individuals' impatience greatly depends on the size, time shape, composition and foreseeable risks of the income stream. In direct contrast to the permanent-income theories of savings, Fisher highlights that the poor tend to trust the luck of the future if the all-engrossing need of the present necessities can be satisfied. The smaller the income, the higher the impatience, and the more "a bird in the hand" is preferred to "two in the bush".

Of the so-called personal factors, foresight and self-control are the ones that influence the degree of impatience. Other personal factors include habits, fashion, life expectations, concern for the lives of other persons (i.e. bequest motive). Foresight has to do with thinking and reason, but self-control depends on willing.

Fisher's model can be interpreted as is taught by the introductory materials of Economics; that is, a person might borrow heavily until his marginal rate of time preference is equal to the interest rate, but Fisher always stressed that his theory was based on the assumption of *perfect foresight*, which, as we have also mentioned, is not typical of the world we live in. Besides foresight, there are many irrational elements in decisions, e.g. laziness or procrastination. The influence of fashion is particularly irrational. Therefore, his theory is normative, and not a description of facts. In fact, Fisher's *findings match the principles of the school of behavioural economics.* That is why Thaler referred to him. When learning about Fisher, one should not get bogged down in his equations but go back and read the surrounding text…

8. Summary

Irving Fisher was definitely one of the economists who helped introduce mathematics and statistics to economics and applied them (e.g. Edgewort, Pareto). His diagrams and graphs helped understand economic rationale, but the explanatory text is also very important, as it reveals that elements of behavioural economics do have a major role in economic decisions. Thus Fisher was also a pioneer of the behaviourist trend, and his "debt deflation" theory gives a clear explanation of the 2008 crisis, and also forms a basis for crisis management, i.e. micro- and macro-prudential regulation through tools of banking supervision. Modern monetary theory argues that the activity of central banks should be based on his principles. It is very doubtful whether the total restriction of commercial banks' money creation and returning to lending by commercial banks with 100 per cent reserves can become reality. Nonetheless, the development of money theory and changing central banking policies have become a remarkable phenomenon of our age.

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A Shrimp between Fighting Whales: Lessons from the Economic Convergence of South Korea*

Gábor P. Kiss – Katalin Szőke

Having started as a poor, war-worn agricultural country in the mid-20th century, South Korea is now the world's 12th largest economy. The lesson from the country's economic convergence is that export-led growth, strong corporate competitiveness and significant research and development expenditure are essential to avoiding the middle-income trap. Relying on its strong education system, South Korea managed to become a key player in many high-tech industries. However, the challenge for the future is that income inequalities exceed the average of developed countries, and the persistently low fertility rate results in an ageing society. In addition, household indebtedness exceeds 100 per cent of GDP and around half of the housing loans are variable rate loans, which jeopardises the stability of the financial system.

1. Geopolitical situation

Korea's situation is well summarised by the Korean adage referring to it as 'a shrimp between fighting whales'. Traditionally, this refers to the geopolitical position where the neighbouring China and Japan may be regarded as great powers compared to it, with considerable influence over it. Korea's centuries-long isolation was broken by foreign powers. Between 1876 and 1905, it fought with three great powers, i.e. with China, Japan and Russia, which intervened in its internal affairs while at the same time battling with each other. In 1905, Korea became a protectorate of Japan, and then a colony of Japan between 1910 and 1945. In 1945, the United States and the Soviet Union agreed to occupy Korea jointly, and the boundaries of the zones were drawn at the 38th parallel: the northern part became a Soviet sphere of influence, while the southern part was under the control of the USA. China also participated in the conflict of the great powers, and the devastating Korean War between 1950 and 1953 preserved the division. South Korea established economic relations with Japan in 1965, receiving compensation for its colonial past. South Korea joined the Vietnam War in support of the United States. In 1992, a turning point was also reached with China, with the establishment of diplomatic and economic relations (for an overview of this, see *Muraközy 2020*.)

* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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Korea's geopolitical role has strengthened since World War II. The USA provided USD 12.7 billion, at current prices, in economic and military aid to South Korea over 30 years (1946–1976), which is of similar magnitude as the Marshall Aid to 17 European countries over 4 years (1948–1952) in the amount of USD 14 billion.

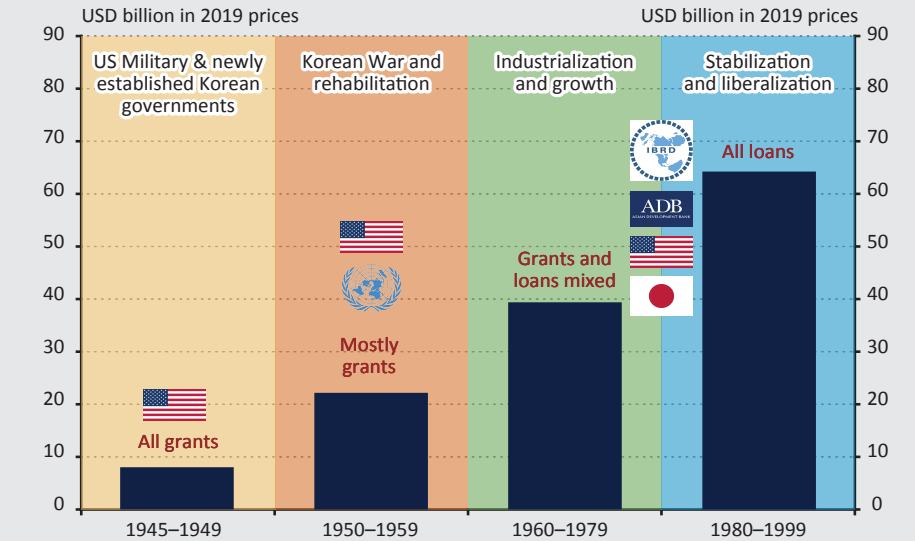
2. From development state to market economy

South Korea's economic policy developments can be divided into three phases; the first lasted from the wars to 1980 with the predominance of the state, the second between 1980 and the 2000s – a period of liberalisation and crisis, and the third, post-2000s period, characterised by the gradual development of a market economy and welfare state after the Asian financial crisis.

In 1945, the Japanese industrial capital (defence industry together with metallurgy, extractive industries, chemical industry and power generation, satisfying the needs of the first) on Korean territory was taken over by the state. This was gradually privatised by keeping in national ownership, creating the privately-owned Korean groups of companies known as the 'chaebols'. The double-digit twin deficit of the initial period was funded by foreign aid and loans (*Figure 1*). In 1961, the Economic Planning Board with broad budgetary powers was established, which lined up capitalist planning for conscious economic development. The state levied very low taxes,[1] and subsidies were realised not so much on the traditional expenditure side, but rather through preferential, targeted lending, the real cost of which appeared much later. In 1954, the Korean Development Bank was established under the Ministry of Finance, the lending activity of which was financed by the Korean central bank. During the period of great development, the central bank actively cooperated with the government and played a role in the development of the economy through loans provided in cooperation with the banking sector. Opening to foreign countries commenced from 1967, setting the steady objective of "exports first". As the weight of large state-owned enterprises declined, the role of the chaebols became increasingly important from the 1970s.[2] They were also involved in the realisation of government objectives, rewarding good performers through funding and punishing bad ones. The possibility of state-owned enterprises going bankrupt made all the difference compared to the socialist planned economy, which also applied the soft budget constraint.

[1] In the late 1950s and early 1960s, tax revenue was 8–11 per cent of GDP. This rate rose to 13–15 per cent in the next ten years.
[2] For example, Samsung, which is now the 3rd largest company in the consumer electronics sector.

Figure 1
Official foreign assistance and loans granted to Korea

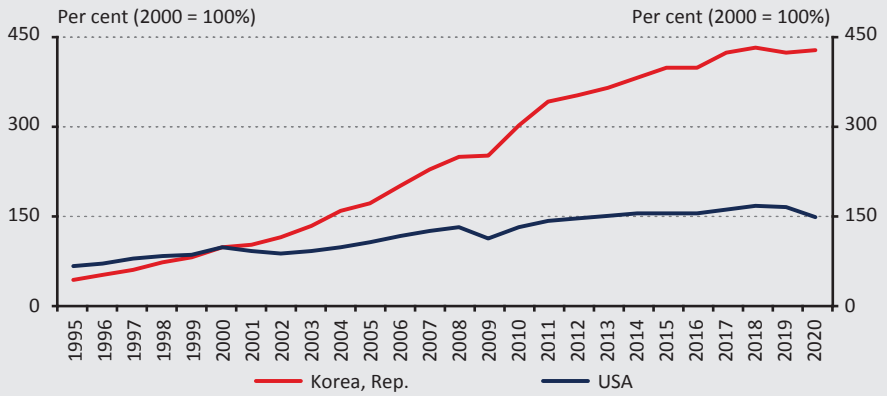


Source: Calculated on the basis of KEI-KIEP (2015)

From 1980, there has been gradual financial and trade liberalisation. Official development assistance[3] has been transformed into preferential public[4] and commercial loans (*Figure 1*). The budget balance turned from the former persistent deficit into a persistent surplus. The government remained active, but tried to operate in a sector neutral way, and in 1994 the Economic Planning Board was abolished. In 1994, the central bank launched a credit incentive programme, providing credit institutions with a preferential credit line for financing SMEs at an interest rate of 0.25 per cent. The seeds of a welfare state appeared. While in 1978 only one tenth of the population held a health insurance policy, by 1990 almost the entire population was covered, but private healthcare had a significant weight.

