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FINANCIAL AND ECONOMIC REVIEW

Financial and Economic Review

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FINANCIAL AND ECONOMIC REVIEW

Contents

CONFERENCE REPORTS

Analysis of the Repricing Practice of Newly Disbursed Housing Loans*

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In the Hungarian banking system, newly disbursed, fixed-rate housing loans are typically repriced with a lag of several months after a change in the interbank rates, which can be viewed as the cost of funds for institutions. This paper examines the number of months it takes for a change in the interbank rates to pass through to the interest rates of newly disbursed housing loans with an initial interest rate period of over one year. The two-step analysis looks at the repricing practices observed for Certified Consumer-Friendly Housing Loans (CCFHLs) employing a descriptive approach, and then a vector autoregressive model is used to estimate the speed at which interbank rates pass through to aggregate housing loan rates. Based on the authors' estimate drawing on aggregate interest rate statistics, the changes in interbank rates are incorporated into the mortgage rates applied by Hungarian banks in approximately four months; however, according to the interest rate condition data of institutions' CCFHL announcements, banks' repricing practices vary, leading to differences in the speed and extent of the interest rate changes following a shift in the cost of funds.

1. Motivation

This study analyses an important part of the interest rate channel of monetary policy transmission: the relationship between interbank rates and client interest rates.[1] This is because it is important to understand how quickly changes in interbank rates, which are directly linked to the interest rate policy of the central bank, appear in the price of the loans disbursed by commercial banks, as the pace of interest

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[1] The study looks at the transmission between average interbank rates and the average annual percentage rate (APR); for the sake of simplicity, the latter is often referred to as the interest rate.

rate pass-through is pivotal in the lag experienced by households (or businesses) after central bank measures are introduced. The paper focuses on housing loans: Hungarian households prefer owner-occupied housing to renting (*Magyar Nemzeti Bank[2]* (*MNB*) *2016*), and purchasing homes on credit has accounted for an increasing share of housing transactions (*MNB 2021*); therefore, it is particularly important to examine the features of how these loans are repriced.

According to the marginal cost pricing model, banks – like all profit-oriented firms – price their products based on their marginal costs.[3] If the interbank rate is taken to be the marginal cost of financing, this relationship can be expressed as follows:

$$i = \alpha + \beta r \qquad (1)$$

where *i* is the interest rate, *α* is a markup constant, *r* is the interbank rate representing marginal cost, and β denotes a sensitivity coefficient (*Rousseas 1985*; *De Bondt 2005*; *Varga 2021*). It follows from Equation (1) that any rise in the marginal costs of financing raises the marginal yield expected from banks' additional lending, as otherwise, ceteris paribus, banks' profitability would decline. In other words, the change in interbank rates influences the pricing of new loans, albeit with some lag. Accordingly, the starting point of the analysis is the assumption that the banks operating in Hungary price housing loans based on the *Budapest Interest Rate Swap* (*BIRS*) rate, as the reference rate, with the maturity corresponding to the given type of loan interest fixation period.[4] In practice, of course, banks' pricing behaviour is influenced not only by the change in interbank rates, but also other factors, such as changes in the intensity of competition within the sector or the credit riskiness of clients, and therefore the size of the markup may change over time.[5] Central banks and other regulatory institutions have several instruments to influence longer-term lending rates, including the base rate, which has an indirect effect, along with macroprudential, resolution and credit market regulations as well as unconventional quantitative tools (*Ábel et al. 2018*). The impact of these measures can be reflected in the change in reference rates and spreads.

In practice, banks' lending rates are determined based on the costs of borrowing, in addition to the factors mentioned above. It can be seen that the interbank rates used in the analysis give a good approximation of this, because in the case of loans with interest rate fixed for the long term, banks can either directly borrow

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[2] The Central Bank of Hungary
[3] In practice, if the sector is characterised by an abundance of liquidity, the price of loans is influenced not only by the marginal cost of the cost of funds, but also by the opportunity cost of lending.
[4] This method is often used in the international literature on the repricing of interest rates, see for example *Sorensen – Werner* (*2006*); *De Bondt* (*2005*); *Sander – Kleimeier* (*2004*). The BIRS also plays an important role in determining the interest rate and its changes with respect to Hungarian housing loans, because these interest rates also serve as the basis for several "fair bank" indicators used for repricing.
[5] For a detailed summary of the main institutional and banking factors shaping interest rates, see *Aczél et al.* (*2016*).

the fixed-rate funds or produce them through interest rate swaps (exchanging the interbank market cost of funds for an interest rate fixing with the same maturity as the interest rate period of the loan). In the latter case, the fixed leg of the interest rate swap has a significant impact on banks' cost of funds. However, it is important to note that interest rates are also influenced by the cost of other funds of banks, such as deposit rates, and therefore the BIRS does not fully capture banks' cost of funds. Ideally, banks' cost of funds should be the weighted average of their classic cost of borrowing (deposits) and market-based borrowing (interbank market, bond issuance), but this is disregarded due to the unavailability of data. Nevertheless, besides using BIRS time series, adjusted cost of funds, time series were also produced, taking into account the cost of deposit-type borrowing:

$$Adjusted\ cost\ of\ funds = \ BIRS - \frac{Deposits}{Loans} * (BUBOR - Weighted\ average\ deposit\ rate) \qquad (2)$$

where *BIRS* denotes the fixed leg of the interest rate swap transaction with the same maturity as the loan's interest rate period, *Deposits/Loans* is the credit institution sector's aggregate deposit-to-loan ratio, *BUBOR* is the six-month interbank lending rate, and the *weighted average deposit rate* stands for the weighted average interest rate on new, HUF-denominated time deposits and demand deposits placed by households and companies. The logic behind the creation of the adjusted cost of funds is the following: if banks raise funds through deposits at a price that is different from the interbank market cost of funds (6-month BUBOR), the difference is incorporated into the pricing of loans to the extent that it reflects banks' overall financing position.[6] The time series created by this method were used in the empirical analysis (see *Section 4*) to examine whether the models estimated by taking into account both deposit-type borrowing and interest rate swaps differ from the dynamics of the baseline model, in which only interest rate swaps are considered in measuring interest rate pass-through.

The central focus of the analysis is warranted by the fact that, based on data from recent years, the aggregate interest rates of newly disbursed housing loans in the Hungarian banking system are repriced only with a lag of several months after a change in BIRS rates, used as the reference rate in the present analysis. This also means that for a limited time there may be an inverse relationship between the change in the reference rate and the interest rate spread (the difference between the interest rate and the reference rate). This causes a distortion in spreads mainly when BIRS yields change in the same direction for several months, creating a trend, or when loan disbursement almost exclusively comprises loans fixed for the longer

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[6] During the calculation, the deposit-to-loan ratio was capped at 1 (100 per cent) on the grounds that banks implement the difference between the cost of funds on deposit-type borrowing and interbank market borrowing up to the extent that is in line with the volume of outstanding loans.

term, such as in the recent period (*Figure 1*). In the case of such loans, banks may incorporate the cost of funds into lending rates only with a lag of several months.[7]

Figure 1
Distribution of HUF-denominated housing loans in the Hungarian banking system based on initial interest rate period

Source: MNB
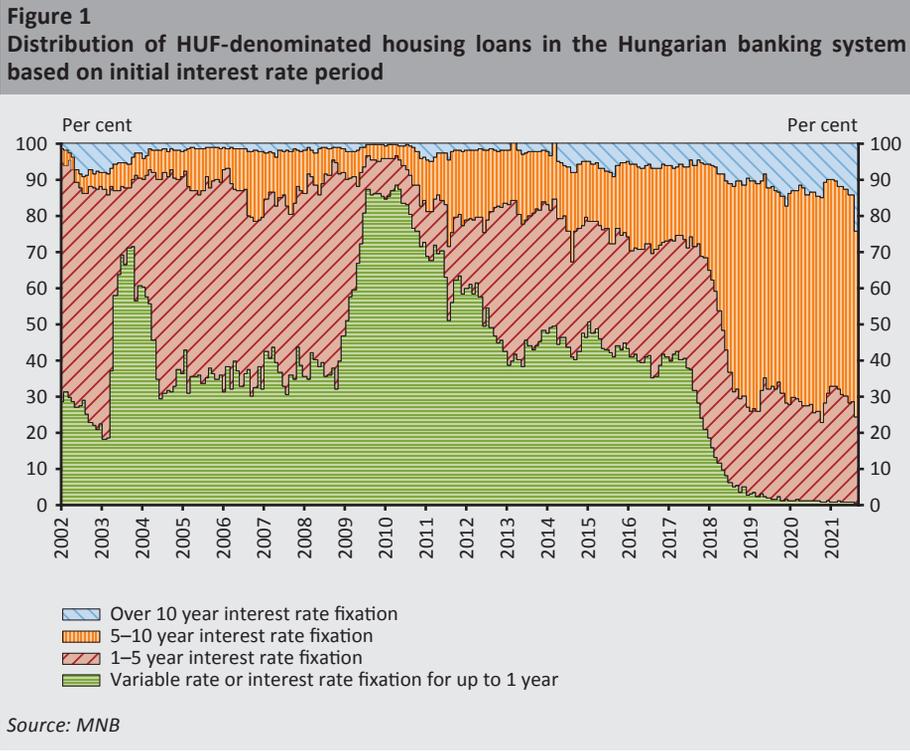
This paper examines the number of months it takes for any change in interbank rates, or the adjusted cost of funds, to pass through to the aggregate interest rates of newly disbursed housing loans with an initial interest rate period of over one year (hereinafter: fixed-rate loans). The research question is answered using two different approaches.

1) Employing a descriptive method and using interest rate condition data collected from the websites of the seven largest banks operating in Hungary based on balance sheet total, banks' practices regarding the repricing of fixed-rate CCFHLs are analysed.

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[7] In the case of variable-rate housing loans with up to one year initial interest rate fixation, according to banks' lists of conditions, the interest rate on new loans typically depends on the BUBOR prevailing at the end of the previous month, and the spread – which is also given in the list of conditions – must be added to this. By contrast, in the case of loans with interest rates fixed for a longer period, typically there are exact interest rate values which are not updated by banks every month.

2) On a model basis, interest rate statistics downloaded from the website of the MNB are used to estimate the amount of time it takes for repricing to take hold. The estimation is performed using a vector autoregression (VAR) model, in which the interest rate of fixed-rate housing loans is explained by the past evolution of the cost of funds (BIRS and adjusted cost of funds) and the dependent variable itself.

The study is structured as follows: *Section 2* presents an overview of the results of the theoretical and empirical studies on slow and partial repricing (stickiness). *Section 3* provides a descriptive summary of the development of the aggregate time series on which this paper focuses, as well as the repricing practices observed based on the interest rate conditions of individual banks. *Section 4* then presents the time series analysis methodology and the results of modelling. Finally, the main findings are summarised.

2. Factors influencing the stickiness of interest rates

Assuming perfect competition, perfect information and zero transaction costs, the derivative of price with respect to marginal cost equals one (*Lowe – Rohling 1992*; *Horváth et al. 2005*). In the context of this paper, the above means that if the conditions listed are satisfied, the change in banks' cost of funds is fully incorporated into lending rates. If the above-mentioned conditions are not met though, the price will adjust to the marginal cost imperfectly. In other words, the pass-through of the cost of funds into lending rates will not necessarily be complete or it will slow down. The stickiness of the customer rates used by banks is a well-known phenomenon in the international financial literature, as confirmed by several empirical studies (for a detailed summary, see, for example, *Lowe – Rohling 1992*; *Nabar et al. 1993*). "*Interest rate stickiness*" is used for two related but nevertheless different phenomena: the relative inelasticity of lending rates to credit demand on the one hand, and the incomplete or slow adjustment of lending rates to money market yields on the other hand (*Cottarelli – Kourelis 1994*). Below, the explanations related to the reasons behind the latter identified on a theoretical or model basis are reviewed.

One of the best-known explanations for the stickiness of interest rates is the one based on the asymmetry of information between banks and borrowers (*Stiglitz – Weiss 1981*), in essence stating that raising interest rates leads to adverse selection of potential borrowers, which dents banks' expected profits through the rising credit risk of the loan portfolio. The reason behind the adverse selection is that the borrowers which are more willing to pay the higher rates are also more likely to have a greater probability of default. Moreover, higher rates may encourage borrowers to implement riskier projects (*moral hazard*). There is, then, an optimal level of

interest rates, where banks' expected profits are maximised. The main conclusion of the theory is that higher interest rates may lift the credit risk and probability of default in the loan portfolio to such an extent that it can begin to erode banks' expected profits. In such a situation, it is rational for banks to raise interest rates less than the rise in the cost of funds and set them lower than the equilibrium rate, which ultimately distorts the interest rate transmission mechanism.

Mester and Saunders (*1995*) attribute the inelasticity of interest rate pricing to the cost of repricing triggered by the change in the cost of funds (*menu costs*). According to the theory, it is only rational for banks to change the interest rate level when the equilibrium interest rate is higher than the current rate by at least an amount where the income induced by the higher rate exceeds the administrative costs of repricing. In their empirical studies, the authors also point out the asymmetrical repricing practices of profit-maximising banks, where banks incorporate a drop in the cost of funds into lending rates less elastically than a rise in the cost of funds.

In the theory of *Fried and Howitt* (*1980*) based on sharing risks, interest rate stickiness is rooted in the risk-aversion of customers. If borrowers are risk-averse, preferring steady, predictable interest rates, banks set lending rates so that they change less than their cost of funds. Overall, banks set a higher interest rate than for a hypothetical risk-free customer, thereby compensating banks' owners for taking greater risk. Thus, the theory runs that banks smooth interest rates over time, and therefore customers can sometimes borrow cheaper than the equilibrium rate, and sometimes they need to pay more than that. According to those behind the theory, due the costs of changing the interest rates (*menu costs for the banks, and shoe-leather costs for customers*), risk-sharing is favourable to both parties. In this context, *Hodgman* (*1963*) found that banks adjust their rates less frequently than warranted by the changes in the cost of funds because they consider customer relations.

In recent decades, in addition to the theoretical considerations detailed above, several studies have examined the factors in the financial systems of certain economic areas and country groups that best explain the differences in the efficiency of the interest rate transmission mechanism. These studies typically used different econometric approaches, but there were many similarities with respect to the variables taken into account and the findings. Most relevant studies have found that the efficiency of transmission is mostly attributable to the structural characteristics of the financial system. Furthermore, the international literature agrees that strong or increasing competition among banks boosts the efficiency of the interest rate transmission mechanism (*Gigineishvili 2011*). Nonetheless, the impact of competition may be exerted asymmetrically within the banking system, depending on the change in the direction of the yield environment: it

entails a quicker adjustment for new loans (on the assets side) in a falling yield environment, and slower adjustment in a rising yield environment.

Cottarelli and Kourelis (*1994*) were the first to use models to identify the factors that determine the repricing of interest rates. The authors looked at data from 31 advanced and emerging economies and found that the efficiency of the interest rate transmission mechanism is mainly attributable to the maturity of financial markets, the barriers to the free flow of capital, the intensity of competition within the banking system and between banks and financial intermediaries, as well as the volatility of money market yields. They showed that the stickiness of lending rates and the features listed here are related in terms of the following factors, which also depend considerably on the structure of the given country's financial system:

1) *The costs of repricing interest rates and the price elasticity of loan demand.* Banks change lending rates if the cost of repricing is lower than the revenue loss arising from deviating from the equilibrium rate. The role played by the cost of repricing in the interest rate transmission mechanism also depends on the price elasticity of loan demand.

2) *The costs of repricing interest rates and the uncertainty surrounding the future change in the cost of funds.* If banks deem the change in money market yields to be temporary, they do not necessarily reprice their products due to menu costs, which constrains the interest rate transmission mechanism.

3) *Non-profit-maximising banking system.* The considerations related to the repricing of interest rates are based on the assumption that banks are profit-maximisers. If the banking system is non-profit-maximising, for example because a large portion of it is state-owned, lending rates may become sticky upwards, meaning that a rise in money market yields is not necessarily reflected in loan prices, or only slowly.

4) *Oligopolistic banking system.* In an oligopolistic banking system, banks' behaviour – and thus also the speed and extent of interest rate repricing – may be influenced by the uncertainty related to competitors' pricing.

Several analyses of the topic have appeared since *Cottarelli and Kourelis* (*1994*). For example, *Sorensen and Werner* (*2006*) examined the banking systems in the euro area and found that pace of repricing was influenced negatively by the concentration of the market, banks' excess liquidity and excess capital, a stable deposit structure and interest rate risk (the maturity mismatch between the assets and liabilities side), and positively by the diversity of banks' portfolio (high share of non-interest income) and the riskiness of the loan portfolio. *Mojon* (*2000*) also looked at the banking systems of the euro area, finding that the volatility of money market yields and high operating costs (personnel costs) had a negative impact on

the interest rate transmission mechanism, while competition among banks and that generated by players offering alternative sources of finance had a positive impact. *Sander and Kleimeier* (*2004*) analysed the interest rate transmission mechanism in the banking systems of Central and Eastern European countries and pointed out that interest rate pass-through was more efficient in banking systems with a low share of non-performing loans and a strong presence of foreign banks. *Gigineishvili* (*2011*) analysed the reasons behind the heterogeneity of interest rate repricing on a sample of 70 economies, taking into account not only the features of the financial system but also other macroeconomic variables. According to his results, the macroeconomic variables of high GDP per capita and inflation had a positive impact on repricing, while the volatility of money market rates had a negative effect.

In addition to exploring the factors that determine the repricing of interest rates, a large portion of the literature cited above also addressed the quantification of the extent and speed of repricing. *Cottarelli and Kourelis* (*1994*) found that the parameter of interest rates' long-term adjustment takes a value of 0.75–1.25 on average in the sample under review; in other words, changes in money market yields are typically fully reflected in lending rates in the long run. As regards the speed of the pass-through, they showed that three and six months after the change in the market yields, only two thirds or three quarters of that was incorporated into lending rates on average, with significant heterogeneity across the countries under review. Many papers have demonstrated that interest rates respond differently to the rise and fall in yields: lending rates are stickier downwards, while deposit rates are stickier upwards. *Mojon* (*2000*) observed such an asymmetry for European countries, whereas *Mester and Saunders* (*1995*) did so for the United States.

The Hungarian literature, which is even more relevant for the present analysis, also features papers on this topic. *Világi – Vincze* (*1996*), *Árvai* (*1998*), *Horváth et al.* (*2005*) and *Varga* (*2021*) all attempted to provide an econometric model for interest rate pass-through in the banking system. *Világi and Vincze* (*1996*) used ADL (autoregressive distributed lag) models for 1991–1995, finding that the adjustment of banks' interest rates was slow on both the deposit and the lending side, and in the case of loans adjustment it was not complete even in the long term. *Árvai* (*1998*) employed a vector error correction model in her analysis to show that the transmission between market interest rates and lending rates was relatively efficient in 1995–1998, but the results should be used with some reservations due to the short time series. *Horváth et al.* (*2005*) also used an error correction model: based on their linear model, adjustment can be considered complete and quick in the short-term corporate loan market over the long run, while the other submarkets are characterised by partial and/or slow repricing. *Varga* (*2021*) examined the features of interest rate pass-through using a weighted average cost of funds produced by

the author, based on which a long-run equilibrium relationship with housing loan rates was established.

3. Assessment of the change in interest rates based on descriptive statistics

The descriptive analysis uses monthly interest rate statistics and the interest rate condition data from the announcements available on banks' websites. The analysis of the aggregate data covers the period from January 2007 to December 2021, while the analysis of interest rate conditions covers January 2018–December 2021. The examination considers housing loans that have an initial interest rate period of over one year and up to 5 years (hereinafter: 1–5-year loans), and those with an initial interest rate period of over 5 years and up to 10 years (here: 5–10-year loans), as these products have represented a growing share of new housing loans in recent years, while variable-rate loans with an initial interest rate period of up to one year only account for half a per cent of disbursements in the current banking practices.

3.1. Aggregate interest rate statistics

As briefly mentioned in *Section 1*, the examination of the average mortgage rates on new loans in the Hungarian banking system clearly shows that the interest rate spread between lending rates and interbank rates changes when interbank rates shift (*Figure 2*). This also means that there is an inverse relationship between the change in interbank rates and the change in the interest rate spread. That suggests that banks' customer rates do not perfectly adjust to market yields in the short run. This can be clearly observed in several periods characterised by interest rate declines and increases. For example, the latest period when interest rates on the interbank market sank for a longer time was between October 2018 and August 2019, when 5-year and 10-year BIRS yields declined by 171 and 205 basis points, respectively, while the spreads of the loans with corresponding interest rate periods rose by 173 and 150 basis points, respectively. The interest rate increase that began in 2021 is a good example for the inverse relationship between reference rates and spreads as well: between January and December 2021 5-year and 10-year BIRS yields rose by 334 and 255 basis points, respectively, while the spreads of the loans with corresponding interest rate periods narrowed by 194 and 199 basis points, respectively.