[3] According to the OECD's definition, this includes ODA (Official Development Assistance) and to a lesser extent OOA (Other Official Assistance). (See: https://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/officialdevelopmentassistancedefinitionandcoverage.htm. Downloaded: 5 May 2022.)
[4] Mainly OOA-type loans with grant (non-reimbursable) elements less than 25 per cent.

Figure 2
Changes in the export volume index between 1995 and 2020



Source: World Bank

Although liberalisation proceeded at a rapid pace, the combination of the poorly regulated and partially government-controlled banking sector and liberalised capital inflows during the 1997 Asian financial crisis led to swift capital outflows. This was counterbalanced by a crisis package of the International Monetary Fund (IMF), which was conditional on the usual tight fiscal and monetary policies. The crisis and the austerity measures resulted in a wave of bankruptcies. With a view to achieving stabilisation, nominal and real wages were significantly reduced. As part of financial system reform, state control of the interest rate and the exchange rate was abolished between 1998 and 2000, and the central bank moved to inflation targeting with a floating exchange rate from 1998.

In 2000–2001, 21 per cent of GDP was allocated to stabilising the financial institutional system.[5] The loss suffered by the banking sector as a result of the crisis was so high that the state asset manager spent one-quarter of GDP on the buy-out of bad debts after the crisis (*Akama et al. 2003*).

The third key period began in the early 2000s and continues to date. This is characterised by a gradual strengthening of the market economy and welfare system and a huge increase in competitive exports (*Figure 2*). Drawing lessons from the Asian financial crisis, the reformed financial system performed well during the 2007–2008 liquidity crisis, with no banking crisis. Currently, South Korea has one of the most developed financial systems in Asia, with a banking sector of more than 150 players and a balance sheet total of EUR 2,411 billion. South Korea's

[5] This was financed by government-guaranteed securities, half of which had to be assumed by the state at maturity, and thus it appeared in the debt with a delay upon maturity.

banking sector has developed dynamically in recent years, and even the coronavirus pandemic did not interrupt the impetus in lending. The concept of the development government is gradually being left behind, but it has not yet fully disappeared. The budget surplus and low public redistribution (around 20 per cent of GDP) remained in place.

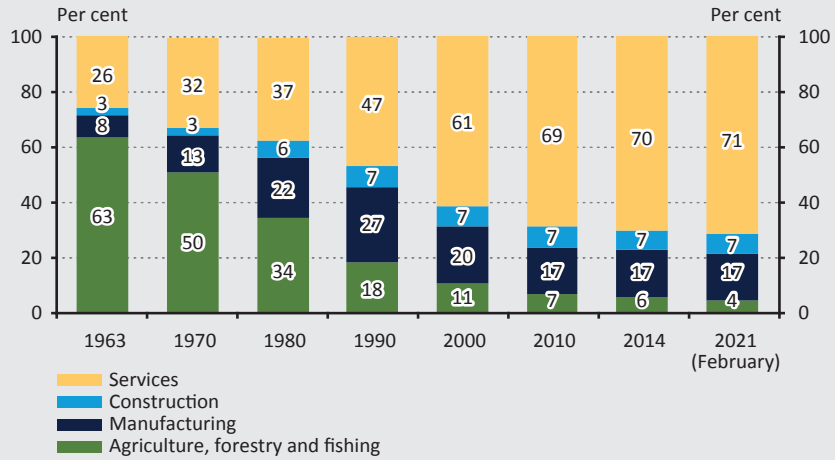
While the ratio of highly skilled labour force was below average in the 1990s, it is now at an outstanding level even by international standards. The high quality of Korean universities is demonstrated by the fact that 15 South Korean universities are included in the top 500, 6 of which are in the top 100: this is the 4th highest figure in the world. Higher education institutions have a high ratio of science graduates, at around 30 per cent in 2018, ranked 3rd among OECD countries. South Korea is among the top 5 countries in all areas of the PISA tests of basic applied skills.

3. Factors of economic development

The development state initially developed in a capital-intensive way, fostered first by large volumes of foreign aid and later by preferential loans, and to a lesser extent, by FDI inflows. Since the mid-1990s (*after the Asian financial crisis*)*, growth has been increasingly based on intensive factors, i.e. on productivity, supported by high R&D expenditure and an advanced education system.* Economic development was fostered by a steady increase in the headcount of the labour force, which, in addition to population growth, was also facilitated by the rise in women's rate of employment from 1985 (*Eichengreen et al. 2012*).

In the period of the development state, until 1980, the ratio of agricultural workers fell by almost 30 percentage points, with half of them flowing to manufacturing and half of them to the service sector. During the decade of liberalisation, the ratio of agricultural workers fell by a further 16 percentage points, and one third of them moved to manufacturing and two thirds to services. Finally, the weight of agriculture has gradually decreased by another 14 percentage points over the period of market economy, while automation also reduced the weight of manufacturing by 10 percentage points, resulting in a combined increase of 24 percentage points in services (*Figure 3*).

Figure 3
Structure of employment by sectors in South Korea (1963–2021)

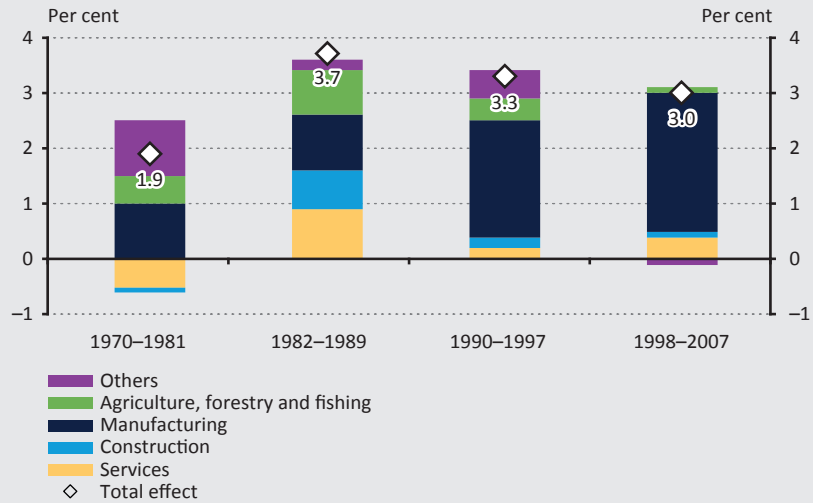


Source: Sakong – Koh (2013), South Korea Bureau of Statistics

This shift in proportions is of particular importance for growth because productivity varies widely between the individual areas (*Figure 4*). As a result of the land reform after the Japanese occupation, large estates were distributed, which led to an agricultural production of lower efficiency. Modernisation and the failure to increase productivity made these small farms unviable. The economy was characterised by indebtedness in the short term and by a major flow from agriculture to services and industry in the long term. However, the structure of the services sector is not optimal, as too many people work in traditional low-productivity service sectors such as retail, wholesale and catering, which prevents the development of high-productivity services such as communications, healthcare, financial intermediation and business services. By contrast, labour productivity in export-led manufacturing has been growing steadily and significantly, reflecting the structural transformation of industry (from light through heavy industry to high-tech).

In the Country Complexity Rankings, which also incorporate the diversity and uniqueness of exported goods, South Korea has steadily maintained its position as the 4th most complex economy in the world. The Country Complexity Rankings intends to capture the knowledge capital present in the countries, for which the trade structure and characteristics serve as tools.

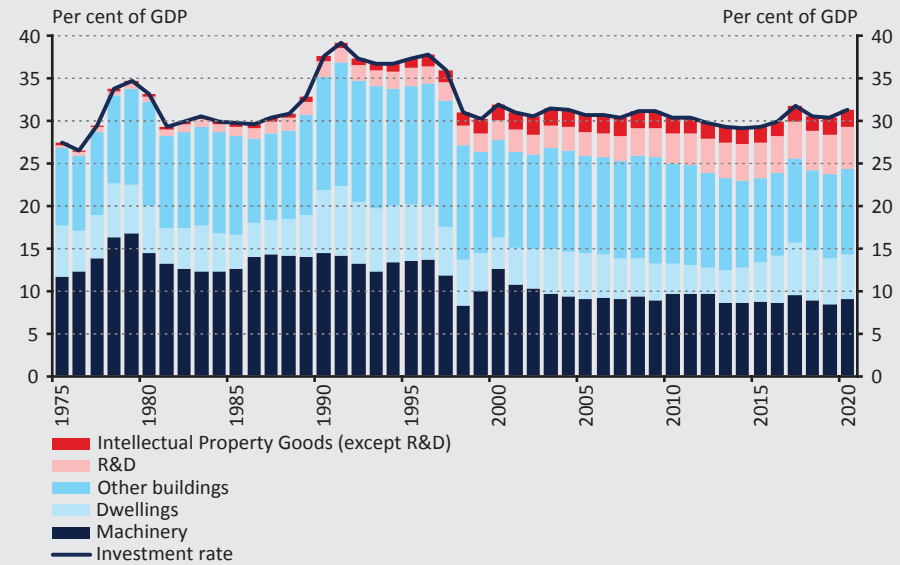
Figure 4
Labour productivity growth by sector



Note: Subtotals and totals in the basic data do not sum exactly due to rounding.
Source: South Korea Bureau of Statistics, Bank of Korea, Eichengreen et al. (2012)

South Korea's investment structure is ready to meet future challenges as it has an increasing ratio of "smart investments". Machinery investment is increasingly being replaced by R&D and the accumulation of intangible assets (*Figure 5*). Research expenditures shifted from the public to the private sector; in 1980 the weight of the public sector was two thirds, while it was only 12 per cent in 2015. Total R&D expenditure as a percentage of GDP has doubled since 1996 and is now one of the highest in the world. In 2021, Korea became the world's most innovative country, according to the Bloomberg Innovation Index.

Figure 5
Structure of investments in South Korea



Source: OECD

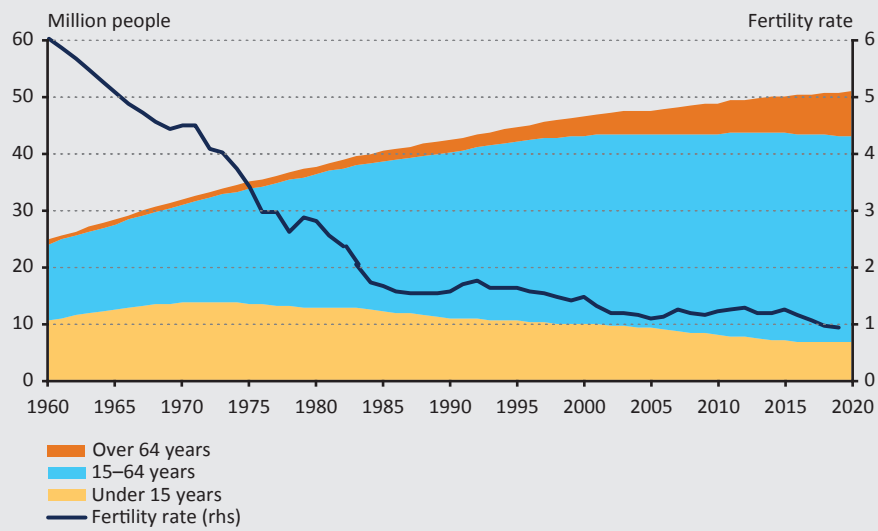
Export-led growth, high corporate competitiveness and significant research and development expenditure are essential for avoiding the middle-income trap. South Korea has built on its strong education system to become a key player in many high-tech industries. The structure of the high investment ratio has gradually shifted towards intangible assets and research and development. Most of the economic convergence was achieved under a balanced budget.

4. Challenges and risks

By now, the chaebols that were once the key drivers of growth, may hinder growth by overshadowing the SME sector. SMEs, which provide a large proportion of the country's employment, are faced with difficulties in growing, as chaebols often use their monopolistic influence to squeeze small and medium-sized enterprises out of the market. The current economic role of the chaebols is well reflected by the fact that they account for more than three quarters of the market capitalisation of all Korean firms, while their ratio in the labour market is only 12 per cent. There is also a significant wage gap, with the average salary of workers in the SME sector at only 63 per cent of those working in chaebols.

Outstanding borrowing of households doubled between 1998 and 2017 (from 86 per cent to 180 per cent of disposable income), mostly burdening the middle class. The high ratio of privately-financed education and healthcare may generate major expenditure for households, as the ratio of those participating in private education in the junior and senior sections of secondary school is 22 and 54 per cent, and at the university and college level is 78 and 96 per cent, respectively. Half of middle-income households become indebted debt month after month, and this accounts for the largest part of the debt (*Lee 2017*). About half of housing loans are variable rate loans, which jeopardises the stability of the financial system.

Figure 6
Population and fertility rate (1960–2020)



Source: OECD, Sakong and Koh (2013), South Korea Bureau of Statistics

Due to the social inequalities exceeding the average of developed countries and rising further, the budget may need a more efficient social system. Whereas in 1990 pension entitlement covered only 15 per cent of workers, it now fully covers permanent employees, while it does not exist for half of part-time workers. Due to the slow expansion of the pension system, as regards elderly people, Korea has the highest proportion of population living below the poverty line among the OECD countries.

The fact the fertility rate has been below the reproduction level for almost 40 years and fell below 1 by 2020 – thereby reducing the proportion of people of working age in the next decades, while pension payments will continue to rise – foreshadows a demographic problem and the ageing of society (*Figure 6*).

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Discussion Paper for the Sustainability-Oriented Renewal of Economics*

Gábor Meizer

Gergely Baksay – György Matolcsy – Barnabás Virág (eds.):
Új fenntartható közgazdaságtan – Globális vitairat
(New Sustainable Economics – Discussion Paper)
Magyar Nemzeti Bank, Budapest, 2022, p. 251
ISBN: 978-615-5318-51-1

Re-organising the way societies and economies work in terms of sustainability is now a vital interest, in order to both address the complex challenges of the 21st century and make more permanent, effective and wider use of development opportunities. Although sustainability initiatives are beginning to gain momentum around the world, a more integrated, coordinated and focused approach is needed to achieve a sustainability turnaround, transforming sustainability into a guiding principle for economic thinking and policy action. The authors of the Discussion Paper[1] of the central bank of Hungary (Magyar Nemzeti Bank, MNB) have undertaken nothing less than to explore the possibility of renewing economics from a sustainability perspective, in order to support these reform processes, also building on domestic economic policy experience, and to launch a discussion of global significance on the synthesis of sustainability considerations.

Thanks to its integrative role in making decisions and shaping the future, economics can provide an adequate framework for achieving sustainability goals. To do so, however, the discipline needs to evolve both theoretically and in its application. Although the main issues addressed by economics, such as improving public welfare and the optimal management of resources, can be considered constant, the approaches to these issues have changed from one period to another, typically induced by crises. This was no different during the Global Financial Crisis of

* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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The opinions expressed in this book review are those of the author.

[1] The Discussion Paper and the extended studies underlying its chapters are available on the MNB website (https://www.mnb.hu/web/ujfenntarthato), which also provides a platform to contact the authors for a broader discussion of the content.

2008–2009, which was a stark reminder of the unsustainability of the excessive financial market liberalization. While the series of shocks redirected a wide range of economic policies back towards rebalancing measures and highlighted the value of targeted growth-enhancing measures, the number of countries that have recognised the importance of a sustained commitment to structural reforms has remained small. Despite widespread economic growth in the 2010s, macro-financial fundamentals eroded in many dimensions, further exacerbated by the Covid-19 pandemic and subsequently the fragmentation caused by geopolitical tensions, while the macro-critical implications of the climate crisis are also rapidly mounting. A holistic rethinking of policies from a sustainability-centred perspective is essential to address multiple and interconnected challenges, but previous economic theories do not provide a comprehensive and adequate response. Both sustainability policies and the lack of such have a crucial impact on the ability to ensure price and financial stability, and thus deserve increased attention from central banks as well.

The Discussion Paper is based on an essay by György Matolcsy, Governor of the Magyar Nemzeti Bank. In his paper, he identifies 36 contexts within the framework of which a new sustainable economics can be built. The importance of the essay lies in the fact that it structures various insights on sustainability, which so far typically appeared on the margins of economics, with the relevant experience of economic policy and the relevant observations of co-disciplines in an arc of thought, and draws new conclusions – paying particular attention to the opportunities and risks arising from global megatrends that actively shape the future – based upon which the fundamentals of a renewed economic thinking can be developed. The broadening, deepening and logical linking of conclusions on sustainability is critical at a time when global debates on sustainability are actively taking shape, which adds to the importance of the paper.

The essay argues for a shift away from growth models based on quantitative factors towards a knowledge-based and innovation-driven growth model, which is organised around the idea of sustainability, and which looks beyond the redefined spatial structure and challenges of the present to a broader time horizon of the future and the public interest. While material resources are limited and in many cases can be consumed along with negative externalities, knowledge is constantly expanding through its “consumption”, and thus policies focused on expanding knowledge offer an unparalleled opportunity to make societies and economies function more sustainably through continuous development. However, the key to realising this potential and putting the principle of increasing returns into effect is to unlock bottlenecks, such as fostering talent as well as steering new technologies and digitalisation in sustainable directions. In the author’s view, this is what the 21st century is all about. Policies should, inter alia, increasingly focus on family and public interest approaches, guaranteeing access to the basic goods of life and

providing frameworks for circular economy, which also require a rethinking of the roles of states, with stronger stabilising, incentivizing and developmental characters. The author places human and community relations at the heart of sustainable economics as a whole, while proposing a holistic approach to sustainability issues by integrating relevant findings from the social and natural sciences. Given that social and economic relations are dynamically changing, with complex interactions and non-linear sequences, the continuous measurement and the transformation of these relations into data, a deeper understanding of network and platform organizational structures, and the feed-back of empirical results into theories are also of high priority, according to the author.