Figure 2
5-year and 10-year BIRS and adjusted cost of funds, and the average APR of housing loans with an initial interest rate period of 1–5 years and 5–10 years

Per cent   Percentage point

— 5-year BIRS
--- Adjusted cost of funds
— 1–5 year spread (RHS)

Per cent   Percentage point

— 10-year BIRS
--- Adjusted cost of funds
— 5–10 year spread (RHS)
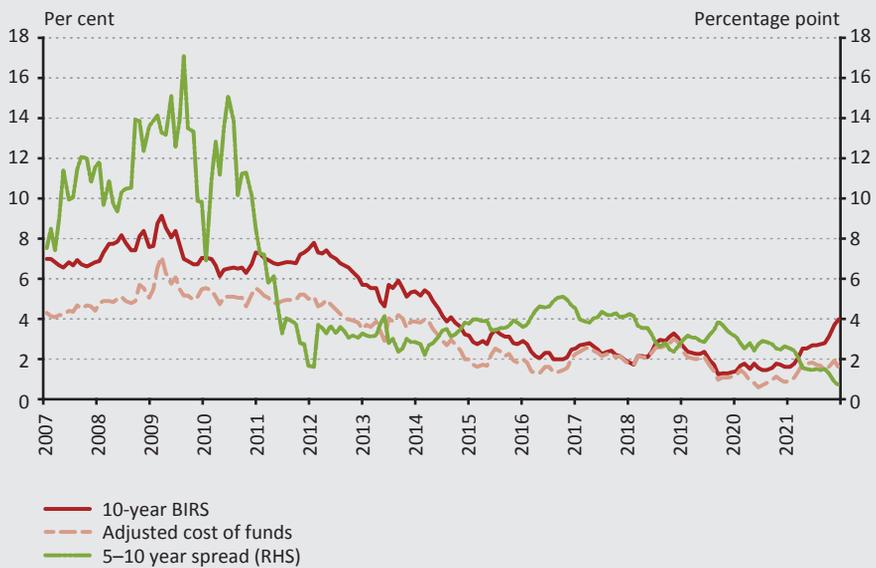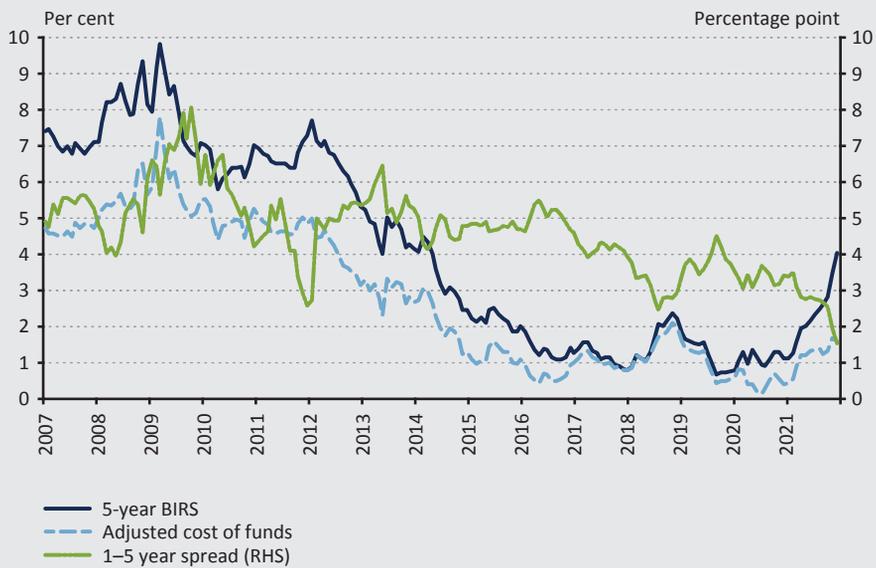
Note: Spreads are relative to the 5-year and 10-year BIRS.
Source: MNB

The inverse relationship between the interbank rate and the interest rate spread is typical of not only the Hungarian banking system, as international data suggest a similar picture. *Table 1* contains the correlation coefficients between the changes of the mortgage rate spread and the interbank rate (IRS) for the maturity corresponding to the interest fixation period in 18 European countries, which all take a negative value. It is important to understand that the examination of the simultaneous correlations between differential time series does not yield an accurate picture of the stickiness of lending rates, because we do not control for factors whose change over time may influence the speed of repricing, such as the change in the intensity of competition; moreover, the time it takes for repricing to take hold is not taken into account. With respect to the latter, it is rational to assume that banks do not reprice their loans within the month, and therefore the fact that market yields are not immediately incorporated into the pricing of housing loans can be considered a given. In this context, if the spread is calculated based on the interest rate for the given month and a reference rate from 1, 2 or 3 months earlier, the negative relationship is weaker in all countries, and in some instances it turns into a positive correlation between the changes in time series.

Table 1

Correlation coefficient between the mortgage rate spread and the interbank rate for the maturity corresponding to the interest fixation period in international comparison

Country	Correlation coefficient (simultaneous spread)	Correlation coefficient (spread with 1-month lag)	Correlation coefficient (spread with 2-month lag)	Correlation coefficient (spread with 3-month lag)	Period
Croatia	−0.99	−0.26	−0.02	−0.12	Oct 2006 – Nov 2021
Denmark	−0.95	−0.26	0.03	−0.03	Jan 2000 – Nov 2021
France	−0.91	−0.26	0.06	0.00	Feb 2013 – Nov 2021
Belgium	−0.90	−0.25	0.08	0.02	Jan 2000 – Nov 2021
Czechia	−0.87	−0.23	0.20	0.13	Jan 2000 – Nov 2021
Netherlands	−0.85	−0.16	0.13	0.10	Jan 2003 – Nov 2021
Ireland	−0.82	−0.18	0.15	0.11	Oct 2007 – Nov 2021
Germany	−0.80	0.00	0.27	0.23	Apr 2009 – Nov 2021
Italy	−0.80	−0.12	0.07	0.16	Jan 2009 – Nov 2021
Slovenia	−0.63	−0.23	−0.05	0.05	Mar 2002 – Nov 2021
Lithuania	−0.56	−0.21	−0.20	−0.23	Dec 2011 – Nov 2021
Austria	−0.56	−0.09	0.08	0.06	Jul 2017 – Nov 2021
Luxembourg	−0.55	−0.04	0.17	0.19	Jan 2000 – Nov 2021
Spain	−0.46	−0.12	−0.01	0.01	Jan 2000 – Nov 2021
Portugal	−0.42	−0.15	−0.14	−0.21	Jan 2000 – Nov 2021
Slovakia	−0.40	−0.10	0.08	0.09	Jan 2003 – Nov 2021
Latvia	−0.27	−0.10	−0.03	−0.03	Dec 2018 – Nov 2021
Finland	−0.24	0.19	0.35	0.33	Jan 2001 – Nov 2021

Note: The lagged spreads are the differences between the given month's interest rates and the reference rates from 1, 2 or 3 months earlier.

Source: ECB

In connection with the aggregate interest rate statistics of the Hungarian banking system, it is important to underline that they contain the average interest rates of the mortgage loans signed by the banks in the given month. When examining repricing, this may cause a distortion, as according to the current practices of Hungarian banks a considerable amount of time can elapse between acceptance of the loan application and actual signing of the contract.

In the case of the CCFHLs, which have accounted for over 60 per cent of newly disbursed housing loans since 2018, the distortion is due to the fact that based on the information provided by the applicant, the lending bank gives an offer, irrevocable for 90 days, to the effect that it will sign a contract with the borrower under the credit terms prevailing at the time of the acceptance, or under better conditions from the perspective of the borrower.[8] This means that the aggregate data of signed loan contracts may not necessarily be based on the credit terms applicable in the given month, but on those applicable at the time of acceptance, and a considerable amount of time may elapse between the two dates. Based on the reporting on CCFHLs, on average about two months pass between the acceptance of the loan application and the signing of the contract, so the interest rate transmission estimated on aggregate data should indeed be distinguished from the actual adjustment time of individual banks, which can be determined based on banks' announcements of condition changes and which is the adjustment time perceived by costumers as well.

In the case of non-CCFHL, market-based loans, no information is available as to the time of the acceptance of the loan application, but since there is no major difference between the two types of products when it comes to the period until the next step in the process, the credit assessment and the signing of the contract (approximately one month), it can be reasonably assumed that the time requirement for the two administrative processes is similar. Nonetheless, one difference in connection with repricing may be that in the case of market-based loans, institutions are not bound by the regulation on the provision of an irrevocable offer upon acceptance, as applicants only get the loan offer after the credit assessment, and therefore the interest rate in the offer may differ from the contract terms applied by the bank at the time of acceptance.

It should also be noted that changes in reference rates may appear even in the conditions for CCFHLs with a considerable lag, if banks offer the maximum interest rates allowed by the CCFHL regulation prevailing at the time, or one close to that. This is because according to this regulation, the initial value of the starting interest rate may not be higher than the reference rate applicable on the 15th day preceding the last working day of the month prior to acceptance[9] plus 3.5 percentage points.

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[8] For the detailed regulations pertaining to CCFHLs, see the tender for Certified Consumer-Friendly Housing Loans (https://www.minositetthitel.hu/letoltes/minositett-fogyasztobarat-lakashitel-palyazati-kiiras-20190723.pdf).
[9] The Government Debt Management Agency's reference yield for the Hungarian government bonds with a nominal maturity corresponding to the interest rate period or the BIRS with the same maturity.

A similar regulation applies to another popular loan product that also appears in aggregate interest rate statistics, namely the Home Purchase Subsidy for Families interest rate-subsidised loan, where the starting interest rate may not be higher than 3 percentage points plus 130 per cent of the arithmetic mean of the yields of the government bonds with a nominal maturity of 5 years, as published monthly by the Hungarian Government Debt Management Agency based on the auctions in the three months preceding the publication date, weighted by the amounts accepted at the given auctions.[10]

3.2. Interest rate conditions

Actual adjustment to the interbank rate can be best captured through the changes in the interest rate conditions of banks' terms and conditions: thus, in order to obtain a comprehensive picture of banks' response time, capturing any heterogeneous repricing by individual banks, the practice of changing interest rate conditions was also examined. The analysis looked at the interest rates offered by banks without discounts. It must be noted here that banks may also implement the change in their cost of funds by tweaking the discounts, so even though the terms and conditions do not immediately reflect the change in interest rates, customers may perceive it earlier through the change in discounts. However, based on the compilation for this study, the discounts changed only rarely and moderately in the period under review, to varying extents or even in different directions across the individual loan amount categories. Therefore, considering the change in discounts does not yield significant additional information, and accordingly it was decided that their change over time would be disregarded.

With respect to the change in interest rate conditions, it is important to distinguish between variable-rate and fixed-rate loans. The interest rate conditions of variable-rate loans are determined by banks as the sum of the previous month-end BUBOR, mostly a 3-month or 6-month figure, and a given spread. Thus, in this case the change in the reference rate in the given month automatically, uniformly and completely appears in the next month's interest rate conditions, the transmission mechanism is homogeneous, and any difference between the interest rates charged by banks can only be caused by the change in interest rate spreads. By contrast, in the case of fixed-rate loans, the reference rate may not necessarily be automatically incorporated into the conditions, and thus banks may reprice interest rates with a lag of several months.

If banks fail to incorporate the change in the reference rate into their interest rates immediately in the next month, it does not mean that they are adjusting their spreads to the same extent as the change, but with the opposite sign. It merely means that they are interested in delaying the repricing for some reason,

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[10] Government Decree No 17/2016. (II. 10.) on the Home Purchase Subsidy for Families for the purchase and extension of used homes. https://net.jogtar.hu/jogszabaly?docid=A1600017.KOR

for example because they wish to acquire market share. On the other hand, if banks do not modify their interest rates by the same amount as the change in the reference rate for a long time, that may not necessarily signal a temporary delay in repricing, but instead a permanent change in spreads. With respect to the speed of interest rate transmission for fixed-rate loans, one cannot rely solely on examining the change in conditions, and this is the reason behind the present econometric analysis. Nevertheless, these are the conditions that are relevant for households.

The practice of adjusting interest rate conditions was examined using the monthly changes in the CCFHL credit conditions[11] at the seven largest credit institutions operating in Hungary, and the shifts in the month-end interbank rates for the corresponding interest rate period, starting from January 2018. Three longer repricing periods were identified where interbank rates steadily rose or declined for months in the beginning. These periods were as follows:

• Period 1: BIRS rising between May and October 2018;

• Period 2: BIRS falling between November 2018 and August 2019;

• Period 3: the portion of the rise in BIRS since January 2021 lasting until the end of December 2021.

These periods were examined to see the extent of the cumulative change in the interest rate conditions of the banks under review in the individual months, relative to the cumulative BIRS change that occurred until the end of the previous month. Repricing within the month is very rare, therefore, and because of the overlap between the repricing periods, the cumulation of banks' interest rate repricing was started from a month later than that of BIRS changes.

The authors found varying practices among banks regarding repricing. Banks typically changed their conditions with a lag of 1–3 months after the first month of the persistent and significant rise/fall in the BIRS, while some institutions waited for 5–8 months in the beginning (*Figure 3*). The different repricing periods were characterised by different bank response times: with the exception of the bank that usually conducted the repricing at the slowest pace, banks first changed their conditions after one month in the first identified period, whereas the most typical lag was two months in the second period, and in the period of yield increase that began in January 2021 the most typical delay was three months or even longer, which suggests an intensification in competition among banks and a motivation to acquire market share.

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[11] The conditions of the market-priced housing loans without CCFHL certification were also analysed. In the case of most banks, these conditions were the same as the CCFHL conditions in all months during the period under review, however, certain large banks offered the non-CCFHL loans under stricter interest rate conditions, and the interest rates were changed much less frequently. Therefore, the paper examines the CCFHL conditions, which better capture the repricing of the banks under review.

Figure 3
Time needed for the first interest rate repricing following the change in the 5-year BIRS among banks disbursing CCFHLs with an initial interest rate fixation of 5 years

Note: The comparison only covers the seven largest credit institutions operating in Hungary that offer CCFHLs.

Source: Based on bank website data
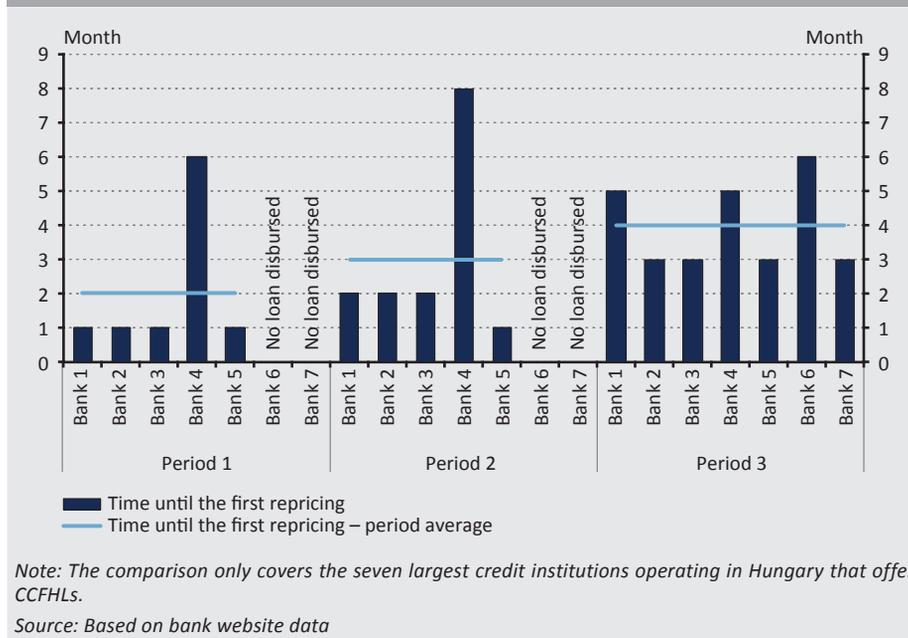
Another important lesson learnt from the comparative analysis was that the extent of banks' change in interest rates usually, and often significantly, fell short of the cumulative change in the BIRS observed until the end of the previous month in the given repricing period, so they were regularly followed by one or two changes in the same direction. An exception to this was the period of steeply rising interbank rates triggered by the tightening cycle: after September 2021, banks changed the conditions of housing loans in almost every month.

Analysing the ratio of the conditions and the cumulative changes in the BIRS not only in the beginning but also for each month, with a simple average across banks (*Figure 4*), the transmission is observed to vary in speed over the various repricing periods. In the first identified repricing period, full transmission was completed in three to four months on average, with an overall transmission of 82 per cent until the end of the period, following the continued rise in the reference rate. In the second repricing period characterised by a contracting reference rate, transmission stood at merely 50 per cent after three to four months, but averaged 83 per cent by the end of the period, meaning that banks permanently raised their spreads in this period. In the rising yield environment that began in January 2021, a steady decline in spreads can be observed, as not a single bank's tightening implemented until September 2021 reached the extent of the BIRS rise in the first two months of

the year (80 basis points), and on average banks' interest rate increases amounted to only 36 per cent of the BIRS rise recorded since the beginning of the year. After this, transmission began to pick up, but the extent of repricing only rose to 60 per cent until January 2022.

Figure 4
Cumulative change in the 5-year BIRS as well as the cumulative change in the interest rate conditions of the CCFHLs with an initial interest rate fixation of 5 years at individual banks relative to the cumulative change in the BIRS until the end of the preceding month
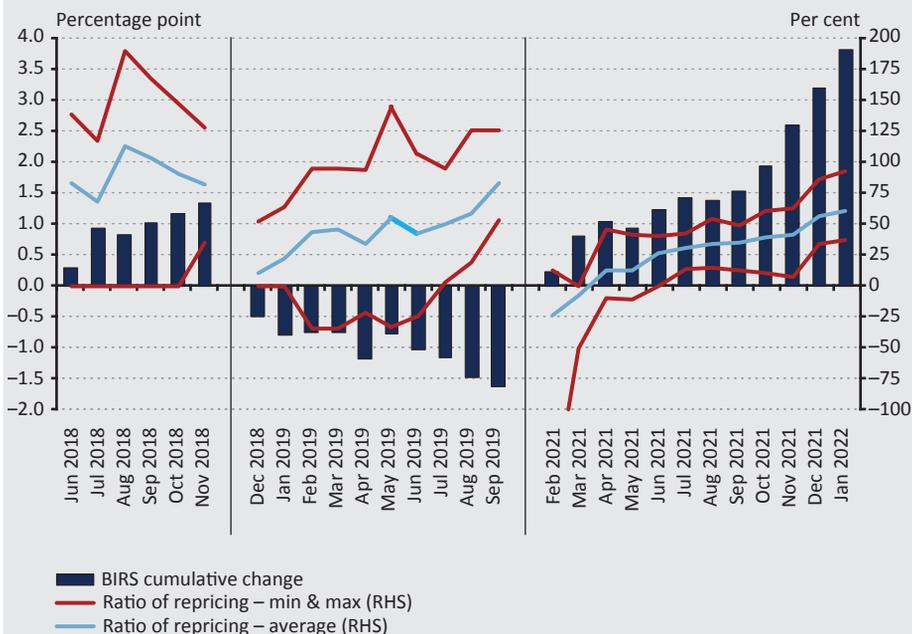
Note: The comparison only covers the seven largest credit institutions operating in Hungary that offer CCFHLs.

Source: Based on bank website data

The results obtained for the products with an interest rate fixation of 5 years were compared to the relationship between the conditions of the CCFHLs with an initial interest rate fixation of 10 years and the monthly changes in the 10-year BIRS. It was observed that the conditions of the products with an initial interest rate fixation of 5 or 10 years were typically changed by banks in the same periods, with differences in timing seen only rarely, and the repricing periods were also identical. By contrast, in the first and second identified repricing periods, the extent to which the cumulative change in the 10-year BIRS appeared in the average conditions of the large banks under review after the start of the given period fell short of the transmission seen in the case of the products with interest rate fixation of 5 years by 20 and 23 percentage points on average, respectively (*Figure 5*). However, the

same significant difference was not observed in the repricing period that started in January 2021, partly owing to the fact that while the 5-year BIRS increased more steeply than the 10-year BIRS, there are banks that usually change the conditions for the loans with an interest rate fixation of 5 and 10 years uniformly, which, of course, was reflected as a higher ratio of transmission in the case of 10-year conditions.

Figure 5
Changes in the interest rate conditions of the fixed-rate CCFHL products relative to the cumulative change in the 5-year and 10-year BIRS at the end of the identified period

Note: The comparison only covers the seven largest credit institutions operating in Hungary that offer CCFHLs.
Source: Based on bank website data
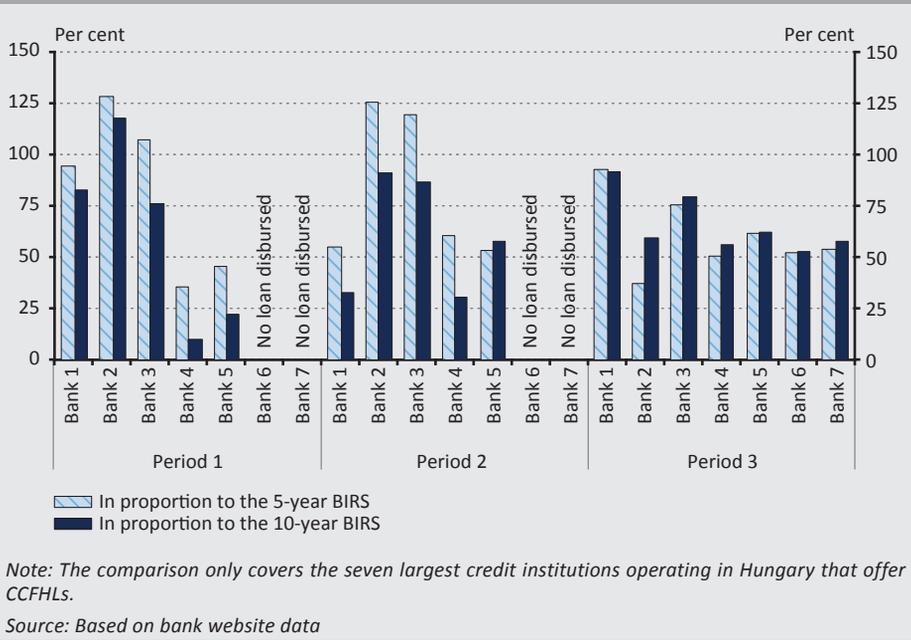
4. Examining the repricing of interest rates with time series econometrics

4.1. Methodology

In a simple vector autoregressive (VAR) model without constant and exogenous explanatory variables, all variables are explained with the lagged values of their own or of the other variables. According to *Lütkepohl* (*2005*), a K-dimensional stationary VAR(p) process can be written as follows:

$$\boldsymbol{y}_t = A_1 \boldsymbol{y}_{t-1} + \cdots + A_p \boldsymbol{y}_{t-p} + \boldsymbol{u}_t , \tag{3}$$

where the K × 1-sized vector denotes the time series to be modelled, A_j (j = 1, ..., p) are K × K-sized coefficient matrices, and the error term is K-dimensional white noise with an expected value of 0 and a variance-covariance matrix of Σu.

If the   observations are available, the coefficients and the error terms can be estimated with the ordinary least squares method (OLS). If there is a significant long-run equilibrium relationship, also known as cointegration, between the time series observed, a vector error correction model (VECM) should be used instead of the VAR model.

Due to the correlations in the time lag structure of the variables, the estimated coefficient values of the VAR model do not necessarily offer much information in themselves, as the causalities can only be appropriately interpreted by using impulse response functions. Impulse response functions show the ceteris paribus impact of a unit shock to a given model variable exerted on all model variables. Based on *Pfaff* (*2008*), they can be determined through the Wold moving average decomposition of the VAR(p) process:

$$\boldsymbol{y}_t = \Phi_0\,\boldsymbol{u}_t + \Phi_1\,\boldsymbol{u}_{t-1} + \Phi_2\,\boldsymbol{u}_{t-2} + \cdots, \tag{4}$$

where and can be calculated recursively from the equation

$$\Phi_s = \sum_{j=1}^{s} \Phi_{s-j}\,A_j \tag{5}$$

where s = 1, 2, …, and A_j = 0 for all j > p.

The Σu matrix may not necessarily be diagonal, so there may be a simultaneous correlation between the error terms in the different equations. If these correlation values differ significantly from zero, independent (uncorrelated) structural shocks should be identified using a structural vector autoregressive model to produce impulse response functions that can be appropriately interpreted from the perspective of economics.

4.2. Examining cointegration

In the relevant section of the literature, the interest rate transmission mechanism is usually examined using a vector error correction model (VECM), however, it can only be applied if the time series in the estimation are cointegrated. The most widely used method for testing cointegration is the Johansen test. In the creation of the model, the test was performed for analysing the relationship between the loans with an initial interest rate fixation of 1–5 years and 5–10 years and the interbank rate for the corresponding maturities as well as the adjusted cost of funds. The aggregate interest rate statistics included in the estimation and the BIRS rates are available from January 2007 with monthly frequency, and the latest observation was from November 2021 at the time when the estimation was performed.

Accordingly, using the entire available time series, the model is based on 179 observations for each variable.

According to the Johansen tests performed for all of the observations available in the period, no cointegration can be detected for either the loans with an initial interest rate fixation period of 1–5 years or those with a fixation of 5–10 years (for the test results, see *Tables 3.a*), *3.b*), *3.c*) and *3.d*) in the *Annex*. Besides taking into account the information criteria pertaining to the optimal number of lags, Johansen tests were also performed with a four-period lag of the BIRS and the adjusted cost of funds time series, because, based on the VAR model presented in the next section, the fourth lagged value of the BIRS and the adjusted cost of funds has the strongest explanatory power regarding the evolution of the APR. The cointegration is not confirmed by the Johansen tests performed based on this method either.

Moreover, the cointegration test was performed for all subperiods that lasted for at least 60 months to obtain better confirmation of the lack of a cointegration. The tests run for the subperiods were performed for 7,381 periods for the loans with an initial interest rate fixation of 1–5 years and those with a fixation of 5–10 years each. In the former case, based on the number of lags specified taking into account the information criteria, a cointegration between the time series was found at a significance level of 5 per cent in 23.8–24.4 per cent of cases, while in the case of the four lags used based on the experiences of the VAR model estimation, such a relationship was found in 19.3–35.0 per cent of cases (*Table 2*). In the case of the loans with an initial interest rate fixation of 5–10 years, a cointegration between the time series can be detected in 28.2–29.0 and 13.9–15.7 per cent of cases, respectively. This presence of cointegration was not deemed to be sufficient to use a VECM.[12]

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[12] In certain periods, cointegration was found in a large number of cases, so another paper may be dedicated to identifying any structural breaks (e.g. near-zero interest rate environment) and asymmetric repricing behaviour. Almost the entire period under review was characterised by a decline in interbank rates, and thus it was deemed that not enough observations were available in both categories to distinguish the repricing in a declining and a rising yield environment (for example, using a threshold VECM or a non-linear ARDL model).

Table 2

Share of subperiods exhibiting cointegration at a significance level of 5 per cent, by the starting year of the time series

		Interest rate period of 1–5 years			
Starting year of time series	Total number of estimated periods	5-year BIRS	Adjusted cost of funds	5-year BIRS with a 4-month lag	Adjusted cost of funds with a 4-month lag
2007	1,386	22.2	3.4	93.0	42.2
2008	1,242	25.7	3.2	37.8	7.1
2009	1,098	0	0	0	0
2010	954	0	0	0	0
2011	810	45.7	73.6	39.0	43.5
2012	666	45.5	45.5	49.4	53.2
2013	522	17.8	41.2	2.3	7.1
2014	378	58.5	90.5	11.9	0.8
2015	234	46.2	59.4	23.9	0
2016	90	91.1	78.9	74.4	6.7
2017	1	0	100	0	0
Total	**7,381**	**24.4**	**23.8**	**35.0**	**19.3**
		Interest rate period of 5–10 years			
Starting year of time series	Total number of estimated periods	10-year BIRS	Adjusted cost of funds	10-year BIRS with a 4-month lag	Adjusted cost of funds with a 4-month lag
2007	1,386	0	0	0	0
2008	1,242	31.6	27.9	8.1	14.1
2009	1,098	54.3	43.4	24.6	32.9
2010	954	54.8	44.3	54.9	44.3
2011	810	17.9	22.3	13.0	17.2
2012	666	12.2	26.4	0	0.8
2013	522	47.7	76.4	5.6	6.3
2014	378	25.9	29.1	0	0
2015	234	0	0	0	0
2016	90	0	27.8	0	26.7
2017	1	0	100	0	0
Total	**7,381**	**28.2**	**29.0**	**13.9**	**15.7**

Note: Calculated based on the cointegration tests run for the subperiods that lasted for at least 60 months.

4.3. Empirical results

The empirical analysis sought to establish the relationship between the mortgage rates of new loans and (1) interbank rates, as well as the (2) adjusted cost of funds calculated based on the method presented in *Section 1*, using the VAR model described in *Section 4.1.*[13] The model was estimated for the loans with an initial interest rate fixation of 1–5 years and 5–10 years and for the interbank rate for the corresponding maturities. Based on the results of the diagnostics run after the estimation for the loans with an interest rate fixation of 5–10 years,[14] the parameters estimated by the model are unreliable; therefore, the analysis is limited to housing loans with an interest rate fixation of 1–5 years.

Before estimating the model, the time series were tested, and in line with the results of the unit root tests, the stationary time series derived from the first differentials of the variables were incorporated into the models (*Annex Table 4*). Taking into account the conclusions of the tests pertaining to the optimal number of lags, the models included four lags (*Annex Table 5*), which is consistent with banks' repricing practices based on the earlier sections of the paper. The lags used ensured the lack of autocorrelation for the residuals (*Annex Table 6*).

As a first step in examining the relationships between the variables, the Granger causality test was performed on the time series to establish whether the lagged values of interbank rates can help predict the actual value of the lending rate (*Annex Table 7*). The null hypothesis of the test, according to which the change in the IRS does not forecast the change in the APR, can be rejected.[15]

In the next step, the VAR model was estimated to capture short-term shocks. The evolution of lending rates was explained by their own values and the lagged values of the BIRS variable denoting the shock. Accordingly, the following VAR models were estimated:

---

[13] During the creation of the model, besides the models detailed in the paper, the time series of the Herfindahl–Hirschman index produced by the authors, capturing the concentration among banks and calculated for the total outstanding housing loan portfolio of the Hungarian banking system was also included in the models as an exogenous variable, but it did not have a statistically significant explanatory power for the APR time series.

[14] Based on the Granger causality test, the significance value (p-value) related to the F-test testing the null hypothesis is 0.3151, in other words the change in the APR is not the result of the change in the IRS. A potential explanation for this is that the housing loans with an initial interest rate fixation of 5–10 years are relatively new products on the Hungarian market and have only recently become popular. Most of the housing loans with an initial interest rate fixation of 5–10 years typical earlier were contracts with building societies, the pricing of which is not necessarily aligned with interbank rates due to the special nature of the product.

[15] No reverse causality can be established, in other words the APR does not cause either the IRS or the adjusted cost of funds.

• Model equation of 5-year BIRS and APR:

$$\begin{pmatrix} \Delta\widehat{BIRS}_t \\ \Delta\widehat{APR}_t \end{pmatrix} = \begin{pmatrix} -0.009 \\ -0.014 \end{pmatrix} + \begin{pmatrix} 0.264 & 0.020 \\ 0.156 & -0.227 \end{pmatrix} \begin{pmatrix} \Delta BIRS_{t-1} \\ \Delta APR_{t-1} \end{pmatrix} + \begin{pmatrix} -0.273 & -0.036 \\ 0.102 & 0.045 \end{pmatrix} \begin{pmatrix} \Delta BIRS_{t-2} \\ \Delta APR_{t-2} \end{pmatrix} +$$
$$+ \begin{pmatrix} 0.158 & -0.050 \\ 0.224 & 0.153 \end{pmatrix} \begin{pmatrix} \Delta BIRS_{t-3} \\ \Delta APR_{t-3} \end{pmatrix} + \begin{pmatrix} 0.031 & 0.139 \\ 0.409 & 0.075 \end{pmatrix} \begin{pmatrix} \Delta BIRS_{t-4} \\ \Delta APR_{t-4} \end{pmatrix} + \begin{pmatrix} \widehat{u_{BIRS,t}} \\ \widehat{u_{APR,t}} \end{pmatrix}$$

(6)

• Model equation of adjusted cost of funds (ACF) and APR:

$$\begin{pmatrix} \Delta\widehat{ACF}_t \\ \Delta\widehat{APR}_t \end{pmatrix} = \begin{pmatrix} -0.014 \\ -0.018 \end{pmatrix} + \begin{pmatrix} 0.116 & 0.044 \\ 0.123 & -0.155 \end{pmatrix} \begin{pmatrix} \Delta ACF_{t-1} \\ \Delta APR_{t-1} \end{pmatrix} + \begin{pmatrix} -0.278 & -0.012 \\ 0.090 & 0.088 \end{pmatrix} \begin{pmatrix} \Delta ACF_{t-2} \\ \Delta APR_{t-2} \end{pmatrix} +$$
$$+ \begin{pmatrix} 0.000 & -0.006 \\ 0.140 & 0.176 \end{pmatrix} \begin{pmatrix} \Delta ACF_{t-3} \\ \Delta APR_{t-3} \end{pmatrix} + \begin{pmatrix} -0.028 & 0.132 \\ 0.415 & 0.066 \end{pmatrix} \begin{pmatrix} \Delta ACF_{t-4} \\ \Delta APR_{t-4} \end{pmatrix} + \begin{pmatrix} \widehat{u_{ACF,t}} \\ \widehat{u_{APR,t}} \end{pmatrix}$$

(7)

The independent assessment of the estimated parameters does not provide meaningful information on the behaviour of interest rates, as they only reflect partial effects, and examining the full impact, covering lagged and second-round effects, is more interesting. The behaviour of the model can be best illustrated using the impulse response describing the spread of the shock. The orthogonalised[16] impulse response functions show the response of the APR to the unit shock in the VAR error term of the BIRS and the adjusted cost of funds, assuming that all other error terms are unchanged. Since the differences of the individual variables were examined, the cumulative impulse response functions are shown, at a 24-month forward-looking horizon (*Figure 6*).

The most important result from the perspective of the study can be clearly seen in *Figure 6:* the APR has a statistically significant and persistent reaction to the shock to the BIRS and the adjusted cost of funds. The impulse response function attests that the APR changes considerably in the same direction as indicated by the sign of the shock to the BIRS and the adjusted cost of funds, and the change is the strongest in the first couple of months directly following the shock. The impact fades over time, albeit remaining significant and persistent throughout. It can also be stated that the APR can be expected to change by the same extent as the initial shock in four months in response to a unit shock to the BIRS, and after that the value of the impulse response function stabilises near the extent of the initial BIRS shock. The shock to the adjusted cost of funds passes through to the APR somewhat slower and to a more limited extent, but even in that case 80 per cent of the shock appears in the interest rate in just four months. It must be reiterated here that these results only reflect the transmission identified in aggregate interest rate statistics, and they do not mirror banks' typical repricing practices.

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[16] The specification of the impulse response function allowed the BIRS and the adjusted cost of funds to be influenced directly only by their own shocks, while the other shocks containing the impact of other factors shaping the spread (which is not relevant for this paper) could only affect them with a lag.

Figure 6
Impulse response function of the shock to the 5-year BIRS and the adjusted cost of funds affecting the APR values of the housing loans with interest rate fixation of 1–5 years (model estimated for the entire period)
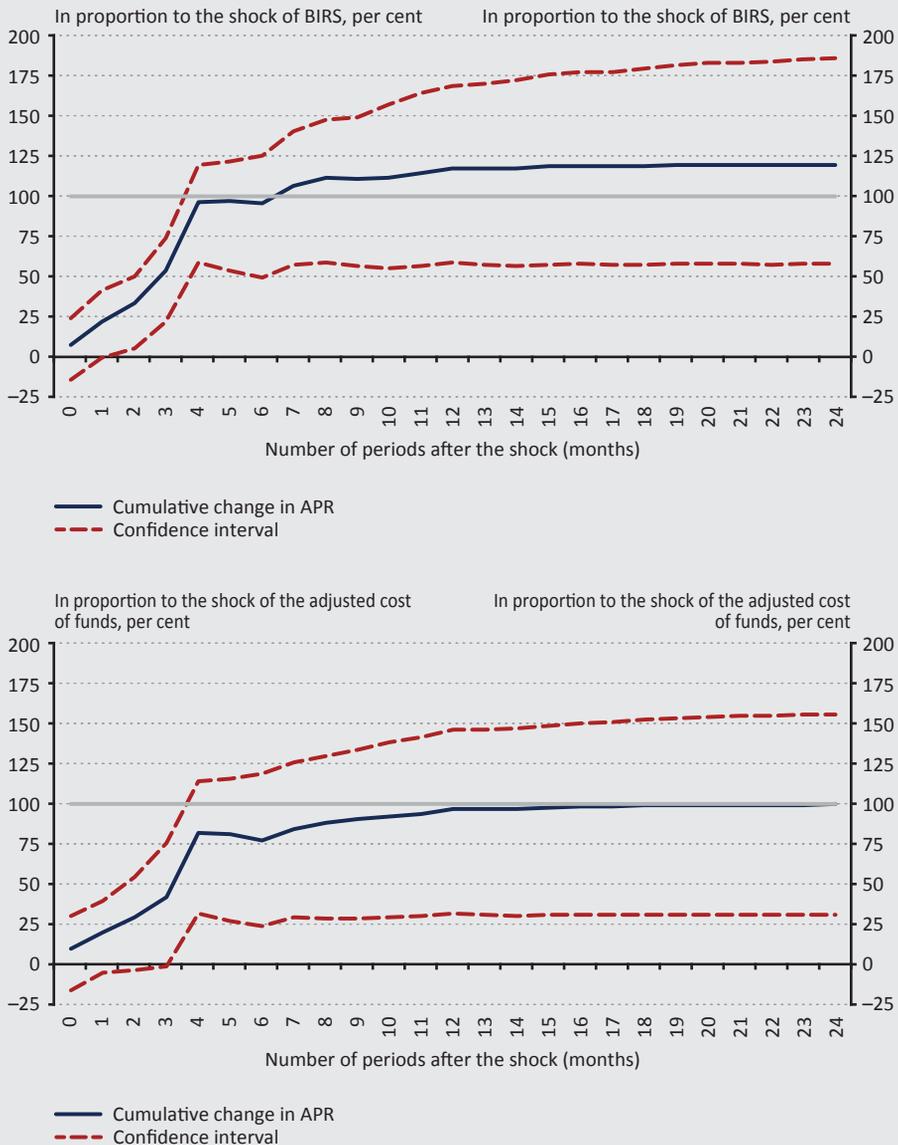
In proportion to the shock of BIRS, per cent

Number of periods after the shock (months)

Cumulative change in APR
Confidence interval

In proportion to the shock of the adjusted cost of funds, per cent

Number of periods after the shock (months)

Cumulative change in APR
Confidence interval

Note: 95-per cent bootstrap confidence intervals. The grey line shows the repricing that is identical in extent to the initial shock to the BIRS and the adjusted cost of funds.

Source: Calculations based on MNB data

The fit of the model specification of the entire time series was also examined on a subperiod. The start date of the narrower period was chosen to be March 2013, for several reasons. First, that was the month when the share of housing loans with an initial interest rate fixation of 1–5 years within new loans rose to over 30 per cent, and it can be assumed that banks increasingly adjusted the interest rates of these products to the cost of funds. Second, the pick-up in housing loans after the financial crisis began in 2013, and the market cycle that has lasted since then has been characterised by several structural changes, such as the Fair Bank Act and the debt cap rules as well as the introduction of CCFHL products. The following VAR models were estimated for the subperiod:

• Model equation of 5-year BIRS and APR:

$$
\begin{pmatrix} \Delta\widehat{BIRS}_t \\ \Delta\widehat{APR}_t \end{pmatrix} = \begin{pmatrix} 0.021 \\ -0.020 \end{pmatrix} + \begin{pmatrix} 0.285 & 0.084 \\ -0.002 & 0.043 \end{pmatrix} \begin{pmatrix} \Delta BIRS_{t-1} \\ \Delta APR_{t-1} \end{pmatrix} + \begin{pmatrix} 0.069 & 0.234 \\ 0.123 & 0.044 \end{pmatrix} \begin{pmatrix} \Delta BIRS_{t-2} \\ \Delta APR_{t-2} \end{pmatrix} +
$$
$$
+ \begin{pmatrix} 0.021 & 0.283 \\ 0.294 & 0.197 \end{pmatrix} \begin{pmatrix} \Delta BIRS_{t-3} \\ \Delta APR_{t-3} \end{pmatrix} + \begin{pmatrix} -0.159 & -0.081 \\ 0.146 & 0.002 \end{pmatrix} \begin{pmatrix} \Delta BIRS_{t-4} \\ \Delta APR_{t-4} \end{pmatrix} + \begin{pmatrix} \widehat{u_{BIRS,t}} \\ \widehat{u_{APR,t}} \end{pmatrix}
$$
(8)

• Model equation of adjusted cost of funds (ACF) and APR:

$$
\begin{pmatrix} \Delta\widehat{ACF}_t \\ \Delta\widehat{APR}_t \end{pmatrix} = \begin{pmatrix} 0.003 \\ -0.014 \end{pmatrix} + \begin{pmatrix} 0.228 & 0.073 \\ -0.047 & 0.146 \end{pmatrix} \begin{pmatrix} \Delta ACF_{t-1} \\ \Delta APR_{t-1} \end{pmatrix} + \begin{pmatrix} -0.009 & 0.136 \\ 0.093 & 0.165 \end{pmatrix} \begin{pmatrix} \Delta ACF_{t-2} \\ \Delta APR_{t-2} \end{pmatrix}.
$$
$$
+ \begin{pmatrix} -0.025 & 0.128 \\ 0.270 & 0.161 \end{pmatrix} \begin{pmatrix} \Delta ACF_{t-3} \\ \Delta APR_{t-3} \end{pmatrix} + \begin{pmatrix} -0.206 & 0.033 \\ 0.099 & 0.004 \end{pmatrix} \begin{pmatrix} \Delta ACF_{t-4} \\ \Delta APR_{t-4} \end{pmatrix} + \begin{pmatrix} \widehat{u_{ACF,t}} \\ \widehat{u_{APR,t}} \end{pmatrix}
$$
(9)

Both estimated models showed that the interest rate transmission mechanism has recently slowed down somewhat: based on the impulse response function fitted to the subperiod model, the BIRS shock is expected to almost fully pass through to lending rates in aggregate interest rate statistics in six months, and 75 per cent of the pass-through occurs in the case of the shock to the adjusted cost of funds during the same period, while complete repricing takes more time, just like in the model fitted to the entire period (*Figure 7*). In the case of the model containing the BIRS, repricing amounting to twice the initial shock was seen in the longer run, but this is only because in the longer run the shock triggers a change in the BIRS that is more than twice as large as in the first period (*Annex Table 8*). According to model diagnostics, the model specifications perform well on the subsample: the results show a lack of autocorrelation in residuals, which contain no ARCH effect in any of the model equations, and their distribution can be deemed normal (*Annex Table 6*). In other words, the models have a good fit for the narrow time series.