The Discussion Paper's 23 chapters aim to address the main issues in the arc of thought of this essay, such as (i) why there is a need to renew economics from a sustainable perspective; (ii) what the resources of the new economic model are; (iii) how "value" is produced in the 21st century; (iv) what the optimal balance between market and state is; and (v) what the deep structures behind economies are. The findings of the research papers included in the Discussion Paper can be summarised in the following points.

A common trend across a wide range of countries is the decline in growth potentials and the constraints to growth becoming more effective; among other things, this linked to key factors such as demographic megatrends, the rising burden of over-indebtedness and the negative effects of climate change. At the same time, humanity is living through a period of technological revolution that is more dynamic than ever before, opening up unprecedented opportunities for the effective reorganisation of economies and societies, but also posing reallocation risks in a period of so-called creative destruction. Given the complexity of these structural changes, it is essential to enhance multidisciplinary approaches by combining economics with disciplines such as network science, information technology, quantum physics, behavioural science and culture. The authors argue that systemic changes must be accompanied by the evolution of approaches in social sciences and a paradigm shift in economics.

As a key message, the Discussion Paper puts knowledge and value creation from knowledge at the heart of sustainable economics. In addition to ensuring access to information, experts therefore call for a reform of the education systems to unlock talent and creativity, and improve skills. They also point out that, in addition to the quantity of investment, the structure and quality of investment are also crucial. With due consideration to the opportunities of the digital transition, the critical importance of green programmes and the cornerstones of inclusive growth, they propose smart investments that foster both competitiveness and economic resilience.

While technological transformation can provide the main source of productivity growth, from a sustainability perspective it is also essential to encourage the widespread adoption of technological innovations and to close the digital divide. The combination of economic development, geopolitical changes and technological transformations also creates the opportunity for the further development of monetary systems, in which the still evolving concept of central bank digital currencies may play a key role. Increasing financial inclusion and efficiency, making economies more dynamic and resilient, are all identified as key aspects of the money of the future. There is also a strong need for well-diversified, balanced and widely accessible financing structures to promote sustainability goals.

Visions for a sustainable future can only be envisaged if the balance between humanity and nature is restored. This is a global challenge that calls for unprecedented cooperation in the international community. Carefully calibrated green programmes for climate protection, climate adaptation and transition risk management are needed, which also pay due attention to country-specific factors. In the section of the Discussion Paper on green policies, there is also an important call for a stronger emphasis on measures to encourage the green energy transition, alongside measures to penalise pollution. The Discussion Paper also highlights ways of effectively connecting supply and demand, including the characteristics of the platform economy, the sharing economy and the circular economy.

Advances in technology not only translate into an enormous increase in the amount of data, but also provide opportunities to process information in new ways. The authors are calling for the launch of a data-driven economy, which as a fundamental part of decision-making, will allow for significant efficiency gains and could thus become a key part of value creation. This requires both increased public involvement and cooperation across society. The authors stress the importance of measuring economic balance and growth more broadly, rapidly and reliable than today, which requires not only new approaches but also new methods and metrics. There is also a need for carefully designed and implemented data strategies that allow for better use of data with appropriate data protection safeguards.

The balance between the state and the market is a central issue in economics through the ages. According to the authors, a reorganisation of public policy towards sustainability is essential to achieve sustainability goals. Tax policy is a priority, which experts say must be transparent, family-friendly, growth-promoting, digital and green at the same time. The Discussion Paper points out that the cooperation between governments and market participants is crucial for the development of innovation ecosystems that support growth as well as the sustainable financing of economies. In this context, based on the example of the MNB, the authors also argue that central banks can be catalyst for green and other sustainability initiatives while achieving their primary mandate. Further, states have a crucial

role to play in creating a framework for inclusive growth, which also requires the promotion of social mobility. Since the high levels of income and wealth inequalities can significantly limit people's potential, the authors also explore policies to reduce inequalities. At a time when networks are becoming increasingly complex, building trust among economic actors is also of particular importance, and this issue is specifically addressed in the Discussion Paper, which points out, among other things, the role of social contracts in the success of economic policy reforms.

Understanding the deep structures behind economies is essential to underpinning sustainability initiatives. A key message of the Discussion Paper is that responsibility for the future is fundamentally a question of values, and the growth of outputs must therefore be in line with the enduring values of societies. But to do so, economics must also move beyond abstract models by reinforcing values-based character traits. In terms of demographic trends, the authors point out, among other things, that the globally growing populations but locally ageing societies induce fundamental changes, ranging from the transformation of the labour market and the changing consumption and savings patterns to the reassessment of the sustainability of large public care systems. The last chapter of the Discussion Paper deals with the tectonic shifts resulting from the emergence of a multipolar world order and shows how a "geofusion" approach can help us understand global macroeconomic trends.

While efforts to rethink economics for sustainability have been underway for at least 50 years (this is when a seminal report entitled *The Limits to Growth* was published), these initiatives have so far failed against the doctrines of mainstream economics. As the Discussion Paper points out, a renewed approach to economics may be able to provide an appropriate framework for these sustainability efforts, but this requires synthesising the relevant considerations in a new and constantly evolving theory. The Discussion Paper provides an exceptional logical framework for this debate of global significance, while at the same time containing a number of findings worthy of further reflection, and is therefore recommended not only for economists but for all readers who are interested in sustainability.

Good Reasoning on Global Warming*

David R. Henderson

Steven E. Koonin:
Unsettled: What Climate Science Tells Us, What It Doesn't, and Why It Matters
BenBella Books, Dallas, 2021, p. 306
ISBN: 978-1950665792

Introduction

We are told almost daily that the earth will suffer from global warming. Why do we need to be told? Because most of us aren't scientists spending hours poring over scientific papers. That information must come from others. But what do those others know? And what if the information we are receiving is incomplete, or severely misleading?

One question that particularly matters for an economic publication is: Will global warming badly hurt economic growth?

In his book *Unsettled*, *physicist Steven E. Koonin* addresses all these issues. Koonin has strong credentials. He was vice-president of Caltech in California and later was undersecretary for science in President Obama's Department of Energy. According to Koonin, many climate scientists and many members of the media have gone beyond what the science can tell us when they predict catastrophe unless we quickly and drastically cut our emissions of carbon dioxide.

His book is full of important, factual information and insights. One of his main messages is that there is much more uncertainty about where the climate is headed than many climate scientists and even a higher percentage of people in the media are willing to admit. And the good news is that the long-term economic effect of even substantial global warming will be small.

* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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Among the scientific sources Koonin uses to make his case are the very reports by the United Nations' Intergovernmental Panel on Climate Change (IPCC) that reporters draw on. The difference is that Koonin spells out what the reports actually say, whereas reporters tend to draw selectively from the reports in ways that – according to Koonin – mislead the reader. It would probably come as a surprise to most people, for example, that the oceans are still rising slowly, that forest fires have not become more common, and that hurricanes are not more frequent than they were 100 years ago. Koonin, who agrees that the earth has warmed and will likely warm further, considers the various options for slowing global warming. He shows how hard it would be, especially in developing countries, to reach net zero emissions by 2050 or even by 2075. So he considers various alternative ways of slowing global warming and also the idea of adapting to global warming.

Our Knowledge of Warming

Probably the most important chapter for teaching us about global warming is Chapter 1, "What We Know About Warming." Koonin writes, "The world's oceans are both the most important and the most problematic piece of the earth's climate system." The reason is that they "hold more than 90 per cent of the earth's heat and are its long-term memory." The problem is that it's even harder to get data that are precise and comprehensive enough to detect climate change. Nevertheless, Koonin seems to accept the idea that global temperatures have risen by about 1 degree Celsius since 1880. His scepticism is less about the change in temperature and more about the causes. He agrees that it could be caused by humans, but reminds the reader that "there are powerful natural forces driving the climate as well." What are these forces? He doesn't specify, but does note that temperatures from 127,000 to about 100,000 years ago were 2 to 3 degrees Celsius higher than today. It's hard to attribute that to humans.

Modelling Climate

In Chapter 4, entitled "*Many Muddled Models*," Koonin explains in detail how climate models are formulated. Modellers start by "covering the earth's atmosphere with a three-dimensional grid." The models typically have between ten and twenty grid boxes that are stacked on top of a surface grid of squares. Each square is typically 100 km by 100 km. The modellers then use laws of physics to calculate how air, water, and energy move to neighbouring grid boxes over very short periods, often as little as ten minutes. Once the modellers input the data, they let the model run on a powerful computer. Koonin states that the smaller the grid squares, the longer the computer takes to run. A computer simulation that would take two

months to run if it had 100 km grid squares would take more than one hundred years to run if the grid size were dropped to 10 km.

How do the various simulations perform? Koonin writes, "[M]odel results differ dramatically both from each other and from observations." Unfortunately, he notes, you wouldn't know – unless you read the IPCC reports very carefully – that what they present is an average of models that differ substantially from each other. Moreover, notes Koonin, the models generally "fail to reproduce the strong warming observed from 1910 to 1940." They show a warming rate for that period that is only about half of the warming observed.