Figure 7
Impulse response function of the shock to the 5-year BIRS and the adjusted cost of funds affecting the APR values of the housing loans with interest rate fixation of 1–5 years (model estimated for the subperiod)

In proportion to the shock of BIRS, per cent   In proportion to the shock of BIRS, per cent

Number of periods after the shock (months)

— Cumulative change in APR
--- Confidence interval

In proportion to the shock of the adjusted cost of funds, per cent   In proportion to the shock of the adjusted cost of funds, per cent

Number of periods after the shock (months)

— Cumulative change in APR
--- Confidence interval
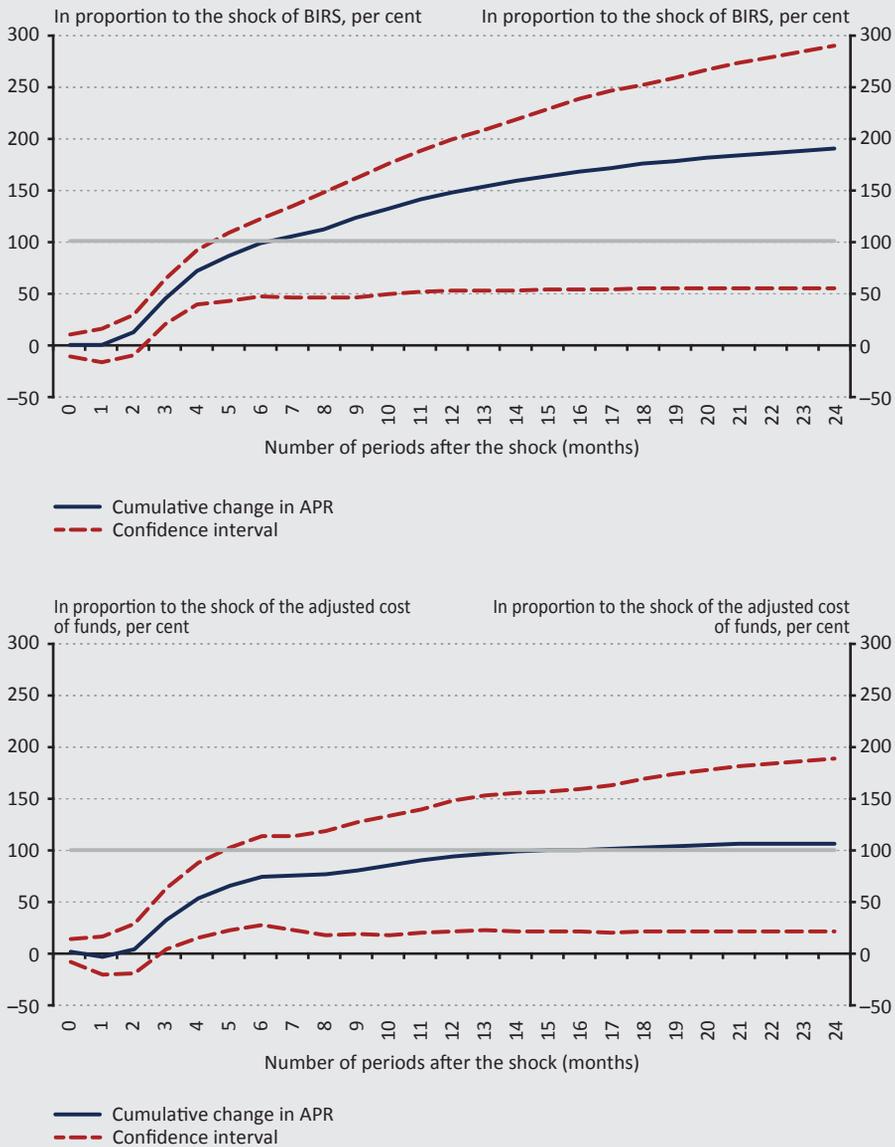
Note: 95-per cent bootstrap confidence intervals. The grey line shows the repricing that is identical in extent to the initial shock to the BIRS and the adjusted cost of funds.

Source: Calculations based on MNB data

The following can be stated based on the comparison of the models estimated for the longer and the shorter time series: in the model for the entire time series, the shocks to the adjusted cost of funds and the BIRS explain 16–24 per cent of the variance in the long-run APR changes, while the same figure is 26–45 per cent for the shorter time series with the same lag structure (*Figure 8*). This suggests that, based on aggregate interest rate statistics, banks increasingly adjust the pricing of their products to the cost of funds, which may be explained by the rise in the share of housing loans with an initial interest rate fixation of 1–5 years within all new loans, as well as by other institutional, structural and market-based factors, which have a varying impact on the data for the subperiod. Variance decomposition also shows that the explanatory power of the BIRS for the APR proved to be stronger than that of the adjusted cost of funds derived by the authors.

Finally, based on the above results, it should be examined how the spread would evolve if it were calculated based on the current value of the average APR and the value of the BIRS from four and six months earlier (lagged spread). Assuming that the results estimated from the models accurately capture banks' time requirement for repricing and thus give a good approximation of the speed of transmission even looking ahead, it could be claimed that banks have persistently changed their spreads when repricing takes longer or shorter than four months, or six months if the results of the subperiod are considered. In other respect, the lagged spread shows the spread expected in four or six months, with the reference rate and other factors being unchanged. This train of thought is illustrated in *Figure 9*, which shows that while the spread calculated without taking into account the time lag was dispersed in a range of several percentage points since the rise in CCFHL products in 2018, the value of lagged spreads in the same period was always close to the 3.5 percentage points allowed by the CCFHL regulations. Based on this, the fluctuation in spreads is mainly derived from banks' delay in repricing, and no intentional and persistent adjustment can be identified in the banking system as a whole.

Figure 8
Variance decomposition of the forecast errors of the average APR change

Whole period   Subperiod

Years following the shock

■ BIRS
■ APR

■ Adjusted cost of funds
■ APR
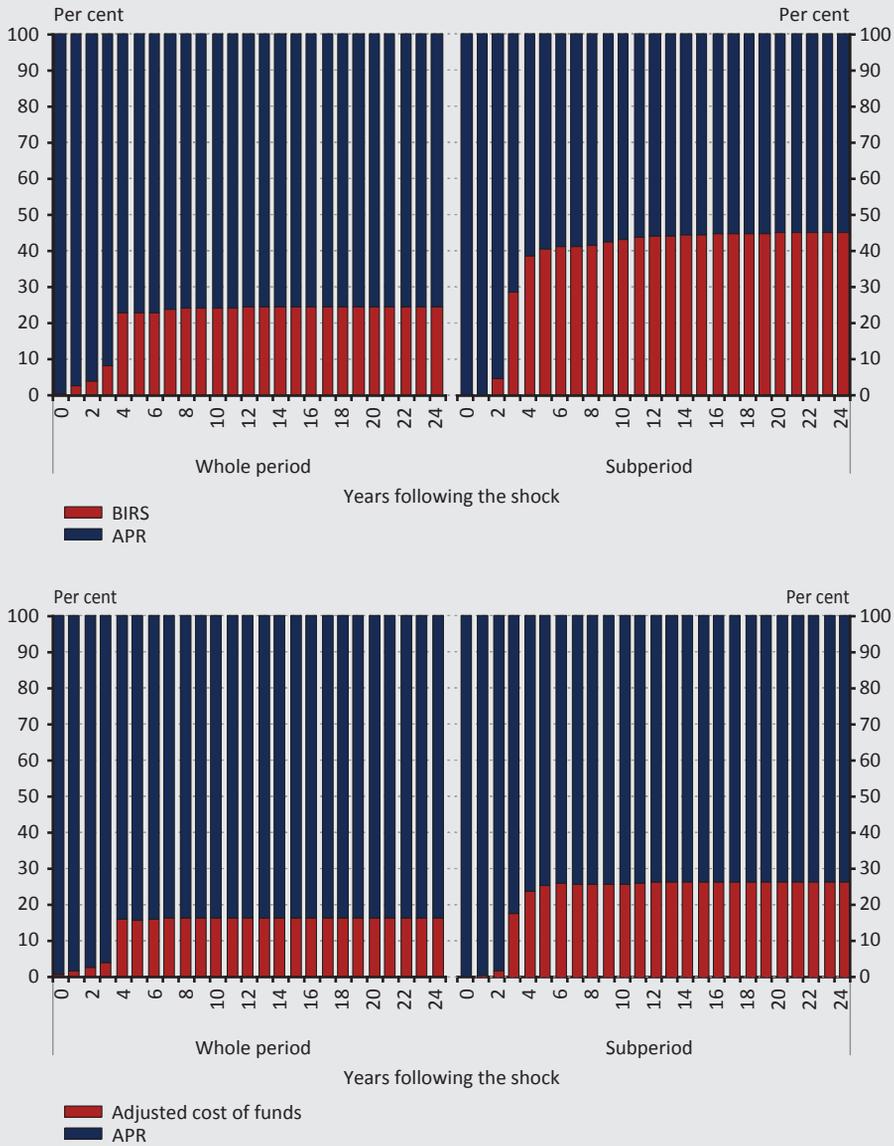
Source: Calculations based on MNB data

Figure 9
Spreads and lagged spreads of the housing loans with interest rate fixation of 1–5 years

Note: The time series calculated with a lag of 4 and 6 months are based on the APR for the given month and the BIRS interest rates from 4 and 6 months earlier. Time series smoothed with three-month averages.

Source: Based on MNB data
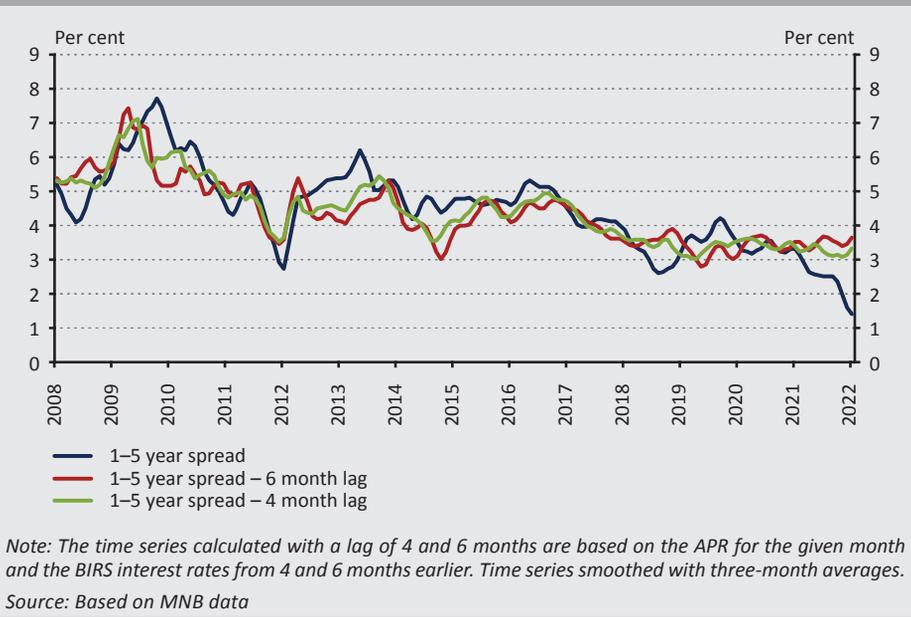
5. Conclusions

The analysis examined a crucial element in the interest rate channel of the monetary policy transmission mechanism, namely the relationship between new housing loan rates and interbank rates, employing not only simple statistical methods but also econometric tools. The actual adjustment to interbank rates was examined using the CCFHL credit conditions at the seven largest credit institutions operating in Hungary, starting from January 2018. Three longer repricing periods were examined to see the extent of the cumulative change in the interest rate conditions of the CCFHL loans offered by banks in the individual months, relative to the cumulative BIRS change that occurred until the end of the previous month. It was observed that banks' pricing practices vary: some of them wait for 1 to 3 months in the beginning, while others wait as long as 5 to 8 months. Interest rate stickiness is also suggested by the fact that the extent of banks' initial interest rates adjustment typically fell short of the cumulative change in the BIRS observed until the end of the previous month. It can also be stated that the transmission used by institutions varied in speed and extent depending on the duration of the repricing period.

The estimation on aggregate interest rate statistics showed that, considering the entire time series, a unit shock to the 5-year interbank rate is expected to pass through to the average housing loan rates with an initial interest rate fixation of

1–5 years in four months. The impulse response function fitted to the subperiod model also showed that transmission is the strongest in the third and fourth month following the shock, but the complete interest rate pass-through required an average of six months over this horizon. The shock to the adjusted cost of funds passes through to the APR somewhat slower and to a more limited extent, in the case of both the entire time series and the subperiod. It should be noted, however, that the estimated speed of transmission may be influenced by the distortive effects identified in connection with aggregate interest rate statistics, and therefore banks' typical repricing practices experienced by customers may differ from these.

Several avenues of further research can be determined based on the lessons from this paper. First, a more accurate understanding of the speed of interest rate transmission could be gained if it was estimated using institutions' actual cost of funds. A good starting point for this strand of research could be *Varga* (*2021*), who examined interest rate pass-through based on the interbank rate and banks' weighted average cost of funds, identifying a more stable equilibrium relationship based on the latter. Interesting findings could be presented about banks' pricing behaviour if the interest rate transmission was modelled not only based on aggregate interest rate statistics but also at the level of individual banks. If sufficient data are available in the future, it should also be examined whether the APR adjusts differently depending on whether the cost of funds decreases or increases. Finally, this study and the avenues for research listed here could be extended beyond housing loans to cover other types of bank loans, such as personal loans.

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Annex: Test results of the model

Table 3

Results of the Johansen cointegration tests

a) 1–5-year interest rate fixation (cost of funds: BIRS)

Unit vectors (eigenvalue statistics)	APR	IRS	Constant	
APR	1.0	1.0	1.0	
BIRS	−1.27	469.33	−1.16	
Constant	−3.22	−1 834.12	−6.73	

Number of cointegration vectors	Test statistics	Critical value at 10% significance level	Critical value at 5% significance level	Critical value at 1% significance level
At least one	2.03	7.52	9.24	12.97
Zero	12.10	13.75	15.67	20.20

Unit vectors (trace statistics)	APR	IRS	Constant	
APR	1.0	1.0	1.0	
BIRS	−1.27	469.33	−1.16	
Constant	−3.22	−1 834.12	−6.73	

Number of cointegration vectors	Test statistics	Critical value at 10% significance level	Critical value at 5% significance level	Critical value at 1% significance level
At least one	2.03	7.52	9.24	12.97
Zero	14.13	17.85	19.96	24.60

b) 1–5-year interest rate fixation (cost of funds: adjusted cost of funds)				
Unit vectors (eigenvalue statistics)	**APR**	**Adjusted cost of funds**	**Constant**	
APR	1.0	1.0	1.0	
Adjusted cost of funds	−1.76	−6.45	−0.49	
Constant	−3.50	2.51	−10.57	

Number of cointegration vectors	**Test statistics**	**Critical value at 10% significance level**	**Critical value at 5% significance level**	**Critical value at 1% significance level**
At least one	1.72	7.52	9.24	12.97
Zero	9.10	13.75	15.67	20.20

Unit vectors (trace statistics)	**APR**	**Adjusted cost of funds**	**Constant**	
APR	1.0	1.0	1.0	
Adjusted cost of funds	−1.76	−6.45	−0.47	
Constant	−3.50	2.52	−10.57	

Number of cointegration vectors	**Test statistics**	**Critical value at 10% significance level**	**Critical value at 5% significance level**	**Critical value at 1% significance level**
At least one	1.72	7.52	9.24	12.97
Zero	10.82	17.85	19.96	24.60

c) 5–10-year interest rate fixation (cost of funds: BIRS)

Unit vectors (eigenvalue statistics)	APR	IRS	Constant	
APR	1.0	1.0	1.0	
BIRS	−2.66	0.28	1.42	
Constant	1.85	−2.98	−23.27	

Number of cointegration vectors	Test statistics	Critical value at 10% significance level	Critical value at 5% significance level	Critical value at 1% significance level
At least one	2.15	7.52	9.24	12.97
Zero	5.52	13.75	15.67	20.20

Unit vectors (trace statistics)	APR	IRS	Constant	
APR	1.0	1.0	1.0	
BIRS	−2.66	0.28	1.42	
Constant	1.85	−2.98	−23.26	

Number of cointegration vectors	Test statistics	Critical value at 10% significance level	Critical value at 5% significance level	Critical value at 1% significance level
At least one	2.15	7.52	9.24	12.97
Zero	7.76	17.85	19.96	24.60

d) 5–10-year interest rate fixation (cost of funds: adjusted cost of funds)			
Unit vectors (eigenvalue statistics)	**APR**	**Adjusted cost of funds**	**Constant**
APR	1.0	1.0	1.0
Adjusted cost of funds	−3.72	−0.66	18.08
Constant	1.20	−2.15	−93.28

Number of cointegration vectors	**Test statistics**	**Critical value at 10% significance level**	**Critical value at 5% significance level**	**Critical value at 1% significance level**
At least one	1.65	7.52	9.24	12.97
Zero	10.09	13.75	15.67	20.20

Unit vectors (trace statistics)	**APR**	**Adjusted cost of funds**	**Constant**
APR	1.0	1.0	1.0
Adjusted cost of funds	−3.72	−0.66	−18.08
Constant	1.20	−2.14	−93.28

Number of cointegration vectors	**Test statistics**	**Critical value at 10% significance level**	**Critical value at 5% significance level**	**Critical value at 1% significance level**
At least one	1.65	7.52	9.24	12.97
Zero	11.74	17.85	19.96	24.60

Table 4 Unit root tests						
Time series	**APR differenced**	**IRS differenced**	**Adjusted cost of funds differenced**	**APR**	**IRS**	**Adjusted cost of funds**
Augmented Dickey Fuller test	−4.99	−4.67	−5.61	−2.15	−0.73	−1.89
p-value	0.001	0.001	0.001	0.51	0.97	0.62
Stationarity	Stationary	Stationary	Stationary	Non-stationary	Non-stationary	Non-stationary

Note: Null hypothesis: time series are non-stationary.