Interestingly, the IPCC admits the uncertainty, as Koonin shows with this quote from one of its reports:

> It remains difficult to quantify the contribution to this warming from internal variability[1], natural forcing ["forcing" is the term used for "influence"] and anthropogenic [human-caused] forcing, due to forcing and response uncertainties and incomplete observation coverage. (*IPCC AR5 WGI 2013*: *887*)[2]

One of the big sources of uncertainty is clouds. The amount of cloud cover matters a lot for global warming. Clouds "reflect sunlight or intercept heat in varying amounts." But because clouds change on a much smaller scale than the usual 100 km square grid and we have limited historical information on cloud cover, climate modellers must make assumptions. The results of their models are only as good as their assumptions.

Temperatures, Hurricanes, Fires, Rainfall, Floods, and Sea Levels

We often hear that global warming is responsible for greater and more frequent floods, and more drought. But Koonin quotes the IPCC report itself noting that climatologists have "low confidence" about whether floods will be greater and more frequent, or smaller and less frequent. Also, the IPCC report states that climatologists have "low confidence in a global-scale observed trend in drought or dryness (lack of rainfall) since the middle of the 20th century." Translation: the IPCC isn't even sure about what has happened in the recent past let alone what will happen in the next few decades.

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[1] Internal variability is due to movements within nature that are independent of humans.
[2] *Climate Change 2013 The Physical Science Basis*. https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_all_final.pdf

What about the record high temperatures we so often hear about? Koonin points out that the measures used to make this claim are actually not the number of days with record high temperatures but are instead the *ratio* of the number of days with record high temperatures to the number of days with record low temperatures. Because the number of days with record low temperatures has fallen, that ratio has increased. But the executive summary of the *Climate Science Special Report* (CSSR), a report produced by the U.S. government, obfuscates this point, stating "Record warm daily temperatures are occurring more often." Koonin caught the error and, digging further, found that the National Academies of Science, Engineering, and Medicine had also noted the error. The National Academies' review panel bluntly wrote:

> Further, it is difficult to understand how a statement that includes increases in extreme warmth can be associated with a high confidence or extremely likely statement, given that most of the graphics in this chapter show a decrease in extreme warmth in the historical record.

The U.S. government's *National Climate Assessment* (NCA) of 2014 stated that "The intensity, frequency, and duration of North Atlantic hurricanes, as well as the frequency of the strongest (Category 4 and 5) hurricanes, have all increased since the early 1980s." When Koonin looked at the accompanying graph, he noted that the data began in 1970. It showed that starting about 1980, the North Atlantic Power Dissipation Index (PDI), a measure of hurricane activity, had shown an upward trend. He wondered what the data looked like before 1970. He found that there had been a *downward* trend in the North Atlantic PSI between 1949 and 1970, with no trend between 1949 and 2015. Searching the NCA more thoroughly, he found the following admission, buried in the text of Appendix 3:

> There has been no significant trend in the global number of tropical cyclones nor has any trend been identified in the number of US landfalling hurricanes.

We often hear that the increased number of fires in recent years is due to global warming. Has there been an upward trend globally? Koonin says no. He has a graph showing a *downward* trend, between 2003 and 2015, in the area burned by fires monthly.

What about rainfall and floods? Interestingly, climate activist *Mark Carney* gave a speech in 2015, while he was the governor of the Bank of England, in which he stated, shortly after England's very wet winter of 2014, that "[F]orecasts suggest we can expect at least a further 10 per cent increase in rainfall during future winters." What actually happened? In the six winters after 2014, writes Koonin, rainfall averaged 39 per cent *less* than in 2014.

One of people's biggest worries is that global warming will cause glaciers to melt and, therefore, increase the global average sea level. The CSSR mentioned earlier added to this worry by pointing out that the average had increased much more quickly after 1993 than before, rising by 7 centimetres in the later period. Koonin wondered if one could find other recent 25-year periods in which sea levels also rose quickly. He found one, the period from 1935 to 1960, when the average rose by 6 centimetres. Koonin argues that one should look at the whole period and not "cherry pick" the periods in which sea levels rose particularly quickly. Koonin notes that he sent his criticism to the lead author of the CSSR report, Don Wuebbles of the University of Illinois, and to Robert Kopp of Rutgers University, the main author of the CSSR's chapter on sea level rise. Both, he writes, agreed with his criticism, though claimed that they would have pointed this out in their report, but that it was too late.

What I, as an economist and not a climate scientist, found interesting is how little the sea will likely rise this century. Koonin quotes an IPCC finding that even in the most extreme case of global warming, the average sea level will be between 0.61 and 1.10 metres higher by 2100. If the Netherlands' experience in the last few centuries is any guide, that shouldn't be difficult to deal with, especially if economic growth continues, giving us more disposable wealth to make adjustments.

Global Warming and the Economy

That brings me to the economy. Koonin points out the IPCC's prediction that a global temperature increase of up to 3 degrees Celsius by 2100 will cause world gross domestic product to be 3 per cent lower in 2100 than if we avoid that temperature increase. If world economic output increases by 2 per cent annually for the rest of the century, global warming of 3 degrees Celsius will cause GDP to increase annually by approximately 1.95 per cent instead. (Koonin's calculation is slightly wrong. The correct calculation is available from the author of this review.) So instead of world output in 2100 being 387.5 per cent higher than it is now, it would be "only" 368.8 per cent higher.

Global Warming Exaggeration

Why does one get such a different impression about many of these issues from following the mainstream media? One reason is that some climate activists and some of the most prominent high-level, well-informed scientists are often willing to exaggerate. Koonin quotes a famous statement in 1989 from the late *Stephen Schneider*, a climate researcher at Stanford University:

> On the one hand, as scientists we are ethically bound to the scientific method, in effect promising to tell the truth, the whole truth, and nothing but — which means that we must include all the doubts, the caveats, the ifs, ands, and buts. On the other hand, we are not just scientists but human beings as well. And like most people we'd like to see the world a better place, which in this context translates into our working to reduce the risk of potentially disastrous climatic change. To do that we need to get some broad based support, to capture the public's imagination. That, of course, entails getting loads of media coverage. So we have to offer up scary scenarios, make simplified, dramatic statements, and make little mention of any doubts we might have. This 'double ethical bind' we frequently find ourselves in cannot be solved by any formula. Each of us has to decide what the right balance is between being effective and being honest. I hope that means being both.

Other climate activists have been even blunter about their willingness to portray scary scenarios. Koonin quotes former politician *Timothy Wirth*, who was the lead U.S. negotiator at the 1997 Kyoto Climate Conference:

> We've got to ride this global warming issue. Even if the theory of global warming is wrong, we will be doing the right thing in terms of economic and environmental policy.

Koonin quotes Wirth to show a bias but, unfortunately, does not directly question Wirth's reasoning. If the theory of global warming is wrong, it would seem strange that following it would lead to good economic and environmental policies. To take an extreme case, if global warming were completely unconnected to carbon usage—and I'm not claiming that it is—it would be hard to argue for a tax on carbon.

But aren't scientific organisations with thousands of members likely to make more-measured statements without exaggeration? Yes, if they consult those members. But Koonin points out an important instance where a major scientific organisation didn't do so. He quotes a 2019 report by the American Association for the Advancement of Science (AAAS) that climate change is an "urgent problem" and that "Americans are already feeling its effects." Koonin notes that he is a member of the AAAS and that the statement "was never submitted for comment, let alone endorsement, by the organisation's 120,000 members."

Conclusion

Koonin's book tells us as much about the transmission of information in our society as about the basic science of global warming. If we want to know the truth, we will need to look beyond the pronouncements of politicians, the mainstream media, and scientists trying – like Stephen Schneider – to be "effective". *Unsettled* is a good place to start.

How to Adapt to Technological Change in a Futureproof Way*

Péter Fáykiss

Kevin Roose:
Futureproof: 9 Rules for Humans in the Age of Automation
Random House, 2021, p. 256
ISBN: 978-0593133347
Hungarian translation:
Jövőbiztos – Kilenc szabály az ember számára az automatizálás korában
Pallas Athéné Könyvkiadó, Budapest, 2021, p. 189
ISBN: 978-963-573-049-0

Readers have recently been exposed to a deluge of books and studies on technology, digitalisation and their impact on society. However, these typically offer little practical advice about people's day-to-day lives, and how to successfully adapt to and navigate today's world dominated by information technology. In his book, *Futureproof – 9 Rules for Humans in the Age of Automation, Kevin Roose* aims to do precisely this, namely to present the characteristics of the stakeholders and institutions that have successfully adapted to technological challenges, and to provide practical advice and rules for readers about handling the challenges caused by disruptive technologies; in other words, how to become 'futureproof'.