Table 5
Optimal number of lags

a) BIRS

Information requirement	Akaike	Hannan–Quinn	Schwarz
Optimal number of lags	4	4	4

b) Adjusted cost of funds

Information requirement	Akaike	Hannan–Quinn	Schwarz
Optimal number of lags	4	4	1

Table 6
The results of the model diagnostics

a) BIRS 5

	Autocorrelation – Portmanteau test	ARCH effect – Lagrange Multiplier test (multivariate)	ARCH effect – Lagrange Multiplier test (APR)	ARCH effect – Lagrange Multiplier test (BIRS)	Normality – Jarque-Bera test
Full time series					
Chi-squared test	45.12	93.35	17.36	43.39	515.43
p-value	0.59	0.001	0.36	0.001	0.001
Narrow time series					
Chi-squared test	42.33	49.46	20.46	7.83	5.03
p-value	0.70	0.30	0.20	0.95	0.28

b) Adjusted cost of funds

	Autocorrelation – Portmanteau test	ARCH effect – Lagrange Multiplier test (multivariate)	ARCH effect – Lagrange Multiplier test (APR)	ARCH effect – Lagrange Multiplier test (adjusted cost of funds)	Normality – Jarque-Bera test
Full time series					
Chi-squared test	51.50	96.84	12.95	40.63	530.65
p-value	0.34	0.001	0.68	0.001	0.001
Narrow time series					
Chi-squared test	44.92	49.96	8.59	17.29	1.90
p-value	0.75	0.28	0.93	0.36	0.38

Table 7
Granger causality tests
a) BIRS 5

Time series	Null hypothesis: the change in the IRS is not the result of the change in the APR	Null hypothesis: the change in the APR is not the result of the change in the IRS
F-test	1.18	12.75
p-value	0.32	0.001

b) Adjusted cost of funds

Time series	Null hypothesis: the change in the adjusted cost of funds is not the result of the change in the APR	Null hypothesis: the change in the APR is not the result of the change in the adjusted cost of funds
F-test	1.25	7.77
p-value	0.28	0.001

Table 8
Cumulative impulse response function values of the unit shock to the 5-year BIRS and the adjusted cost of funds

Number of months elapsed since the shock	Cumulative impulse response function values of the shock to the 1–5-year BIRS				Cumulative impulse response function values of the shock to the 1–5-year adjusted cost of funds			
	Full time series		Narrow time series		Full time series		Narrow time series	
	BIRS 5 -> BIRS 5	BIRS 5 -> APR	BIRS 5 -> BIRS 5	BIRS 5 -> APR	Adjusted cost of funds -> Adjusted cost of funds	Adjusted cost of funds -> APR	Adjusted cost of funds -> Adjusted cost of funds	Adjusted cost of funds -> APR
0	1.000	0.059	1.000	−0.008	1.000	0.102	1.000	0.013
1	1.265	0.201	1.284	−0.010	1.121	0.209	1.229	−0.032
2	1.063	0.314	1.431	0.112	0.860	0.306	1.270	0.045
3	1.089	0.523	1.521	0.444	0.799	0.437	1.254	0.340
4	1.225	0.959	1.461	0.710	0.854	0.852	1.065	0.554
5	1.246	0.984	1.543	0.856	0.904	0.838	1.038	0.688
6	1.202	0.978	1.699	0.981	0.909	0.801	1.105	0.774
7	1.213	1.099	1.826	1.051	0.910	0.875	1.190	0.786
8	1.297	1.166	1.939	1.123	0.966	0.915	1.285	0.800
9	1.311	1.170	2.016	1.227	0.970	0.936	1.327	0.837
10	1.283	1.185	2.059	1.323	0.950	0.955	1.330	0.884
11	1.299	1.222	2.106	1.407	0.957	0.972	1.320	0.937
12	1.325	1.257	2.159	1.480	0.967	1.000	1.313	0.980
13	1.323	1.258	2.211	1.535	0.970	1.003	1.320	1.007
14	1.316	1.261	2.261	1.584	0.971	1.003	1.338	1.023
15	1.322	1.279	2.303	1.632	0.972	1.014	1.356	1.034
16	1.332	1.288	2.337	1.676	0.976	1.020	1.369	1.045
17	1.331	1.287	2.366	1.717	0.976	1.022	1.375	1.058
18	1.328	1.290	2.393	1.754	0.975	1.024	1.377	1.071
19	1.331	1.297	2.418	1.786	0.976	1.027	1.378	1.082
20	1.334	1.300	2.442	1.814	0.977	1.029	1.379	1.091
21	1.333	1.299	2.463	1.839	0.978	1.030	1.383	1.098
22	1.332	1.300	2.482	1.862	0.978	1.031	1.387	1.102
23	1.334	1.303	2.498	1.883	0.978	1.032	1.390	1.106
24	1.335	1.304	2.513	1.902	0.978	1.032	1.393	1.110
25	1.334	1.304	2.526	1.919	0.978	1.033	1.394	1.114

Effect of the Yield Level, the Inflation Environment and the Pandemic on the Lapse Rates of Life Insurances*

László Szepesváry

This study examines the lapse rates of certain life insurances in relation to various economic and non-economic events, analysing empirical insurance data, in search of answers to the questions of what impact the changed yield and inflation environments and lockdowns due to Covid-19 had on the cancellation of contracts, and how sensitive policyholders are to changes in yields in the case of certain investment-type insurances. In addition to the conclusions drawn on the basis of time series data, further statistical analyses (such as Granger causality testing, contract classification with k-means clustering) contribute to a more complete picture. The effect of certain changes in the interest rate level on lapses can be detected in the case of the single premium investment-type insurance under review (especially for the higher premium classes). No similar behaviour is typical of the current premium insurances under review, and so far it has also not been possible to detect any significant relationship with lapses in connection with inflation or the lockdowns due to Covid-19.

1. Introduction

Life insurance is a long-term business. The policyholder and the insurance company sign a contract for a long period of time (even for several decades) for an insured event that depends on the insured person's being alive. Both the relevant legislation and the terms and conditions of the insurance contract itself contain the conditions of cancellation and lapse of the insurance. The insurance company is not entitled to cancel a life insurance contract. The policyholder may exercise his/her right of cancellation; each contract determines in what cases, with what effect and under what conditions the contract can be terminated. In the case of life insurances that

contain an investment element as well (in our study we examine these types of insurances), typically some kind of residual right is also associated with cancellation of the life insurance. The most frequent case is that the policyholder surrenders his/her contract, which means that the contract is terminated definitely, and simultaneously with that the insurance company pays back to the policyholder a certain part of the premium reserve accumulated for the later service from the premiums collected until then. In the case of traditional life insurance products, the insurance company undertakes a long-term interest rate guarantee vis-à-vis its policyholders. It is the so-called technical interest rate, which shows the interest rate undertaken by the insurance company in advance for the coverage accumulated for later services (this is what they call premium reserve). Therefore, the insurance company must make long-term investments. Cancellations of a given type of insurance are very important in terms of yields and liquidity, and the lapse rates are also of crucial importance in terms of the cash flows (e.g. insurance premiums, insurance service payments, costs, etc.) that affect the insurance company's long-term profitability. It is not surprising that the statistical analysis of lapses and lapse effects are important subjects in the insurance profession and insurance mathematics (actuarial science). This is also demonstrated by the fact that the so-called standard formula of the Solvency II framework,[1] which regulates insurance companies' solvency capital requirement, also determines a capital requirement for the lapse risk.

In the Hungarian literature, *Hanák* (*2001*) deals in detail with the mathematical model of lapses and the underlying factors. *Janecek* (*2012*) proposes to take into account the underwriting year of the contract, the elapsed time from the beginning of the contract and the type of the product in any case when analysing lapses. Using an empirical sample, *Szepesváry* (*2015*) examined whether the insurance premium and the policyholder's entry age have a significant impact on lapses. The so-called survival models (see, for example, *Vékás 2011*) constitute an accepted methodological basis for analyses of this kind. Where T indicates the time until lapse, the function defined with the formula $G(t) = P(T \geq t)$ is called the survival function, which gives the probability for the individual t points of time that the contract was in-force for at least t months. The two best-known survival models are the Kaplan–Meier estimate and the Cox regression. Explanatory variables may also be involved in the estimate in the case of the latter.

The relationship between external factors and lapses is also analysed in the literature. A related notion is the phenomenon known as dynamic policyholder behaviour (see, for example, *Barsotti et al. 2016*). This refers to the modelling of the

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[1] See, for example, *Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II)* (https://eur-lex. europa.eu/legal-content/EN/TXT/?uri=celex:32009L0138, downloaded: 1 February 2022) or https://www. mnb.hu/felugyelet/szabalyozas/szolvencia-ii (Downloaded: 1 February 2022)

effect that the probability of drawdown of the options available for policyholders (e.g. lapse) may change dynamically in view of the external (e.g. economic) environment. *Campbell et al.* (*2014:47*) highlight two main hypotheses with regard to surrenders. According to the interest rate hypothesis, lapse rates show a negative relationship with internal return (e.g. with the technical interest rate) and a positive relationship with external (e.g. market) interest rates, i.e. if the yield guarantee is high, lapse by policyholders tends to be lower, whereas more policyholders cancel their contracts if other forms of investment offer higher yields. According to the 'emergency fund hypothesis', surrenders mostly take place as a result of difficult financial positions. This study also examines materialisation of the interest rate hypothesis and emergency fund hypothesis in Hungary in certain cases. Using generalised linear modelling, *Kim* (*2005*) estimates the probability of lapse on the basis of the unemployment rate, economic growth, the indicator of the period of financial crisis and the age of the contract. *Poufinas – Michaelide* (*2018*) examine the trends in lapses as a function of various macroeconomic variables (such as unemployment, inflation and interest rates). *Russell et al.* (*2013*) find empirical evidence for materialisation of the interest rate and emergency fund hypotheses. For insurances with profit participation, *Grosen and Jorgensen* (*2000*) examine whether the contract can be decomposed into the sum of a risk-free policy, a bonus option and a surrender option element. *Milhaud et al.* (*2011*) model lapses with logistic regression and decision tree methods. In addition, the Cox regression also has a variant that contains time-dependent covariates as well (see, for example, *Fisher – Lin 1999*), which is a suitable tool for the inclusion of variables related to dynamic policyholder behaviour.

In this study, changes in lapses are examined in relation to external, economic and non-economic events that are similar to the ones described above. We examine, for example, how the change in the yield and inflation levels as well as the lockdowns related to Covid-19 affected the probability of lapse. For this, we examine the time series of lapse rates of traditional single and current premium life insurances that contain an investment element, using graphic and statistical tools as well.

2. Analysed data and their sources

The analysis was prepared on the basis of empirical insurance data. The insurance types listed below are examined in the study. The features of traditional life insurance products are only briefly summarised in the study; one can read about the related traditional techniques in more detail in the book by *Banyár* (*2016*), for example.

• Traditional, regular premium endowment product with technical interest rate and yield surplus participation if the yield exceeds the technical interest rate. In the case of life insurances, the technical interest rate means a kind of guaranteed

yield level, for which the insurance company undertakes a guarantee that it will pay at least the interest yield on the premium reserve accumulated from the policyholder's payments. In addition, if the actual yield exceeds the technical interest rate (the surplus is called yield surplus), a portion of that, as determined in the terms and conditions of the contract, is also returned by the insurance company to the policyholder. We examined groups of contracts with 2.25 per cent and 1.6 per cent technical interest rates, where at least 80 per cent of the yield surpluses above these rates are refunded by the insurance company. In addition, the essence of endowment products is that the chosen sum assured is paid by the insurance company even if the insured person survives until the end of the term, but the total amount is also disbursed if the insured person dies during the term. As it is uncertain (and depends on the insured person's being alive) how long the insurance premiums are received and when the total sum assured has to be paid, this scheme contains a material mortality risk, the cover for which is included by the insurance company in the insurance premiums. In the case of death, the beneficiaries of the insurance may even get back a significantly higher amount compared to the premium paid until then. The insurance company deducts cover from the insurance premium for the mortality risk and costs as well, and the rest is invested into the premium reserve (which bears interest as described above), and this will be the basis for future services. If the policyholder does not wish to pay the regular premium after a certain point of time, the current premium reserve will constitute the basis for his/her residual rights. For example, if he/she surrenders his/her contract, the insurance company will refund a certain part of the premium reserve to him/her.

• Current premium investment-type life insurance (pure endowment product with 2.25 per cent or 1.6 per cent technical interest rate and at least 80 per cent yield surplus participation). A scheme similar to the one presented in the previous point, with lower mortality sum. Accordingly, of the investment and mortality risk elements, the investment part dominates in the insurance in this case.

• Current premium pension product (with 2 per cent or 1.6 per cent technical interest rate and at least 80 per cent yield surplus participation). An insurance product similar to the one presented in the previous point, which can be bought by policyholders as savings for retirement. Under certain conditions, pursuant to the prevailing legislation, a 20 per cent tax refund granted by the state can be received on the premiums paid, which may represent an excellent return for the policyholder. However, a high penalty is imposed on the policyholder in the case of surrender, especially in terms of the tax refund.

• Single premium traditional investment-type life insurance, with short-term yield periods fixed in advance. The insurance company announces the short-term yield periods with quarterly frequency, in every case in advance, in the form of yields

promised for the individual contracts. Accordingly, not later than until the end of the given month all policyholders may gather information about the yields offered by the insurance company for the next month, and may decide to maintain their savings or surrender them depending on that. Consequently, the expected yield is foreseeable for policyholders for 1–3 months. In the case of surrender, a low penalty burdens policyholders (not even in every case), and thus the policyholder can invest his/her savings in another scheme without any significant sanction. In addition to the investment element, accident insurance services are also included in the contract.

The analysed specific products and contract groups originate from the portfolio of a Hungarian life insurance company. *Due to the limiting of business recognisability, the axes of the figures presented (e.g. lapse rate) are rescaled in the study. Nevertheless, this does not significantly change the interpretations and conclusions.*

The monthly lapse rates of individual products and product groups and their relations with various external and internal circumstances are examined in the period between 2019 and 2021. Lapse rate means the ratio of the contract volume cancelled (surrendered contracts or contracts with terminated premium payment) in the given month to the average in-force portfolio in that month. We quantified lapse rates by policy and by premium. We examine them as a function of the factors listed below.

• How do the external and internal interest rate environments affect the lapses of life insurances?

– The role of the yield guarantee provided by the technical interest rate, which is also regulated in a Decree of the Magyar Nemzeti Bank (the Central Bank of Hungary, MNB),[2] may appreciate in a low yield environment, whereas in a reverse case it may happen (see the aforementioned interest rate hypothesis) that lapses increase if the available external yields exceed the technical interest rate (and if the policyholder does not receive a high enough portion from the yield surplus either). In view of the strong increase in yields that started in the last months of 2021, this is an important, topical issue in the case of traditional life insurance products.

– Similarly, in the case of the single premium insurance under review, we examine the impact on lapses of the external yield environment and of the internal short-term interest rates fixed in advance to the portfolio and the individual contracts: how does it affect the lapse rate if the interest rate level promised to the given policyholder declines during the next fixed yield period?

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[2] See: https://net.jogtar.hu/jogszabaly?docid=a1500054.mnb

– The external interest rate environment is measured with the 1-, 5- and 10-year benchmark yields of the Government Debt Management Agency (ÁKK),[3] and we also examine the effect exerted by the introduction of a preferential government bond (such as the MÁP+ super government bond[4]) available for households.

• How does the increase in inflation affect the lapse rates of life insurances?

– Similarly to yields, inflation also increased significantly in the final months of 2021. It may result in a decline in the real value of the savings if the rate of inflation significantly exceeds the interest rate level that can be attained by the insurance. We examine whether the effect of this can be detected in the lapse rates.

• How did the lockdowns related to Covid-19 affect the lapse rates of the life insurance products under review?

– The book review by *Kovács* (*2021*) presents a comparison of the pandemic and economic crises, highlighting that the unemployment rate and economic uncertainty increased considerably as a result of the pandemic. In this environment, more policyholders may draw on their long-term savings, and thus the probability of lapse of life insurance products may also change.

– The degree of the restrictions related to Covid-19 are measured with the so-called stringency index.[5] We use the time series for Hungary.

– It may occur that in the case of greater 'stringency' a greater stratum may need to draw on their savings and surrender their insurances (see the above 'emergency fund hypothesis'). However, a contrasting effect can also be imagined: policyholders may postpone some major expenditures to the period after the end of the pandemic. We examine whether any of the hypotheses had any verifiable effect on the lapse rates.

– *G. Szabó and Nagy* (*2021*) also examined the continuity of investment-type insurances and their new acquisitions in connection with the lockdowns due to Covid-19 in 2020. They believe that it was a result of the high employment rate and the payment moratorium that not a large number of policyholders needed to free the reserves accumulated in life insurance.

– The stringency index has already been used in other insurance related studies as well. In their study, *Csépai and Kovács* (*2021*) analysed the ratio of deaths due Covid-19 as a function of the stringency index for various European countries.

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[3] See: https://www.akk.hu/statisztika/hozamok-indexek-forgalmi-adatok/referenciahozamok
[4] See: https://www.allampapir.hu/allampapirok/MAPP/
[5] See: https://ourworldindata.org/grapher/covid-stringency-index?tab=chart&region=Europe&country=~HUN

In the analyses presented, first we graphically depict the time series of lapse rates and the above variables for visualisation of the relationship. Very often, the figures are already expressive for analysing the relationship between the variables, but the hypotheses set up are also tested statistically with time series analysis techniques. So-called vector autoregressive models (VAR) and the Granger causality provide the methodological tools for this. In other cases, cross-section data are also analysed in connection with the classification of the individual policyholders, for which the *k*-means clustering provides a statistical basis. The figures were prepared in Microsoft Excel on the basis of the databases. The time series analysis calculations were performed using the Gertl software, while the cross-section data were analysed in the IBM-SPSS software.

The following are highlighted in connection with the selected methodology and the data. Data in monthly breakdown on the number of lapses and volumes of portfolio at the product level were available for the three-year period between 2019 and 2021 for the analyses. Cross-section data for all points of time regarding the contract level portfolio are not available; therefore, for example, the Cox regression with time dependent covariates would not have been feasible on the data. Accordingly, the aim of the analyses is not to prepare a complete model that describes the surrender ratios by mapping all the factors that have an effect on the lapse rates, but rather the examination whether the change in certain circumstances mentioned above (such as yield level, inflation, lockdowns related to the pandemic) had a provable impact on the lapse rates. The applied methodology was chosen in line with the above. First, the time series and lapse statistics were illustrated in a graphic manner, which allows a simple visualisation of the presence of the trends in question from the data. The vector autoregressive models were drawn up and the presence of the Granger causality was tested in order to have stronger statistical evidence than the conclusions drawn from the figures.

3. Effects of changes in the yield environment on lapses of life insurances

3.1. Relationship between the lapses of current premium insurance products having technical interest rate and the external interest rate environment

We examine the dependence on the external yield environment in the case of the lapses of the current premium insurances presented in *Section 2*. Lapse rates by policy and by premium (scale on the vertical axis on the left side) in a monthly breakdown for the period between 2019 and 2021 as well as the ÁKK benchmark yields and the level of the technical interest rate typical of the product (scale on the vertical axis on the right side) are depicted in one figure. Due to size limitations, not all the related figures are published in the study; in all cases, only some examples are shown. For similar reasons, the results for all of the various technical interest rates are not given either. In the headings of the figures, the percentage value

appearing next to the name of the product shows the technical interest rate of the contract group.

The composition of the portfolios and the volatility observed in the lapse time series in a monthly breakdown were assessed in advance. The composition of portfolios (e.g. number of policies, distribution according to the period since underwriting of the contract, composition according to the size of premium and age) can be considered basically stable in the case of the portfolios under review. Nevertheless, some of the outliers seen in the figures (e.g. *Figures 1* and *2*) are partly justified by the composition of the portfolio (for example, in the first two insurance years or following the insurance anniversaries, the probability of lapse is typically higher; if there were more contracts like that in a given month, the lapse rate is also higher), and partly seasonal effects or other external circumstances may also interfere. Due to the smoothing of these effects, the use of quarterly data instead of monthly data may also arise: the volatility observed in the time series would have declined considerably in the case of pension products and to a lesser degree in the case of current premium investment-type insurances. However, quarterly transformation would result in very short time series, with which the later models would not work well. Therefore, taking everything into account, in the following we analysed the data in a monthly breakdown.