The author of the book is a technology columnist for *The New York Times* who made it to the '30 Under 30' list of Forbes in 2015. Roose graduated from Brown University, worked as the news director for Fusion, an American television company, and has been writing for *The New York Times* since 2017 in his column 'The Shift'. His pieces mainly focus on the connections and correlations between technology, business and culture, and he regularly discusses the social impact of artificial intelligence and social media as well as the challenges posed by new, emerging technologies. He is the author of several popular books. Besides technology, he has also explored the difficulties faced by graduates working in the financial sector and the issues of university culture.

* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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Unlike most similarly themed books, Roose's primary focus is not on whether artificial intelligence and robots will take away jobs from people, when to expect technological singularity or how people can cooperate with machines. Instead, he tries to establish how people can live human lives in a world principally run by machines, and what those uniquely human skills are that machines are not expected to have.

The book has two main parts. In the first part, entitled 'The Machines', using expert interviews, scientific studies and other literature, the author presents the developments that are already having a profound transformative effect on society, and lists the reasons that are anticipated to accelerate these developments even more in coming years. He then reviews the characteristics of institutions that have successfully adapted to technological challenges. In the second part, called 'The Rules', Roose mainly puts forward proposals and recommendations on how to handle the challenges caused by disruptive technologies. He presents a total of nine specific recommendations that can help people become futureproof without losing their human self, while mitigating the most negative effects of modern technology. Although today's technological changes are often apparently unique, the author cites several historical examples when a stakeholder or institution was able to successfully manage the challenges posed by new technologies.

In Chapter 1, *Birth of a Suboptimist,* he lists the most important arguments of AI optimists and examines how justified claims such as 'we have been here before, and it turned out to be fine' or 'AI will make our jobs better, by doing the boring parts for us' are. The author points out that such arguments may hold true in a historical perspective, but in practice the current technological transition will entail quite serious social frictions and difficulties, just like in earlier industrial revolutions. This is partly because, due to the nature of technology, the disappearing and newly established jobs will not be in the same fields, which will inevitably lead to social conflict.

Chapter 2 is entitled *The Myth of the Robot-Proof Job*. The author uses history to illustrate that even though people often think that certain jobs are 'robot-proof', meaning that automation and algorithms will not be able to replace them even in the medium term, this is a fallacy. Historical experience and current developments actually suggest that no job is really 'robot-proof'.

In the next chapter, Roose then turns to examining *how machines replace people.* He cites numerous examples of the processes where machines actually 'invisibly' reduce the demand for human labour. This happens gradually, rather than immediately and directly, in the form of wage cuts, unfilled positions and the failure to replace workers who switched jobs.

Chapter 4, called *The Algorithmic Manager*, shows that the typical automation process at the workplace is usually assumed to involve machines that perform low-level routine tasks that are typically not very complicated. Algorithms are not considered to be able to perform much more complex tasks than that nowadays. But this is not the case, as some AI solutions can already carry out mid-level management duties.

In the last chapter of the first part, *Beware of Boring Bots,* the author argues that the robots posing the biggest threat to jobs and society are actually the automated solutions that take over 'boring' bureaucratic and back-office tasks. This is because such bots, called 'boring bots' by the author, are already good enough to take away jobs, but they are not advanced or innovative enough to create jobs in new fields.

In the second part of the book, called 'The Rules', the author formulates useful recommendations for appropriately managing the most important issues related to technological progress in people's personal lives. The author claims that by adhering to these nine 'rules', people can retain their human roles and reduce the risks caused by technological progress nowadays and in the longer run as well.

The first and eighth rules ('Be surprising, social and scarce' and 'Learn machine-age humanities') are basically about characteristics that need to be enhanced to make it difficult for machines to replace people. Spontaneity, being people-centric, meeting social needs, using unique approaches and associations, and handling rare but risky situations with a low margin of error are all skills in which humans may outperform machines in the medium term. The ability to distinguish based on different aspects, reviewing and applying a nuanced approach to ethical questions and resolving such questions as well as concentration are all skills in which humans can be better than machines for a long time to come.

The second, third and sixth rules ('Quit hustling', 'Demote your devices' and 'Treat AI like a chimp army') teach readers that it is important to keep some distance from machines in people's personal lives, whether that seems difficult or not. This is because modern technological solutions are very convenient (digital personal assistants, recommender algorithms), but they actually create the 'tyranny of convenience', and it is increasingly difficult to escape this. That is why awareness is important in such issues. In this context, the author offers practical advice related to 'digital detox'. Another important point is to have reservations regarding algorithmic solutions, regardless of how advanced they seem, as they are produced by machines, and the consequences of the problems caused by the misguided or premature application of AI will eventually be borne by humans. As the author puts it: 'If the chimp army destroys the office, […] nobody's going to be mad at the chimps'.

The fourth, fifth and ninth rules mainly focus on the role people should play in work and the areas where people should enhance their skills. The recommendations 'Leave handprints' and 'Don't be an endpoint' suggest that in the race against machines, the human touch or 'artisanship' can create added value. It has to be borne in mind that no one should become an 'endpoint', so people's jobs should not be about ensuring the connection between various systems or carrying out the instructions of an algorithm. Instead, proactivity and creativity should be emphasised. The rule 'Arm the rebels' is also connected to this, as it points out the importance of being open to, and proactively using, new innovations in the age of technological progress.

Finally, the seventh rule ('Build big nets and small webs') is about paying special attention to the relations and opportunities in society and people's own environment in the age of dynamic technological progress. Society as a whole can help those who struggle with technological changes, and at the micro level smaller 'webs' can be created so that 'if change comes to our doorstep, we'll have what we need to get by'.

Although for now technology fundamentally influences people's day-to-day lives, people typically get little practical help in successfully adapting to and navigating this 'tech-driven' and dynamic world. Therefore *Futureproof – 9 Rules for Humans in the Age of Automation by Kevin Roose* should be read by everyone who is interested in the topic and wishes to receive practical advice and constructive, pragmatic recommendations about being 'futureproof'.

Situation of Women in the FinTech Community*

Kitti Dióssy

Nadia Edwards-Dashti:
FinTech Women Walk the Talk: Moving the Needle for Workplace Gender Equality in Financial Services and Beyond
Harrington Starr Ltd., London, UK, 2022, p. 150
ISBN: 9783030905743

Today's society expects women to be successful managers, mothers and businesswomen in one person. The author, Nadia Edwards-Dashti, may act as a role model for women who want to move up the corporate ladder. She is the co-founder of a leading recruitment business based in London (Harrington Starr), which has helped over 2,000 people find jobs in the FinTech field. The idea of writing the book began with a podcast, in which she talked to 150 women about far-reaching as well as sensitive topics. In her book, she interviewed almost 200 people in managerial positions and with considerable experience at FinTech companies covering a wide range of activities. She focuses on the question of how difficult it is for women to succeed at FinTech companies today. She also explains that the disadvantaged situation may and should be changed. There are several companies where employees are discriminated on the grounds of their gender, religion, ethnicity or culture, which is also reflected by significant pay gaps.

The author analyses environmental factors, sector-specific factors as well as characteristics outside and within the sector. During the talks, important topics emerged, for example – without being exhaustive – why FinTech fails to attract more women than men, what it is like to work in a male-dominated environment, what are the real problems that should be addressed, how we can change these, and whether it is difficult for women to become successful in FinTech professions.

* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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The background of FinTech and the (lack of) presence of women

Mrs Edwards-Dashti believes that financial institutions and institutional systems in the traditional sense have completely changed. Digitalisation of the financial sector began in the 1950s, with the introduction of credit cards, and then mainframe computers, which record financial transactions, came. In the past fifty years, technology has been continuously developing, helping this sector (as well). *In the 1980s, FinTech meant all the technologies of financial services; today, however, we use the term to describe automated financial companies.* These are the companies which were able to benefit and even profit from the crisis of 2008, since they could explore everything that was not functioning or malfunctioning in the traditional financial sector, and by employing new technology, the operation of the system has been made easier, cheaper, faster, better, safer and more acceptable, even in cross-border transactions. These developments have primarily supported users. The attitude of digital nomads has also changed in recent years: a lot of them use new, innovative solutions. Investments in FinTech amounted to USD 4 billion in 2013 and USD 137 billion in 2019, which is a significant increase in only five years. The forecast for 2022 was USD 309 billion, which has not been realised because of the pandemic, but the market has reacted well even to this situation.

In this enormous FinTech industry, only 17 per cent of managerial positions in the United Kingdom are filled by women, despite the fact that a survey conducted by KPMG in 2019 reveals that FinTech companies led by women perform better by 113 per cent than the ones led by men. Adequate leadership and the implementation of strategy are essential for investments to avoid failure. *Of the global Fintech Founder community, women account for only 7 per cent.* In 2010, FinTech companies with female-only founding teams and the ones with at least one woman on their founding team accounted for less than 11 per cent of total start-ups, and their share had scarcely grown by only 1.3 per cent in 2019. These figures are surprisingly low.

The author also recalls that after she started her recruiting career in 2005, hiring experts in the FinTech sector was mostly about hiring specifically “culturally similar” people so that they should “fit in” at enterprises led by men, i.e. diversity as such was not promoted at all.

FinTech is a continuously developing, innovative industry, putting its consumers first and responding flexibly to their needs. Therefore, the workforce of companies should be increasingly diverse to promote this kind of change. In financial institutions, achieving digital transformation is easier than creating an innovative culture, since the process does not stop at automating transactions. Creating a whole new, innovative culture, where challenges generate development, is the key. The situation that evolved during the pandemic was a very good example of that.

Reality in the FinTech market

According to the book, the key to success in this industry is communication, creativity and resilience, and therefore diversity is crucial. The best example of that is the start-up ecosystem, since all companies want to enter the market with various missions and visions, find their consumers and meet their needs in the best possible ways. This culture enables its employees to learn from each other and develop, in addition to networking. However, negative examples also exist: corporate communities where women are in the minority and where it is hard to get in. Uber was like that, where machismo was strong within the company, discriminating women (its Chief Executive Officer later had to exit the business). It was surprising to read about Google, where female employees were discriminated in the technology area, or Amazon, where such Artificial Intelligence-led technology was used which selected based on demographic data and ignored women's resumés (it is no longer used).

Since 2010, the large companies of the United Kingdom (250+ employees) have had to disclose data on their gender distribution and exact salaries within the company. As a result, the current situation can be observed more transparently and objectively. In 2019, the pay gap was still significant, at 17.3 per cent. The pay gap, however, is not so simple. When determining pay, opportunities of work from home, corporate daycare and flexitime are considered. Working mothers have to face an unconscious bias in their workplace with regard to their competence, dedication and aspirations. In the banking sector, a higher share of lower-paid jobs is filled by women, and their share in higher-paid positions is lower. They are less frequently promoted and their forward-looking ideas are not really considered or awarded. That is exactly why the phenomenon of the so-called "confidence gap" exists among them, which means that they have less confidence in themselves, they tend to doubt their competence and are more reluctant to ask for a pay raise. Now, countless companies have recognised these deficiencies and are changing them. The FinTech sector also has considerable potential to eliminate these shortcomings.

The quota system, enabling companies to decide the share of female and male employees, may be a good starting point but is not enough in itself. In the long run, managers willing to change and an entrepreneurial attitude making this change sustainable are required. Interestingly, several outdated recruitment practices have been shut down at companies where FinTech is seen as adaptable, changing and agile.

Fintech companies should invest in as many soft skills as hard ones for success. Several high-ranking women do not have an IT-related degree. In the world of ever-changing technology, the attitude, talent and potential of employees are often much more significant. The author emphasised that as a recruiter she had seen so

many career paths, and knowledge is obviously important, but in today's world the potential, innovation and diversity inherent in employees should be appreciated. In this sector, an open mind is vital as it does not restrict the employees only to technological developments. There is a need for people who are interested in the ideas of others, beyond their own experience.

Disagreements make us stronger, different viewpoints make us better, and encouraging these viewpoints is of key importance for a successful business. FinTech, as the number one representative of innovation, is like that. However, if only people from technology sectors are hired, the issue of gender imbalance and the ensuing shortcomings will become permanent. Change is crucial in this sector, in both attitude and the environment.

How can a positive change be achieved?

The problem we still face is that women are underrepresented, despite the steps forward that many businesses have taken, including addressing gendered language in their adverts and the introduction of quota systems. The author mentions repeatedly that change will not take place by itself, and we should be proactive to make it happen.

It is important to inform young people about their opportunities. This market is perfectly suitable for the inclusion and education of the next generation. In the area of FinTech, talent is a long-term investment. It is not only about financial performance, but also the introduction of adequate guidelines and processes to support employees.

Numerous FinTech companies are aware of a fundamental factor: inspiring and motivating their employees is profitable for them as well, because commitment is the key to productivity. Another solution may be if the financial market and the FinTech industry applied for subsidised childcare support for parents to encourage them to return to work earlier. But work-life balance should also be considered, and managers at companies have to set examples to drive change. Internal biases must be eliminated and the diversity of all must be appreciated, enhancing cohesion and promoting free information flows within teams.

But what else can be done in addition to recognising the problem, eliminating biases, creating a safe working environment and providing managerial support? These will not solve the problem. The solution might be to reach out to universities, to hire more women from other industries, to re-train and retain them in the long run, i.e. we need to open our minds to identify their inherent potential. Change is possible if it is initiated by high-ranking leaders, whose willingness is also clearly demonstrated. After rebuilding the corporate culture, the presence of women

must be showcased. It does not necessarily mean employing more women and deciding on the basis of the quota system; it has to be ensured they are also listened to. It is corporate culture that has a direct impact on performance and improves competitiveness. This is equally the responsibility of women and men.

Determining external factors

In recent years, there have been significant internal factors as well as external ones, affecting the FinTech market. The author primarily mentions the Covid-19 pandemic and the fact that in the United Kingdom proportionally more women lost their job than men. Those who lost their jobs had less opportunities to use government support, and thus help came from private individuals. In addition, progress in this sector has been also facilitated by an open mindset over the past two years. Nevertheless, the FinTech market was the best at surviving the current crisis as companies had both the capital and the technology for developing. This sector has been the most successful at adapting to changes. In addition, it has provided the safest source of livelihood and the opportunity for working from home for women.

Mrs Edwards-Dashti concludes that in the technology sector gender imbalance is a well-known problem; however, it is not a problem people know how to solve. The truth is that there is a huge demand for talent in the financial services and the FinTech markets. As the sector gains more traction and customer bases continue to grow, businesses also need to become more attractive in their working environments. It is up to us to make the change and shape the next generation.

Report on the 12th Annual Financial Market Liquidity Conference*

Balázs Bence Kotró – Martin Márkus – Balázs Árpád Szűcs – Fanni Tóth

The *Annual Financial Market Liquidity Conference,* one of the most important international financial conferences in Hungary, was held for the 12th time at the Corvinus University of Budapest (CUB). Similarly to previous years, the conference, held on 11–12 November 2021, was organised jointly by the Department of Finance of the Institute of Finance, Accounting and Business Law of CUB and the Momentum Game Theory Research Group of the Centre for Economic and Regional Studies. In addition to the Foundation of the Department of Finance, as the gold sponsor, KELER CCP, Morgan Stanley and OTP Bank acted as key sponsors. Due to the continuation of the coronavirus outbreak, the conference was held in a hybrid form for the first time in 2021, allowing the more than 150 registered participants to join online, while also offering the possibility to attend in person at the university. The conference alternated between plenary presentations and parallel sessions focusing on different topics. The parallel sessions on the first day covered the following topics: savings and households, market microstructure and machine learning, theory, risks, market efficiency, ESG investments and sustainability. Topics of the parallel sessions of the second day: asset pricing and ESG investments, fintech, theory and experiments, market microstructure and corporate finance, bonds and financial institutions, and bankruptcy prediction. Four of the 53 presentations in total were keynote speeches, and another seven were given by invited experts. More than half of the speakers were from abroad.

The first presentation at the opening plenary session of the AFML Conference was given by *Mariassunta Giannetti*. A professor at the Stockholm School of Economics, she shed light on how the announcements by the US Federal Reserve System (Fed) affect the trading of large mutual funds in the event of a financial shock. Giannetti spoke about the experience of mutual fund data over the period January 2003 to December 2019, and the six months before and after the appearance of

* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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Covid-19. In the latter period, the impact of both the coronavirus and the Fed's crisis management programme (SMCCF – Secondary Market Corporate Credit Facility) were felt. In the event of financial turmoil, investment funds trade to minimise the negative price effects of forced sales. Giannetti showed that the Fed's intervention in the bond market had broadly and quickly stabilised the market by allowing large bond funds to concentrate their crisis management trading on ineligible bonds, which also led to a rapid recovery in their prices.

The second speaker in the plenary session was *Luc Renneboog*, professor of finance at Tilburg University, on sustainable finance. He sought to answer three fundamental questions: 1) What are the fundamental forces that drive companies to behave responsibly and not just maximise profit? What is the reason for differences between countries? 2) Does corporate social responsibility (CSR) create value? 3) Does shareholder activism on CSR or socially responsible investment (SRI) create value? Regarding the first question, the CSR ratings of 23,000 companies in 114 countries show that the legal origin of the countries is more important, for example, than the other characteristics of the company or country (concentration of ownership or political institutions). Turning to the second question, the speaker said that CSR can also be seen as an agency problem and a waste of corporate resources. Well-managed companies, which suffer less from agency problems (e.g. less cash abundance), have higher levels of corporate social responsibility. Finally, based on data from a large international socially responsible activist fund, Renneboog explained that companies successfully committed to social responsibility achieve a 5-percentage-point higher stock return than their unsuccessful counterparts.

The final presentation of the *Savings and Households Session* was given by *Hubert János Kiss*, associate professor at the Institute of Economics, Corvinus University of Budapest, who sought to answer the question of *how patience in making savings decisions is related to education*. A step-by-step questionnaire was used to assess the preferences of a representative sample of the Hungarian population for holding securities and saving for retirement. He divided respondents into education groups and then used regression models to analyse the effect of education. The results show that the more educated someone is, the less patient they are with their investment decisions. This can be explained by the fact that the highly educated are more confident in their own abilities and future potential, so it is less important for them to think about the distant future and to save for this time horizon.