Figure 1
Lapse rates of current premium investment-type insurance (pure endowment product) according to changes in yields


Pure endowment (2.25%)

Source: Compiled on the basis of insurer data and benchmark yields of the ÁKK
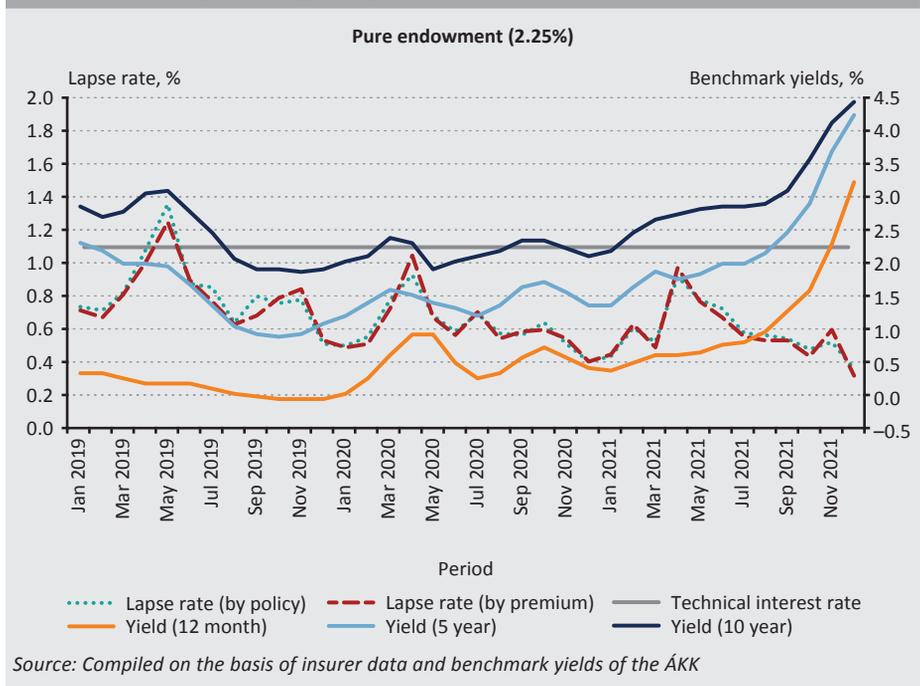
Figure 2
Lapse rates of pension product according to changes in yields

Pension product (2%)

Sources: Compiled on the basis of insurer data and benchmark yields of the ÁKK
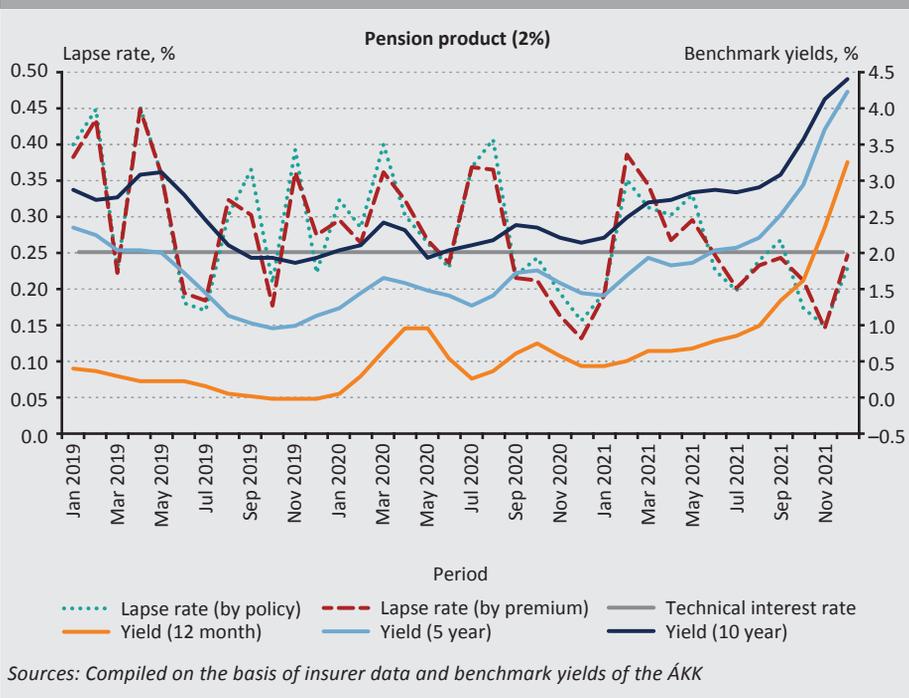
The following conclusions can be drawn on the basis of *Figures 1 and 2*. The rise in benchmark yields that occurred in 2021 H2 did not result in higher lapse rates for the products under review, and no increase was observed even when the level of the attainable interest rate exceeded the technical interest rate. Of course, it can also be attributable to the fact that most of the yield surplus above the technical interest rate is due back to policyholders, and the contract provides long-term guarantee. Nevertheless, it is much more likely that policyholders buy these contracts because they need a long-term life insurance or pension product, where they accumulate savings through regular premium payments, exploiting in the meantime the advantages of the given insurance product, and this is why government bond benchmark yields do not compete with the product (i.e. they do not modify the probability of lapse). On the basis of Insurance Europe's survey, *Lambert* (*2020:104–106*) also arrives at a similar conclusion: in connection with pension savings, he highlights that in Hungary 73 per cent of the respondents prefer safe investments (do not take a risk), while accessibility before retirement (liquidity) and the performance of the investment are less important aspects for the group under review. However, many of the respondents are ready to pay for the additional insurance coverage as well. A further possible explanation might be that financial literacy and the knowledge of products are not sufficiently developed in Hungary, and many policyholders do not have adequate information on the

complex yield level provided by the technical interest rate and the yield surplus participation, and they cannot compare that with other investment possibilities. *Kovács and Nagy* (*2022*) write about the financial awareness typical in Hungary, the distribution of the forms of savings and the changes in the former during the pandemic, while the study by *Terták* (*2022*) examines – as a comparison – the financial literacy typical in the world. *Németh-Lékó* (*2020*) emphasises that the inadequate financial awareness of Hungarian households can be confirmed on the basis of international and domestic research as well. For example, it is often typical that financial decisions are not made in a prudent manner, and the ratio of those who consciously compare offers when selecting a financial product is only 30–38 per cent (i.e. below the international average). Although no clear evidence can be found for the above hypotheses in terms of the explanation, it does not change the result that no relationship is observable between lapse rates and benchmark yields.

The above hypothesis is examined with time series analysis methods as well. The study does not provide a detailed presentation of the time series analysis–econometric techniques. The applied methodology was prepared in line with the work of *Kirchgässner et al.* (*2013*), in which one can read more about the methods; the methodological book by *Wooldridge* (*2009*) also presents the related econometric models in detail.

We fit vector autoregressive (VAR) models to the lapse rates and the time series of the benchmark yields. The essence of this is that we consider each variable as an endogenous variable (dependent variable), and explain it with a system of equations where the explanatory variables are the lags of the endogenous variables. For example, in the case of two endogenous variables, X_t and Y_t time series in the case of k maximum lag number equation (1) describes the VAR model (α, β coefficients are constant, ε_1, ε_2 are the residual variables, white noises according to assumption, and t is the time parameter).

$$X_t = \alpha_0 + \alpha_{1,1}X_{t-1} + \cdots + \alpha_{1,k}X_{t-k} + \alpha_{2,1}Y_{t-1} + \cdots + \alpha_{2,k}Y_{t-k} + \varepsilon_{1,t}$$
$$Y_t = \beta_0 + \beta_{1,1}X_{t-1} + \cdots + \beta_{1,k}X_{t-k} + \beta_{2,1}Y_{t-1} + \cdots + \beta_{2,k}Y_{t-k} + \varepsilon_{2,t} \quad (1)$$

According to the definition of the Granger causality, Y_t is the Granger cause of X_t if in the equation stated for X_t the lagged values of time series Y_t have a significant effect on the value of X_t (its coefficients are not zeros), i.e. the past of Y_t contains explanatory power for the present of X_t. The definition does not exclude the examination of the Granger causality of a variable taken on for itself. In this case, a single-variable autoregressive model, which is the one-dimensional equivalent of the VAR model, is also sufficient. In our examples, we examine whether any variable is a Granger cause of the lapse rates, i.e. whether the past of a process affects the value of the lapse rate in a given period, or the dependency can be excluded.

For the examination of the Granger causality, it is necessary that the X_t and Y_t time series be stationary (their expected value and variance should be constant, and their

autocovariance function should only depend on the distance of the observations and be constant in time). Stationarity in the Gretl software was examined with the help of the augmented Dickey–Fuller test; the null hypothesis of the test is that the time series is not stationary. In our samples, in the case of the time series under review, the p-value of the test exceeded the usual significance levels (i.e. the hypothesis of non-stationarity was acceptable). In such a case, the differentiation of the time series (creation of differences), i.e. the analysis of the changes in the given time series, is generally accepted practice. In the case of benchmark yields, even the first difference was not sufficient for considering the time series stationary; therefore, we created the second differences uniformly (i.e. for each variable) and included these in the analysis. Accordingly, for the variables under review we received p-values between 0–3 per cent, which we already considered appropriate for the continuation. The disadvantage of the second difference is that it is more difficult to interpret (it shows the change of the change), and thus we did not interpret the coefficients in the equations that were received later.

The VAR equations were estimated after the examination of stationarity. As our time series are short, we always included only two variables simultaneously (a lapse variable and a yield variable) in the estimation. We selected the optimal lag number on the basis of the values of the information criteria offered by Gretl (Bayes information criterion, Hannan–Quinn and the Akaike criteria). On the basis of the indicators, we typically applied maximum lags between 2–6 in the models set up.

Gretl estimates the coefficients with the ordinary least squares method. The software prepares a t-test for the estimated coefficients of the variables, with which the significance of the given variable can be tested. The null hypothesis of the test is that the real value of the coefficient is 0 (and the estimated value is not 0 only because of the random deviation in the sample), i.e. the variable does not have any significant explanatory power. The F-test is created with similar logic, allowing the testing of the null hypothesis, whether, for example, the coefficients of every lagged value of Y_t are zero in the estimate of X_t. If the null hypothesis of the test is acceptable, it means exactly that Y_t is not a Granger cause of X_t.

When the VAR model is ready, it is also worth testing whether the residual variables can be considered white noise. We also did this with the built-in tests of Gretl, but due to space limitations we do not go into details here.

We performed the Granger causality test according to the process presented above for the lapse rates by policy and by premium of the three types of regular premium insurances and the time series of the benchmark yields by pairs. In almost all cases we found that in the case of all usual significance levels the hypothesis of the F-test was acceptable, i.e. the benchmark yield is not a Granger cause of the lapse rate. Interestingly, in some cases (for example, when we examined the lapse rates by premium of the regular premium investment-type insurance with the 10-year benchmark yield in a VAR model), the hypothesis of the F-test could not be

accepted, only at a significance level of 1 per cent. Indeed, in the first 30 months some co-movement of the lagged 10-year benchmark yields and the lapse rate is discernible (*Figure 1*), and a further economic argument may be that the lapse rate was mainly higher when the benchmark yield was above the level of the technical interest rate. However, it completely contradicts this hypothesis that in the last 6 months, when the most significant rise in yield took place, the lapse rates did not increase at all. We repeated the analysis for the data of the years 2020 and 2021 only (to give a greater weight to the observation of the last half year); then the null hypothesis of the F-test could already be accepted at all usual significance levels.

It is also to be mentioned that a clear AR effect is often observed on the lapse rate (more exactly on its second difference) on the basis of the obtained equations; the relationship with the past of the time series is significant on the basis of both the t- and F-tests.

On the whole, we also found with statistical methods that in the period under review in the case of the analysed current premium insurances the benchmark yield did not have any significant impact on the lapse rates. However, as only a short time has elapsed since the major change in the yield environment, it could be expedient to repeat this examination later as well, for example in a year's time, if a similarly high yield level also prevails until then. It may also occur that the circumstances change even according to products, and lapse rates increase in the case of the ones where there is no higher insurance coverage or policyholders cannot enjoy the advantage of the tax refund of the pension product. However, the data do not suggest any such effect so far.

3.2. Lapse rates of the single premium insurance and the relationship between the external and internal interest rate environments

First, we examine the lapse rates of the single premium insurance with the help of *Figure 3*, which is similar to that of the current premium insurances. Instead of the technical interest rate, in this case we depicted the average interest rate level according to the short-term yield periods. As this product type is characterised by shorter duration compared to regular premium insurances, we included only 12-month and 5-year benchmark yields.

Figure 3 does not suggest any dependency between benchmark yields and the lapse rates. The benchmark yield exceeded the average yield of the portfolio in the last months of 2021. However, this effect did not raise the lapse rate of the portfolio at all. No correlation between the lapse rate and the benchmark yield is seen in the previous period either, an explanation for which might be that the average yield of the portfolio in this period was higher than the benchmark yield.

It is remarkable in *Figure 3* that the lapse rate by premium is much higher and much more volatile than the lapse rate by policy. This suggests that the policyholder portfolio is not homogeneous: the size of the premium invested affects the lapse

rate, and policyholders with higher amounts of savings are more likely to use the lapse option. In order to be able to better understand the reasons for the volatile behaviour, we examine the impact of the yield level on lapses using data broken down to the level of individual policyholders.

Figure 3
Lapse rates of single premium insurances according to the changes of yields

Single premium (with short interest rate periods)

Source: Compiled on the basis of insurer data and benchmark yields of the ÁKK
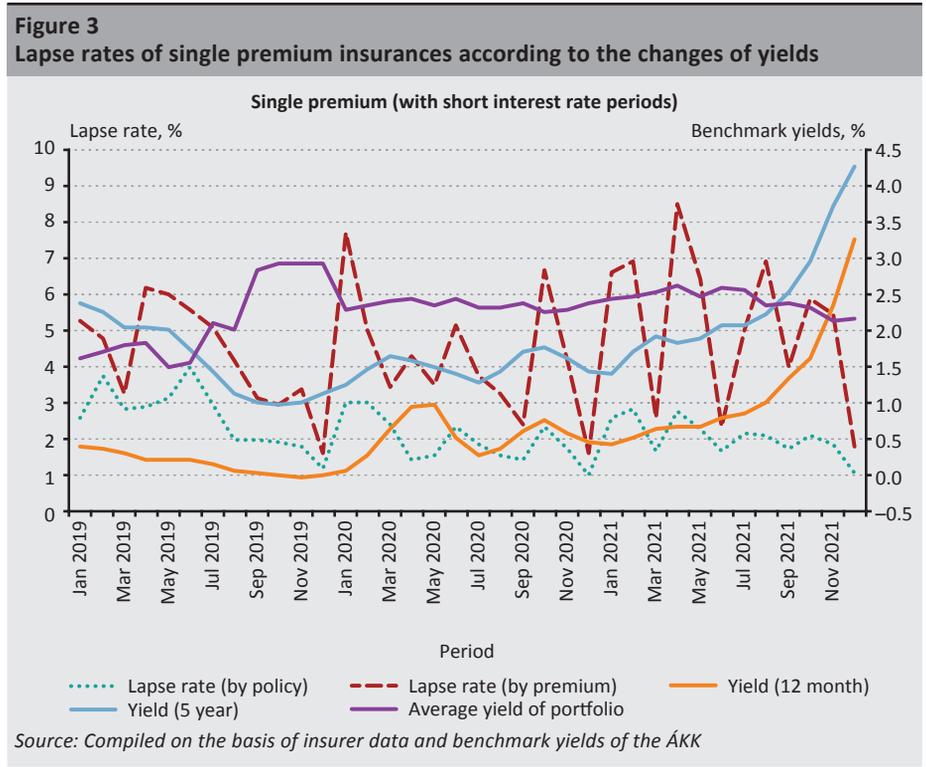
We continue the analysis with cross-section data. We examine by contract all the lapse events that took place in the 3-year period. It may be logical that in the case of this product the internal interest rate level and its changes may also play a role in policyholders' decisions (compared to current premium insurances the fluctuation of the internal interest rate level may be greater here than it was in the case of the products with fixed technical interest rate). Therefore, it was assigned to the individual claims[6] how the short-term interest rate announced for the given policyholder changed close to the surrender, in the month before the surrender (r_{t-1}), in the month of the surrender (r_t), and how it would have changed in the month following the surrender if the policyholder had not cancelled the insurance (r_{t+1}). In all cases we use annualised yields. According to the analyses, the $r_{t+1} - r_{t-1}$ quantity has a major impact on the incurred claims. It measures how the yield

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[6] Service disbursements or disbursements according to residual right are often called claim in the case of life insurances as well.

level credited to the policyholder would have changed if he/she had not cancelled the insurance. It is called yield change indicator. If r_{t-1} is unknown (for example, because then the insurance was not in-force yet), the change in yield is defined with the $r_{t+1} - r_t$ formula. *Table 1* shows the distribution of the claims incurred according to the level of the change in yield defined above.

Table 1		
Distribution of single premium surrenders according to the yield change indicator		
	As a percentage of all surrenders	
Yield change indicator	**By policy**	**By premium**
−1% and below	12.6%	41.1%
Between −1% and 0%	7.3%	5.0%
0%	68.0%	47.6%
Above 0% (yield increase)	12.2%	6.3%
Source: Compiled on the basis of insurer data		

In terms of the number of lapses, in the month following the lapse the interest rate level of the contracts would not have declined in the case of 80 per cent of the number of surrenders. Accordingly, we may assume that the lapse was not triggered by the internal interest rate level.

However, it is very conspicuous that 12.6 per cent of the number of surrenders shows a ratio of more than 40 per cent in the case of the distribution according to premium; moreover, this applies in the case when the yield change indicator was at the level of −1 per cent or below. It means that the other group of policyholders is expressly interest rate sensitive, and cancelled their contracts when the decline in interest rate reached 1 per cent (in absolute terms).

In order to better understand this effect, we classify the lapse events with the help of the *k*-means clustering known from multivariate statistical modelling and draw conclusions for the portfolio based on this, which finally allows us to group policyholders in terms of yield sensitivity with the help of contract parameters. At the individual level, we examine only this internal interest rate dependence. We do not have information whether in a case when a policyholder lapsed (cancelled his/her contract) he/she invested his/her money in a competing (higher-yield) investment product or terminated the insurance due to other reasons. However, as we will see, the yield change indicator is very informative with regard to lapses.

In the case of the clustering, all of the lapse events of the 3 years under review were observed, and the following variables were examined:

• the time that elapsed between the beginning and the lapse of the contract (months)
• the premium invested

• yield after the decision to cancel
• yield before the decision to cancel
• yield change indicator (difference of the previous two amounts)

The variables were standardised (transformed to have 0 expected value and a unit of standard deviation), so that the different units of measure and magnitudes should not distort the distances. The essence of *k*-means clustering is that the method should formulate *k* pieces of cluster centres in the space constituted by the selected variables, and then, classifying the individual observations on the basis of a defined distance to the nearest cluster centre, it should be possible to classify the observations into class *k*. It is possible to draw conclusions about the characteristics of the given group on the basis of the co-ordinates of the cluster centres. We do not present the further mathematical bases of the method; for more details see, for example, the work of *Kovács* (*2011*).

Clustering was performed with the help of the IBM-SPSS software. We examined the *k = 2, 3, 4, 5* cases. All of the variables involved had significant grouping power. In the *k = 2* case, based on the co-ordinates of the cluster centres, the following two clusters take shape (hereinafter they are called lapse clusters):

• Lapse cluster 1: low-premium, less yield sensitive policyholders in terms of lapse (upon lapse the yield declined to a lesser degree from a low yield level), and the time that elapsed from the start of the contract until the lapse was longer,

• Lapse cluster 2: higher-premium, more yield sensitive policyholders in terms of lapse (upon lapse the yield declined to a greater degree from a higher yield level), and the time that elapsed from the start of the contract until the lapse was shorter.

In the *k = 3, 4, 5* cases, the method decomposed the groups further mainly according to premium compared to the *k = 2* case; there were no major differences in terms of the time of the lapse and the yield indicators in the newer groups. Based on the so-called cluster elbow method coming into being on the basis of the ANOVA tables, the *k = 4* could also be an optimal choice, but in the case of the variances between the groups as well it is mainly the variance explained from the premium that grows with the increasing of the number of clusters. Therefore, we stay with the 2-cluster classification, with the interpretation as explained.

As we would like to classify the whole set of contracts (i.e. not only the lapsed contracts), and as the lapse data are not known in advance, of the variables under review, it is the size of the premium paid (which is known for each contract from the start of the contract) with which we attempt to approximate as best as possible the groups resulting from the lapse clustering. We achieve this by taking the co-ordinates of the cluster centres concerning the premium invested, and for each contract we examine to which point the premium of the given contract is closer.

Accordingly, the trim point coming into being will be the average of the two values (of the premium co-ordinates of the cluster centres). This type of group breakdown is hereinafter called clustering according to premium.

Figure 4 shows on a smaller sample of the data in the cross section of the size of the premium and the yield change indicator how the clusters according to lapse are positioned compared to the clustering according to premium (the latter is the left and right sides of the vertical line, where higher-premium policyholders, whose probability of lapse is typically higher, are located on the right side). The clusters according to lapse reflect the described characteristics well; significant differences are seen between the two groups both in the yield change indicator and the premium.

Figure 4
Clusters according to lapse and premium by dimensions of the premium size (HUF) and the yield change indicator

Source: Compiled on the basis of insurer data using results of IBM-SPSS software
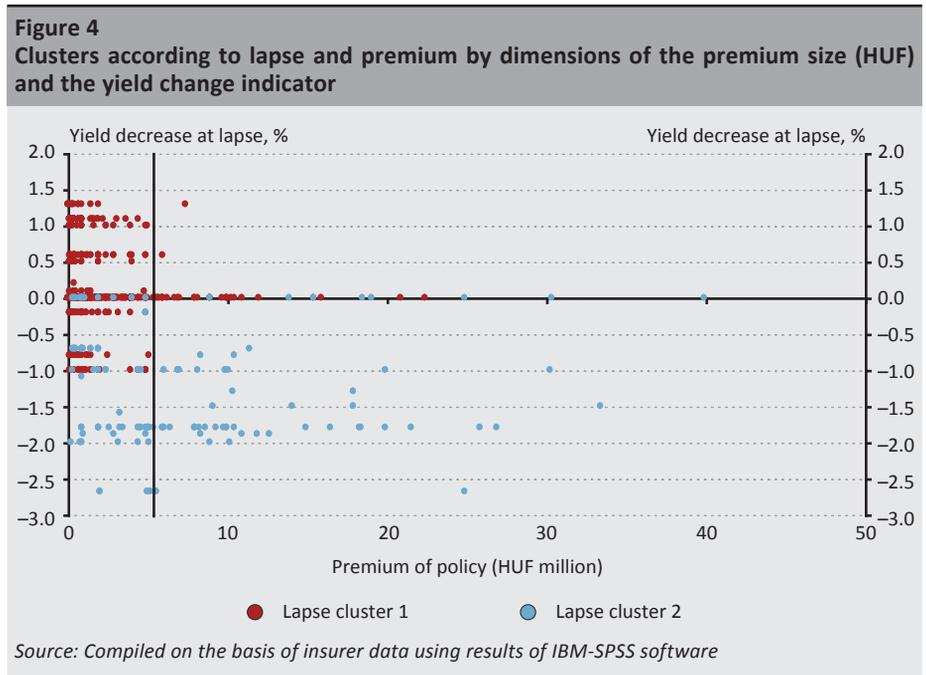
We compared the contract classification resulting from the clustering by lapse and the clustering by premium with a crosstab in relation to all the lapse events (see *Table 2*). With the simpler classification by premium, 88.7 per cent of the multivariate clusters according to lapse can be explained. Breaking further down, 94.3 per cent of Lapse cluster 1 can be properly classified with the trimming according to premium class, while in the case of Lapse cluster 2 classification only on the basis of the premium is possible with a precision of 56.3 per cent.