At the end of the theoretical session, *László Á. Kóczy*, senior research fellow at the Centre for Economic and Regional Studies and associate professor at the Budapest University of Technology and Economics, gave a presentation. He examined the European energy crisis and the potential impact on gas supply security from the opening of Nord Stream 2, i.e. the doubling of direct interconnection capacity between Russia and Germany. Kóczy modelled the European gas market in a graph-

theoretic approach to the gas pipelines connecting countries. It sought to find the optimal supply for Europe as a whole, taking into account transmission capacities and winter/summer seasonality. The main question was what would happen if a pipeline dropped out of the system, e.g. due to sabotage, technical failure or any other reason. He captured this risk using a risk measurement technique borrowed from finance (*"expected shortfall"*). He assumed there was an equal chance of failure for any edge, so he disregarded the different lengths of the pipelines and the territorial political context. The results show that in the event the Ukrainian gas corridor is closed, the opening of Nord Stream 2 would mainly help the northern and neighbouring countries, but the southern countries would suffer severely from the failure. Since Eastern Europe's gas supply is already very fragile, the rapporteur criticised EU decisions to reject proposals to expand the southern gas pipelines. In his opinion, these would be necessary to increase the security of supply and would be in line with the principle of seeking optimal solutions for the Energy Union as a whole.

In the afternoon session on Risks, *Rose Liao*, professor of finance at Rutgers University, discussed *the impact of gender quotas on banks' stand-alone and systemic risks*. In a sample of banks in 39 countries, 70 per cent of the banks meet the legal quota within three years. The results show little impact of the rule on banks' *stand-alone* risk, but an increase in systemic risk after the introduction of the quota can be detected. The increase in risk is concentrated at banks where the quota was not met before the reform, typically in countries with fewer female managers and less equality. In the case of banks forced to recruit, newly appointed female directors tend to have less experience and are more likely to be insiders. The results are consistent with the fact that some banks circumvent the reform by appointing insiders for strategic reasons, which in turn leads to a deterioration of the board's control function.

The next invited speaker for the *Risk Session* was *James M. Steeley*, professor of the Department of Economics and Finance at Brunel University London. The speaker, a researcher on financial markets and investment, explored the question of *how the behaviour of market participants varies depending on how much information they have about the value of a risky asset*. The results contrast with the theses of the *Expected Utility Theory* – which is often used in both empirical and theoretical models to model investor behaviour in a risky environment – and find less stable risk preferences. The speaker reported on an experiment involving 172 subjects and 6,250 forecasts in which *participants were asked to determine the expected value of a risky asset while the amount of information available to them about the value of the asset was constantly varied*. The payment was proportional to the accuracy of the forecast. The experiment showed that less information indicates risk-seeking

behaviour, while more information indicates risk-averse behaviour, i.e. agents pay for less risk with the expected profits.

Thomas Walker, professor at Concordia University, gave a presentation in the block on ESG investments and sustainability. During his talk the audience could learn about *the role of cultural and political factors* in the different transmission rates of Covid-19 in different countries, in the mortality rates and in the macroeconomic shocks of the pandemic. The topical and relevant presentation pointed out that *the socio-political factors are significant predictors of the resilience of countries* to pandemics. The results show that in individualistic societies, the spread of the virus is slower and the number of infections is lower, while corrupt governance is associated with a faster virus spread. In countries with a stable legal system and cultures that think in the long term, the unemployment caused by the coronavirus is lower and a stable political environment leads to better preparedness in uncertain situations.

The evening plenary session started with a presentation by *Yakov Amihud*, professor at the Stern School of Business, New York University. The researcher on financial market microstructures and corporate finance gave an online presentation on his study linking the world of large institutional investors with that of the average small investor. *"This paper ties Wall Street with Main Street..."* he said highlighting the impact of the illiquidity of shares on the cost of capital and expected return. The results show that illiquidity increases the cost of capital and reduces capital investment, research and development and inventories, regardless of the financial position of the firm. Thus illiquidity encourages firms to engage in less capital-intensive processes. Consequently, illiquid firms are less exposed to fixed costs due to the higher marginal productivity of capital, higher labour flexibility on assets, and lower operating leverage.

The plenary session and the first day closed with a presentation by *Avanidhar Subrahmanyam*, professor at the University of California Los Angeles (UCLA), who also joined the conference online, on the analysis of *the spillover effects of liquidity shocks across assets* on empirical data. This effect has already been documented in literature, but studies have often used regressions whose identifiability is open to criticism, or analysed systemic liquidity shocks that naturally involve multiple instruments. The main novelty presented by the speaker is that he has found a non-systemic event, i.e. an event type for which it is concurrently true that it means only a liquidity shock, carries no other (e.g. pricing) information, and also only affects one stock. This event type is the two-step spinoff with an initial public offering (IPO). At the time, during the IPO, only 20 percent of the spin-off is listed, and then the date for listing the remaining 80 percent is announced. A second-round listing in such a case is only a liquidity shock, as the information is already built into the expectations at the time of the announcement. The speaker shared the experience

of 64 such events observed on the New York Stock Exchange between 1986 and 2017. The liquidity shock to the spin-off is clear in such a case, and the spillover effect to similar firms in the industry can be examined. The liquidity shock also improved the liquidity of similar companies, and institutions bought more of them. Higher liquidity makes securities more valuable; an effect that was also observed for similar firms not directly affected by the liquidity shock. Subrahmanyam interpreted this to mean that the liquidity and price of the shares of the spin-offs also carry additional public information for similar firms. For this reason, the increase in liquidity also reduces information asymmetry in similar firms.

The second day opened with an online presentation by *Jonathan Batten* entitled *Insider Trading and Market Manipulation*. The presentation highlighted why the banking sector is called "the rotten heart of finance". Three case studies were presented to the audience. In the first case, Batten illustrated how a chat room named "Cartel" was able to manipulate exchange rates. Secondly, he discussed the misuse of LIBOR determination and how the scandal had affected the global financial market. Finally, we heard the details of an insider trading case. An employee of the Australian Bureau of Statistics leaked non-public information about the Australian dollar to a friend who worked as a trader at a bank, making a profit of 5 million dollars in one year. With all these examples, Batten wanted to show that a *top-down* regulatory authority is too exposed to market supervision, which has serious limitations.

Batten's opening presentation was followed by three parallel sessions, of which the Fintech block was closed by *Zsuzsa Huszár*. In the early part of 2021, there was a lot of media coverage in the US about the surge in retail stock trading in the wake of the Covid-19 pandemic. The speaker sought similar trends in the Chinese market and wondered whether the number of internet searches was in line with capital market movements. The study is relevant because this Asian market is dominated by retail trading, and the number of hours the average person spends online per day is much higher than in the Western world. Using statistics from the Baidu search engine, Huszár shared the results of her analysis of the IT sector, the pharmaceutical industry, and the wine market which is very popular in China. Based on her panel regression model, she found that the shares of companies that attracted a lot of interest performed better in the long run, but this effect was negligible due to trading costs and transaction fees. The speaker drew attention to the dangers of purely popularity-based trading and its role in encouraging diversification.

The conference was closed by *Barbara Dömötör*, associate professor at the Department of Finance, Corvinus University of Budapest, and chair of the conference organising committee. She announced that the 13th Annual Financial Market Liquidity Conference will be held on 10 and 11 November 2022, for which registration is now open (http://afml.uni-corvinus.hu).

INSTRUCTION FOR AUTHORS

Manuscripts should be submitted in accordance with the following rules:

- The length of the manuscripts should be limited to 40,000 characters (including spaces) but a ± 50 per cent deviation is accepted. Manuscripts should be written in Hungarian and/or English.
- The unnumbered footnote of the author's name contains his/her position, the institution the author works at, his/her email address and any other relevant information and acknowledgment regarding the article.
- Papers always begin with an abstract which should not exceed 800–1,000 characters. In the abstract a brief summary is to be given in which the main hypotheses and points are highlighted.
- Journal of Economic Literature (JEL) classification numbers and keywords should be given (three at least).
- Manuscripts should be written in clear, concise and grammatically correct Hungarian and/or English. Chapters and subchapters should be bold.
- Manuscripts should contain the list of references with the first and surname of the authors (in case of non-Hungarians the initials of the first name is required), the year of publication, the exact title of the book, the publisher, the place of publication. In case of papers, the exact title of the journal, the year, the volume, and the pages should be indicated. References in the text should contain the surname and the year. When citing the exact page should be indicated.
- Tables and figures are to be numbered continuously (chapters and subchapters should not contain restarted the numbering). Every table and figure should have a title and the units of quantitative values are to be indicated. Tables are to be made in Word, while figures must be edited in Excel. Notes and sources are to be put directly at the bottom of the tables, figures.
- Equations should be aligned to the right and should be numbered continuously in parenthesis. (Chapters and subchapters should not contain restarted the numbering.)
- Manuscripts are to be sent to the Editorial Office of the FER only. Papers are peer-reviewed by two independent and anonymous reviewers.
- Manuscripts should be sent as attachment by e-mail in MS Word file. Figures should be sent in MS Excel file both in Hungarian and English.
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Thank you!

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