As on the whole a good hit rate can be achieved with the classification according to premium as well for the groups of the lapse clustering, and in the following we analyse the complete set of contracts (not only the lapsed ones), we continue the analyses on the basis of the clustering according to premium.

Table 2

Cross table comparison of clusters according to lapse and premium

Distribution of the groups as a percentage of all lapsed contracts		Lapse clusters		
		1	2	Total
Clusters according to premium	1	80.3%	6.5%	86.8%
	2	4.8%	8.4%	13.2%
Proper classification on the basis of clusters according to premium		94.3%	56.3%	88.7%
Source: Compiled on the basis of insurer data				

We divide the portfolio into two and draw the time series of the lapse rates according to the trimming resulting from the clustering according to premium (*Figures 5* and *6*), trusting that this allows us to see the lapse data already for more homogeneous groups. The time series of the lapse rates by policy and by premium come much closer to each other in the figures broken down to premium groups. Even in these figures the lapse rate by premium is somewhat higher, suggesting that even within these classes it is true that higher premiums entail a higher probability of lapse.

Figure 5

Lapse rates of single premium insurances (lower premium class) according to yields
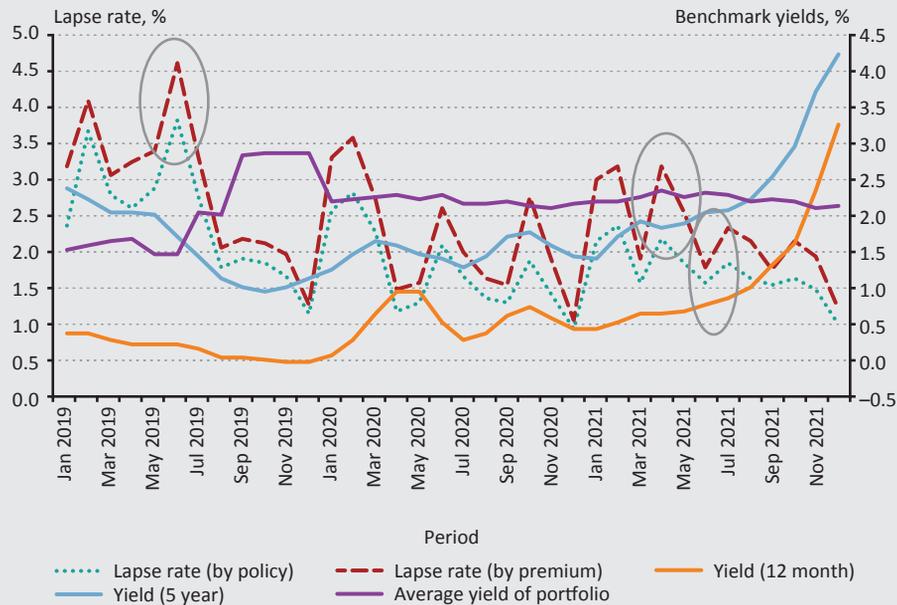
Source: Compiled on the basis of insurer data and benchmark yields of the ÁKK

Figure 6
Lapse rates of single premium insurances (higher premium class) according to yields

Source: Compiled on the basis of insurer data and benchmark yields of the ÁKK
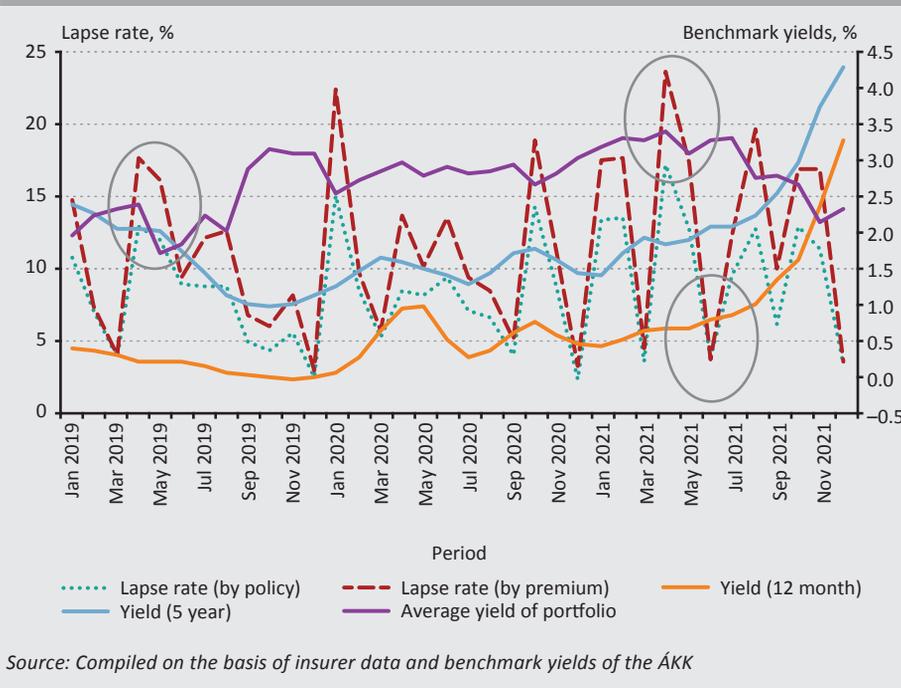
In order to better understand the volatility seen in monthly data, we continue to examine the set, which is now already broken down into two groups, to see whether the fluctuation may have any relation to the yields. We examine three periods in more detail (these periods are marked in *Figures 5* and *6*) to see what may cause the higher or lower lapse rates. We selected the following three periods:

• June 2019: The MÁP+ government bond was introduced in this month. It has offered extraordinary yield compared to (then existing) government bonds yields and other forms of investment, and has advantageous features both in terms of liquidity and tax conditions. Both figures show that high lapse rates were typical in this period.

• April 2021: Extremely high lapse rates were typical of both groups (but especially in the case of the higher premium class).

• June 2021: Both groups were characterised by low lapse rates.

Table 3

Monthly lapse rates of the two contract groups in three selected periods

	June 2019	April 2021	June 2021	3-year lapse rate average
Lower-premium contract group				
Lapse rate by policy	3.81%	2.18%	1.56%	2.00%
Lapse rate by premium	4.60%	3.17%	1.78%	2.45%
Higher-premium contract group				
Lapse rate by policy	8.87%	17.09%	3.85%	8.55%
Lapse rate by premium	9.26%	23.46%	3.71%	11.47%

Source: Compiled on the basis of insurer data

In all of the three selected periods, we examined the yield change indicator in the case of the contracts of the two groups for both the complete sample and the contracts cancelled in the given month, and how the lapse rate changed compared to the average lapse rate (calculated over the 3-year period) typical of the group (*Table 3* and *Figure 7*, the diagram was presented only for the April 2021 data). *We recall that due to the limiting of business recognisability, the lapse rates are shown in a rescaled manner. However, the pattern between them was in line with what was seen in the case of the original data series as well.*

In June 2019, measured according to the previous definition, yields did not decline in any of the contract groups. Nevertheless, the lapse rate nearly doubled compared to the average in the case of the lower-premium group. Lapse was expressly high in the higher-premium group as well, although here the monthly data for the lapse rate by premium did not become higher compared to its own long-term average. We can come to the conclusion that the introduction of the MÁP+ government bond may have led to the high lapse rate. It is especially conspicuous how significant growth was entailed by the effect even in the case of the lower premium class (where yield sensitivity is typically lower). No correlation with the ÁKK benchmark yield was seen in the lapse rate, but a government scheme like the MÁP+ supported by good marketing and strong financial advantages resulted in a verifiable increase in lapse in the month of its introduction.

Figure 7
Lapse rates by premium class and yield change indicator (April 2021)

Lapse rate, %   Lapse rate, %

| | Lapse rate (by policy) | Lapse rate (by premium) |

Source: Compiled on the basis of insurer data
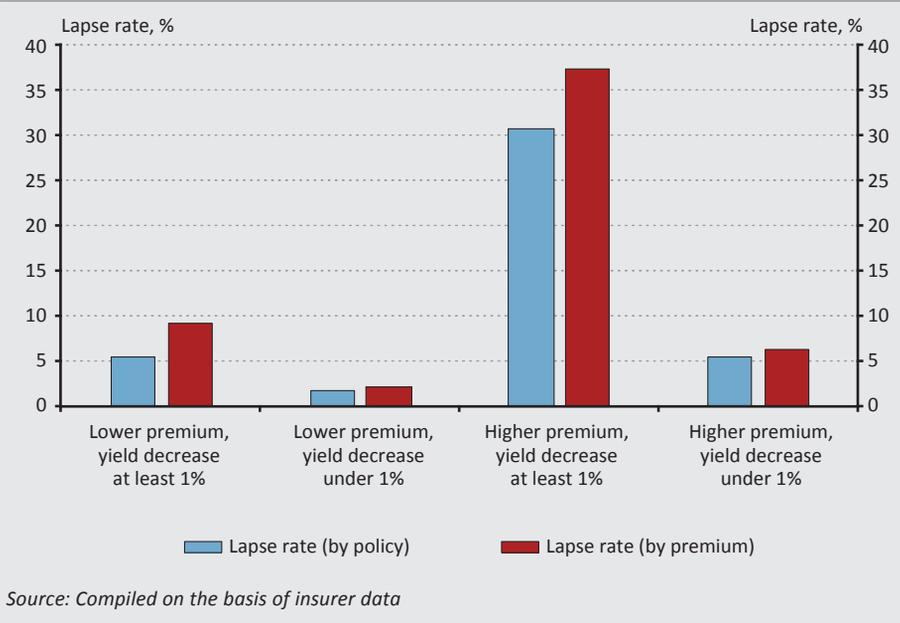
In April 2021, it was clearly the yield change indicator that affected the lapse rate (*Figure 7*). In the lower premium class group, the lapse rate of the contracts for which the yield decline reached 1 per cent (in absolute terms) was 3–3.87 time higher (according to policy and premium) compared to the contracts for which the yield decline was less (or where there was a yield increase). The same indicator meant a lapse rate increase that was 5.8–5.9 times higher in the higher-premium group. From all of this, way can draw the conclusion that the internal yield level of the given product is a very strong indicator of lapse. A 1 per cent yield decline in absolute terms already encourages significant strata to surrender. It is even more typical in the case of the higher premium class (where the ratio of yield sensitive policyholders is even higher), but even in the lower premium class there were significantly more lapses before the possible yield decline taking place.

It can be detected in June 2021 as well that the probability of lapse was also higher for the contracts where the yield decline was greater. However, in this period the ratio of contracts exposed to yield decline was very low (the yield level remained unchanged or increased by the next month for more than 90 per cent of the portfolio). Consequently, the lapse rate was stagnant.

Finally, we carried out the Granger causality test for the two premium classes in order to learn whether the benchmark yield is a Granger cause of the lapse. In each case, the null hypothesis could be accepted at the usual significance levels that the

Granger causality relationship does not materialise. One of the possible reasons is that the benchmark yield was lower than the average yield of the portfolio for almost all of the period. It may be expedient to repeat this analysis as well in a year's time, if the benchmark yields remain persistently high until then as well.

From the analyses presented, we may conclude that the yield level is one of the main factors of lapse in the case of the single premium insurance under review, as in the months when a major change took place in the external or internal yield levels, the lapse rate also increased, and low lapse was typical when there was no such event. However, in terms of the external yield level, no relationship with the benchmark yield could be verified, but in the month of the introduction of the MÁP+ we detected a significant increase in lapse. Policyholders are sensitive to the changes in internal yield level as well. In this regard, we identified a difference in lapse according to the insurance premium; the ratio of those who are yield sensitive is higher among the higher-premium policyholders, but lapse driven by changes in the yield level was observed in the lower premium class as well.

4. Effects of changes in the inflation environment on lapses of the life insurances under review

In this section, we examine the relationship between lapse rates and inflation. We depict the seasonally adjusted core inflation[7] published by the MNB in one figure with the lapse rates and the level of the technical interest rate, and in the case of the single premium insurance with the average interest rate level of the short-term yield periods. The analysis is mainly motivated by the rise in the level of inflation from 2021 H2: we were interested whether its impact on the lapse rates can be detected. *Balogh* (*2021*) presents the possible underlying reasons of the increase in inflation in 2021.

As similar trends are seen in the other cases as well, we illustrate only the figure of the contracts of the endowment product and of the single premium insurance belonging to the lower premium class. The conclusion to be drawn on the basis of *Figures 8* and *9* is that the lapse rates did not increase with the rise in inflation.

We attempted the testing of the Granger causality relationship here as well, but even the second difference of the inflation rate could not be considered stationary. Nevertheless, a relationship between the 12-month benchmark yield and the inflation rate is seen on the basis of *Figure 8*. If two time series have a common long-term path on which they move together, the two time series are called cointegrated. Carrying out the Engle–Granger test (see, for example, *Kirchgässner et al. 2013*)

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[7] See: https://www.mnb.hu/statisztika/statisztikai-adatok-informaciok/adatok-idosorok/vi-arak
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in Gretl, the two time series can be considered cointegrated.[8] As we managed to detect that inflation and the benchmark yield move on one path, and we previously realised that the benchmark yield did not affect the lapse rate in the case of the insurances under review, we can assume the same in relation to the inflation as well.

Figure 8
Lapse rates of endowment product according to inflation

Endowment (2.25%)

Lapse rate, %

Inflation and yield level, %

Period

······ Lapse rate (by policy)   – – – Lapse rate (by premium)   —— Yield (12 month)
—— Technical interest rate   —— Seasonally adjusted core inflation

Source: Compiled on the basis of insurer data and the MNB's inflation rate

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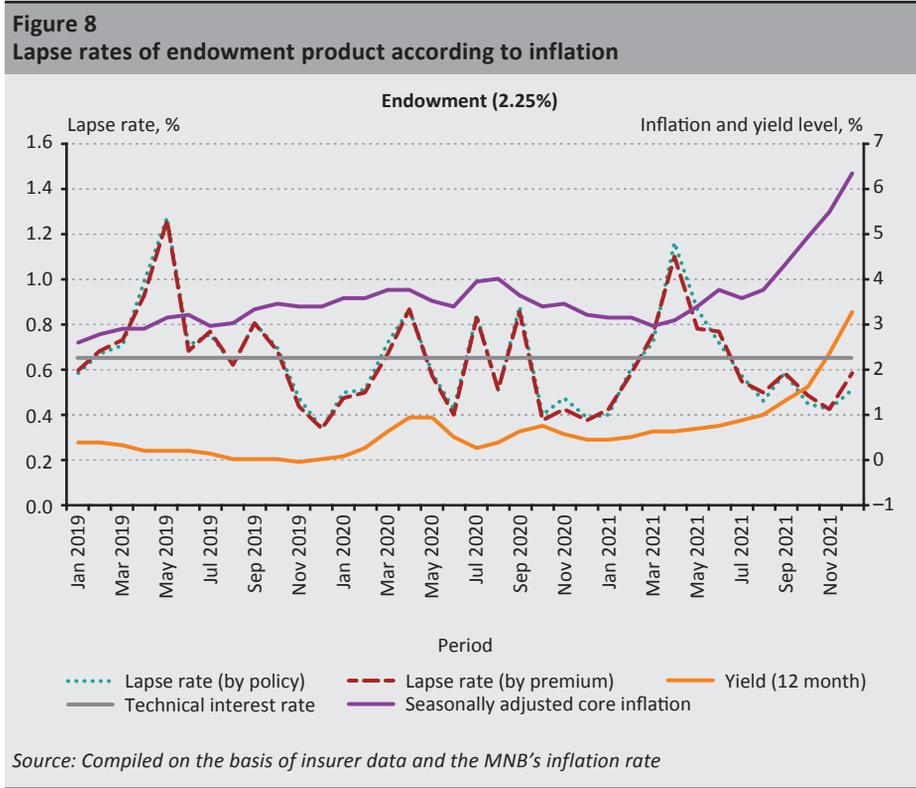
[8] Of course, here we must not forget that the central bank started an interest rate hike strategy in order to ease the inflationary pressure, and the correlation and the verifiable cointegration may result from that as well. Whether the cointegration would exist under other circumstances as well is not important in respect of the study, and we do not examine it. For the various models of interest rate theories and certain empirical results of the correlation between interest rates and inflation see, for example, the study by *Ábel et al.* (*2019*).

Figure 9
Lapse rates of single premium insurances (lower premium class) according to inflation

Source: Compiled on the basis of insurer data and the MNB's inflation rate
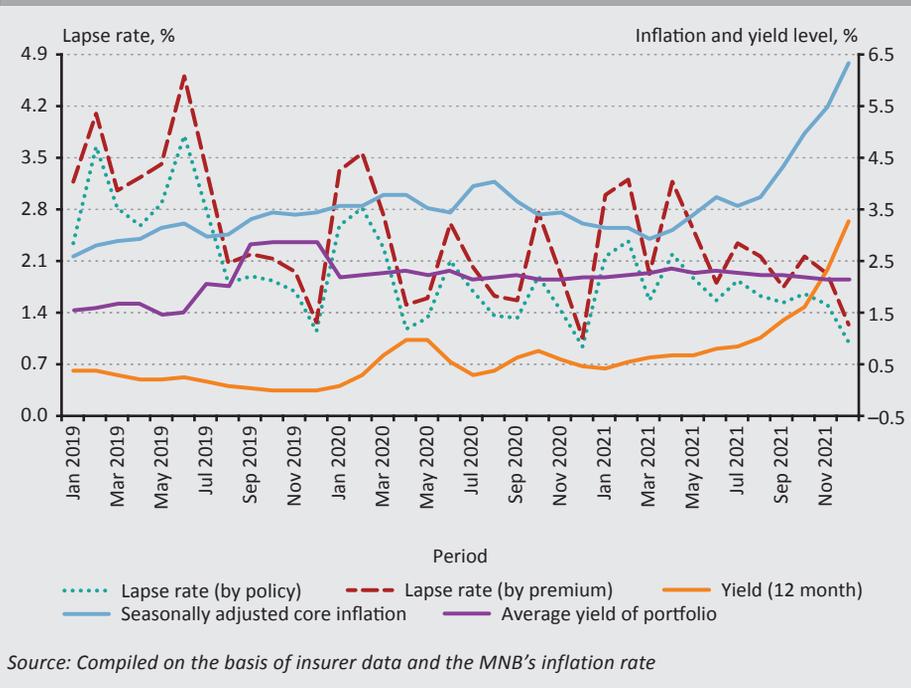
It is also conspicuous that the interest rate level inherent in the insurances did not reach the inflation rate in the period under review, but apart from the last half year the internal interest rate level was almost always higher than the current 1-year and 5-year benchmark yields (see, for example, *Figures 5*, *8* and *9*). Accordingly, even with government bonds having these maturities, it would not have been possible to attain a higher yield than the internal yield level or inflation. Both the benchmark yield and inflation started to increase and departed more significantly from the internal interest rate level of the portfolios in 2021 H2. For the time being, no increase in the lapse rates was observed in this period, but here as well it may be expedient to repeat the analysis at a later time in order to find out whether the frequency of surrenders appears as a lagged effect.

5. Impact of the stringency index related to the Covid-19 lockdowns on lapses of life insurances

The degree of the restrictions related to Covid-19 is measured with the stringency index, as noted above.

Due to space limitations, only two figures are shown here as well: they concern the endowment product and the lower premium class of the single premium insurance. We assumed that the possible lockdown effect due to Covid-19 does not become differentiated according to the technical interest rate, and therefore here in the case of the endowment product we did not screen the data according to the technical interest rate, but the portfolio belonging to all interest rates is included as a whole.

The lockdowns due to Covid-19 did not have any major impact (measured with the stringency index) either on the lapse rates of current premium or single premium life insurances. It can be seen in *Figures 10* and *11* that in the period following the outbreak of the pandemic the lapse rate practically did not leave the band observed in the period between January 2019 and February 2020 in any direction.

Figure 10
Lapse rate of the endowment product according to the Covid-19 stringency index

Source: Compiled on the basis of insurer data and the stringency index
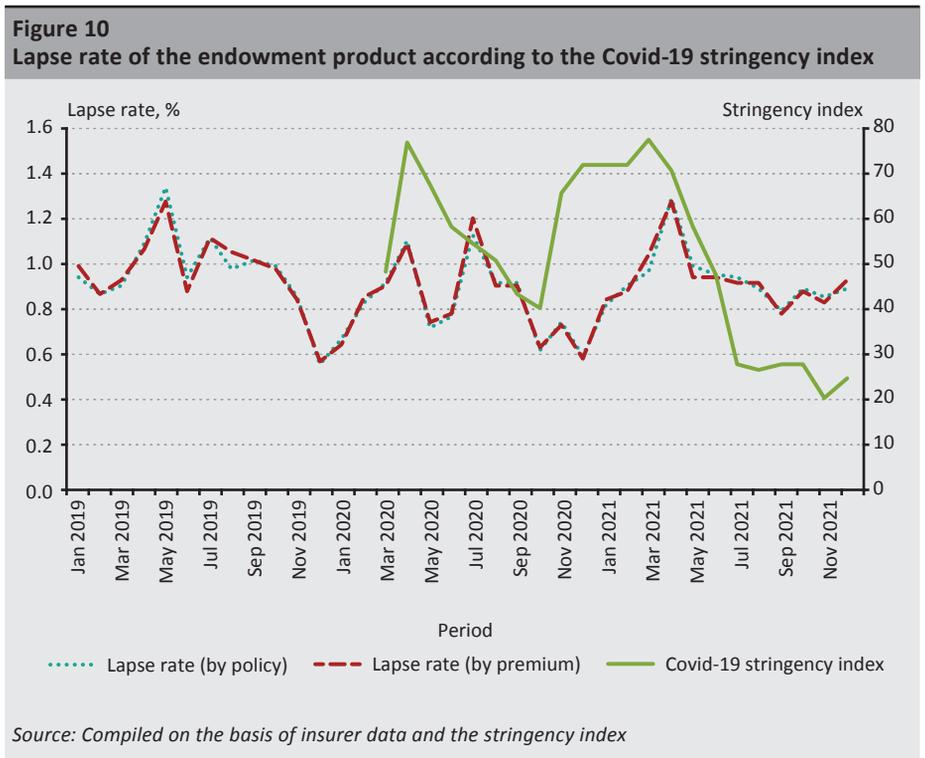
Figure 11
Lapse rates of the single premium insurance according to the Covid-19 stringency index

Lapse rate, %   Stringency index

.... Lapse rate (by policy)   - - - Lapse rate (by premium)   ——— Covid-19 stringency index

Source: Compiled on the basis of insurer data and the stringency index
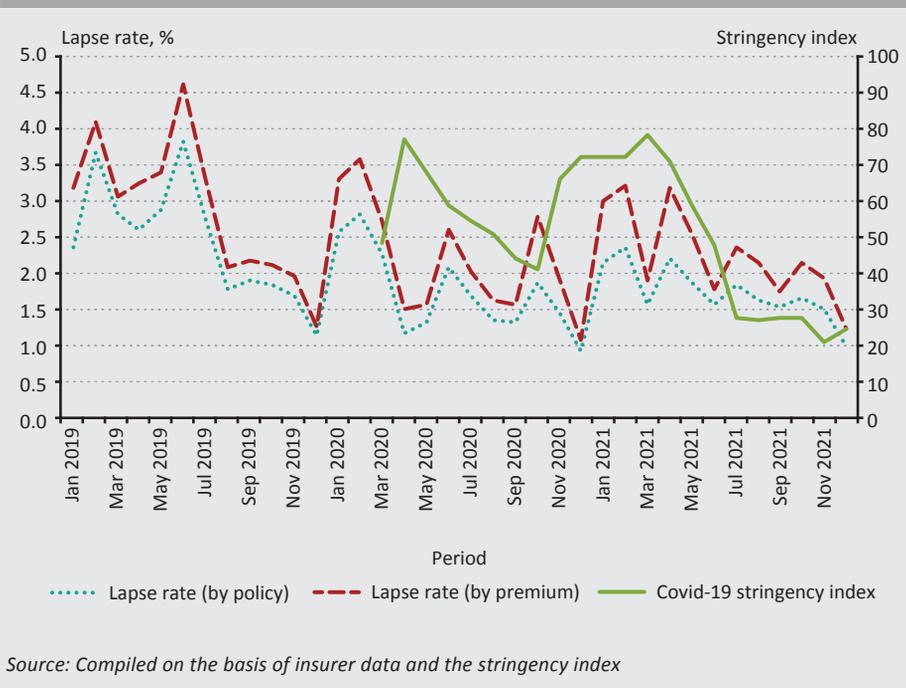
It is interesting, however, that in the case of the current premium insurance there seems to be some relationship: lapse rates increased to some extent with a lag of some months after the major lockdowns. Logically, the underlying reason for this lag may be that policyholders draw on these long-term savings only if it is necessary in any case and they do not have any other liquid sources. Also, the insurance company applies a grace period of some months if the premium is not received, so this may be another cause of the lag.

Again with the help of the Granger causality, we examined whether the aforementioned effect can really be proven statistically as well. For this, we kept the parts of the time series starting from March 2020 in relation to the beginning of the pandemic, which resulted in relatively short time series. We could consider the time series stationary after the second differentiation; they were the ones we worked with. The hypothesis that the Covid-19 stringency index is not a Granger cause of the lapse rate could be accepted at all usual significance levels, in the case of all types of insurances. Of course, it cannot be ruled out that some kind of more complex economic dependency amended the path of lapses, but on the basis of the short time series and the little data available we could not find evidence for that. In addition, a convincing argument for the assumption that even if there was such

an effect, it was not significant is that according to the figures the lapse rates did not move out of the previously typical band either upwards or downwards during the pandemic.

6. Summary and final conclusions

In the study, we examined the relationship between the lapse rate time series of various life insurances and the yield environment. There was no relationship between the lapses of regular premium insurances with a technical interest rate and the benchmark yield. In most of the period and the portfolios under review, the technical interest rate exceeded the relevant benchmark yields, but the lapse rate did not increase even when the benchmark yield exceeded the technical interest rate. In the case of the single premium insurances, especially those policyholders' yield sensitivity is greater that have higher savings. According to the analyses, lapse rates may already rise significantly (even 6 times higher) in the case of an at least 1 percentage point yield decline. A significant effect may also prompt policyholders with lower savings to cancel, but there the ratio of the yield sensitive clientele is lower. However, a government bond supported by good marketing and strong financial advantages (such as the MÁP+) may make a higher number of policyholders in the latter group also cancel their insurances and invest their savings in competing products (although we do not have information on the second part of the assertion, i.e. that policyholders really invested their money following the lapse; we can only assume that). The rise in inflation has not increased the lapse rate yet. However, just as in the case of the rising yield curve, not much time has elapsed here either since the change in the macro environment; circumstances may still change as time goes by.

We may assume on the basis of the above that financial literacy and awareness are not yet developed enough in Hungary for the social stratum that has savings to be completely informed about the current interest rate, investment and inflation environment, enabling everybody to make optimal investment decisions in line with the given situation. The clientele with higher amounts of savings is more informed, dependence on the (internal) interest rate environment was more verifiable there, but – to a lesser degree – this effect was present in the lower-premium group as well. We can assume that the social group under review needs a well understandable and easily accessible investment product (e.g. the insurance company's single premium product under review, MÁP+ government bond, etc.), and individuals make their investment decisions in accordance with these known dimensions and current conditions. The above conclusions were true for the group of policyholders with single premium insurances; in their case the changes in yield level played a more important role. Long-term savings, life insurance coverage or the

tax refund possibility of the pension product are the likely reasons for concluding the contracts in the case of regular premium insurances; here the lapse rate did not depend on the current yield and inflation levels.

Of course, the analysis is not representative for the country as a whole (other strata were not examined, but presumably there are many people who are even less conscious – for example those who keep their savings in cash or on a bank account; and presumably there is also a stratum that is more conscious than the ones presented here). We can surely state that a life insurance company which sells mass products and has a large portfolio shows relevant experiences about a significant stratum.

The lockdowns due to Covid-19 did not have any major impact on the lapse rates of life insurances in any insurance type. In the case of the examples under review, even in the period of the pandemic the lapse rate did not leave the band typical before – neither upwards, nor downwards. For regular premium insurances, a slight increase in lapses with a lag of some months was observed, but this effect was not strong (statistically not significant). This also suggests that policyholders invest in these products with the aim of long-term savings, and even during the lockdowns due to Covid-19 no major stratum of the clientele got into such a bad financial situation that would have increased the lapse rates drastically. There was also no direct relationship in the case of the single premium insurance either and the previously described effects tend to dominate there.

It may be a reason for optimism that, as we know at present, the effect of the pandemic on the functioning of the country is waning, and hopefully the economy and the insurance sector will return to the pre-pandemic operation. Changes in the yield and inflation environments may still affect developments in the life insurance market in the longer run. It could be expedient to examine the related effects later as well and to adjust insurance companies' long-term strategies to the consolidating circumstances.

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There and Back Again – Six Fiscal Tales from the Past Decades*

Gábor P. Kiss

A phenomenon known in the international literature that is nevertheless unaddressed is that the standard indicators used for analysing fiscal policy can yield misleading results. Creative accounting can distort basic statistics, dividing data into groups of "revenue" and "expenditure" leads to the same distorted results, and the common indicators of the cyclically adjusted balance are also misleading. Based on the indicators adjusted for the impact of these distortions, six fiscal episodes are defined in Hungary between 1995 and 2016. The first episode is the adjustment in 1995–1996. The structure of spending changed then between 1997 and 2001. In 2002–2006, consolidation was delayed after a sudden, major round of fiscal expansion. After this, several approaches were tried to ensure consolidation, in two steps, between 2007 and 2009 and then between 2010 and 2012. Finally, between 2013 and 2016 the structure of spending was changed once again.

Journal of Economic Literature (JEL) codes: E30, H10, H60

Keywords: fiscal expansion, consolidation, cyclical adjustment, creative accounting

1. Introduction

The four points in the introduction summarise the issues where the international literature maintains that standard indicators are unsuitable for fiscal analysis as well as the reasons behind this.

The first issue concerns the distortion of statistical indicators. Creative accounting exerts first a positive and then a negative distortion effect on the balance (that zero out each other overall), such as the so-called self-reversing measures (*Hoffmann – P. Kiss 2010*). The period of reversal can last for a few years or even decades, such as in the case of the public infrastructure built and maintained by the private sector (PPP[1] projects). This would require a direct adjustment to the statistics, as seen in

[1] PPP: Public-Private-Partnership

the *Methodological Annex* (*the Annex*).[2] However, in practice attempts are usually made at the level of the medium-term analytical indicator, the structural deficit, considered the second line of defence, by filtering out temporary items. *P. Kiss* (*2011*) notes that in international practice (e.g. *Kremer et al. 2006*) the definition of temporary items is misleading, as it is often combined with partial, asymmetrical and often individual items.[3] The simple time series filtering (e.g. *Joumard et al. 2008*) of these is no substitute for the solutions using background information (*Hoffmann – P. Kiss 2010*; *P. Kiss 2011*).

The second set of issues concerns the assumed size of the general government balance in a given year if the cyclical fluctuation of the economy did not divert it from the structural balance. The response of the standard approach (European Commission, IMF, OECD) deduces the structural deficit mechanically, based on the output gap, and the tax revenues included in the cyclical adjustment also include the tax content of government expenditure. The mechanical approach assumes constant elasticity between the output gap and the gaps of the macroeconomic variables that comprise the tax base. This assumption is not realistic, neither in theory nor in practice; after this mechanical adjustment of the macroeconomic variables, the tax bases which underlie the estimate of the structural deficit are very far from what might be called trend. The separate estimation of the macroeconomic tax bases is attempted by the so-called disaggregated methods (*Bouthevillain et al. 2001; P. Kiss – Vadas 2005a, 2005b; P. Kiss – Reppa 2010*). Macroeconomic variables do not include the public part, comprising only the private wage bill and consumption. Accordingly, taxes also do not include the public wage bill and the tax content of consumption/investment, and therefore this spending can also be interpreted in net terms (*Kremer et al. 2006; P. Kiss et al. 2009*). However, experience has shown that the above methods of cyclical adjustment do not filter out the fluctuations of every exogenous factor. According to *Morris et al.* (*2007*), corporate tax revenues were much more volatile than the cyclical fluctuations in GDP and operating surplus. It was also found that the housing market bubble entailed a greater volatility in indirect taxes than deduced based on the tax base considered during the cyclical adjustment of indirect taxes, namely household consumption. This shows that the disaggregated method of adjustment should have included housing investment, that tax revenues and expenditure can be affected not only by real economy

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[2] The Methodological Annex can be accessed online: https://en-hitelintezetiszemle.mnb.hu/letoltes/fer-21-3-st3-kiss-ma.pdf

[3] Individual items are extraordinary investments implemented very rarely, such as the construction of nuclear power plants. The aggregate investment spending usually includes a few individual items, but these can simply crowd out other investment plans, therefore they do not lead to major peaks. Accordingly, they should not be mechanically deducted.

developments but also inflation and asset prices,[4] and finally that instead of the business cycles that last for 8 years on average, the financial cycles lasting twice as long should be filtered. The right question does not concern the size of the deficit while the effect of the business cycle phases out over a horizon of a couple of years, but the size of the deficit with the disappearance of the financial cycle over decades.

The third set of issues examines how the *change* in the *levels* of structural deficit, tax revenues and net expenditure derived after addressing the first two criticisms can be divided into explanatory factors.[5] Three adjustments can be derived from the disaggregated method.[6] First, at the level of real tax bases, the GDP trend and the trends of the macroeconomic variables included in the adjustment are decoupled. Second, nominal tax bases evolve on two different paths because wages and consumption are related to the consumer price index, while the price index of the rest of the variables is tied to the GDP deflator. Finally, private tax revenues also mean that the direct tax content of expenditure should also be netted.

The fourth set of issues is related to the trend GDP used above. This is important not only for establishing the private tax and net expenditure rates where a given structural deficit emerges, but also because estimating trend GDP is crucial for determining the neutral, no-policy-change, spending path, as per the definition. Expenditure following the GDP trend stabilises the economy, and any fiscal impulse can be expansionary or contractionary for aggregate demand if calculated as a difference from this neutral budget path (*Chand 1993*). A major problem is that determining the trend GDP in the ratio and thus real-time cyclical adjustment can differ markedly from subsequent estimates. Therefore, the ex-post estimates of spending measures also differ from what fiscal policy sought to achieve in real time. The evaluation of potential growth can often deteriorate later, and therefore a spending path intended as neutral and following the real-time estimate of trend GDP may prove to be expansionary in retrospect. It has been demonstrated in several countries that fiscal policy was unintentionally procyclical in the 1990s and 2000s (*Caudal et al. 2013; Forni – Momigliano 2005; Cimadomo 2008; P. Kiss 2017, 2020*). The Hungarian estimates are presented in the Methodological Annex. Subsequent revisions are reduced to a minimum if a method is used that takes into account the build-up of financial cycles through the rise in property prices and credit aggregates (*Borio et al. 2013; Bernhofer et al. 2014*). According to their results, while business cycles last no more than 8 years, financial cycles can last up to 16–20 years.

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[4] For example, while analysing the United States, cyclical adjustment does not filter out the impact of asset price volatility (*CBO 2013*), and the same distortion can also be detected among OECD countries (*Price – Dang 2011*). Since the positive effect of asset prices on taxes was not filtered out by cyclical adjustment, the methods that used the change in the cyclically adjusted primary balance to determine the discretionary measure misclassified this effect as measure having improved the balance (i.e. a tax increase) (*Guajardo et al. 2011*).

[5] Trivial mistakes include when the spending and revenue measures are defined as a shift in rates relative to GDP (e.g. *Alesina et al. 2018*), instead of using trend GDP for comparison.

[6] This is presented in detail in the Methodological Annex, available online.

The methodological solutions presented in the online Annex are used to identify and analyse the key episodes in Hungarian fiscal policy between 1995 and 2016. Since this is the first paper to compile the numbers from 1994 for comparison, it enables a consistent analysis of the adjustment in 1995–1996 for the first time. The examination ends with 2016 for several reasons. First, the events in recent years (the pandemic, the war in Ukraine) may change the evaluation of potential growth (and other real economy trends) to such an extent that would be visible not only in 2020–2022 but, to a decreasing extent, also in earlier years, changing the entire analysis based on an estimated trend and private tax and net expenditure. Second, after the spring of 2017 a portion of creative accounting, unknown to the author, was adjusted in national accounts statistics going back years, and therefore the adjustments made by the author would duplicate them in the analysis. Finally, funds received as part of the 2014–2020 EU Multiannual Financial Framework became significant from 2017 and had sizeable impact on the net expenditure thereafter. This results in a break in developments and analysis.

2. The economic policy adjustment in 1995–1996

One of the main functions of the state is to contribute to macroeconomic stability through the countercyclical policy reflected in the budget (*Musgrave 1959; Benczes – Kutasi 2010*). This can be achieved by pursuing a tight, debt-reducing fiscal policy in times of an economic upswing, which can reduce the overheating of the economy and also enables the mitigation of the effects of an economic downturn by increasing the budget deficit during a crisis. This is because a precondition for stimulating demand is having fiscal space, in other words the deficit and the debt should allow a temporary expansion.

However, this was not possible in Hungary in the early 1990s, because economic policy faced not only a downturn but serious structural problems as well. The period following the political transition implied a heavy burden. As a result of the transformation crisis, GDP contracted by 18 per cent between 1989 and 1993 (*Ecostat 2010*). This is because the development of the institutional system necessary for the operation of the market economy, infrastructure developments and the creation and liberalisation of money and capital markets (*Neményi – Halpern 2000*) exerted a massive fiscal impact. The amortisation rates of the fixed assets that became more realistic thanks to the Accounting Act and the Bankruptcy Act allowed the full extent of the crisis to be evident. The appearance of the previously hidden unemployment required general government expenditure amounting to 3 per cent of GDP (in the form of municipal social support and unemployment benefits). Employment declined by close to 1 million until the middle of the decade, so while in the mid-1980s each economically active person supported one economically inactive, ten years later this figure was already 1.5. Meanwhile, the number of

entrepreneurs surged from 30,000 to over 700,000, and the number of employees registered at the minimum wage also spiked, and tax evasion also became a major factor: tax revenues fell much more than the contraction in GDP.[7] In effect, one economically active person actually paying taxes supported almost 2 economically inactive or minimum tax-paying persons. In parallel with the decline in tax revenue, fiscal policymakers tried to cut government expenditure, but these efforts were not successful,[8] because it was only sufficient to offset the additional spending generated by unemployment. This created a sizeable deficit, and government debt gradually climbed from 70 to 90 per cent of GDP. And because unlike most transforming countries Hungary inherited a huge amount of debt mostly owned by non-residents, the growing interest burden also contributed to the imbalances.

GDP output and domestic absorption became decoupled. Output decreased until 1993, mainly in industry and agriculture that had an outdated structure. The inflow of FDI created competitive export capacities in industry, so this sector contributed the most to the gradual recovery of production from 1994. During the initial shock, investments declined in line with output, but within that the share of public investment remained high until 1994. By contrast, the share of government absorption[9] (collective consumption and public consumption provided to households in kind) and households' purchased consumption increased after 1991 and remained stable until 1995. Although households experienced a shock in the labour market, real wages responded slower, and this was partly offset by cash benefits from the government; therefore, consumption was initially not affected much by the drop in economic output. As regards external economic developments, just when Hungarian exports started to be oriented from Eastern markets towards Western ones, the temporary and substantial rise in oil prices and the interest rate increase following the inflationary impact of German reunification caused a recession in Western Europe. The negative effect of the recession was mainly felt in 1993, however, after this, Hungary successfully joined the European growth, and the economic policy adjustment of 1995–1996 that contracted demand in the economy was implemented in a favourable external environment. The adjustment was necessary because the effective (augmented SNA) general government deficit and the current account deficit were both over 9 per cent of GDP in 1994, and after

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[7] Entrepreneurs typically paid only the minimum required taxes and contributions. In the meantime, the VAT chain was broken in the case of services, because it made more sense to forgo the VAT refund than to pay the taxes and contributions related to wages in the formal economy. According to the estimate prepared based on this aspect of tax evasion, the taxes and contributions that went unreported by the self-employed accounted for half of the VAT tax base lost (*Krekó – P. Kiss 2008*).

[8] In the 1980s and the early 1990s a decentralised general government system emerged where the central government only controlled a portion of spending. Even if it cut intra-governmental transfers, local governments could be indebted, use their deposits, and the central budgetary chapters and units were able to offset the cuts by using carry-overs from the previous year. Therefore, the central government only had an indirect impact on wages, the purchase of goods and services and some of the investments.

[9] This mostly referred to the spending of the decentralised general government, which did not coincide with the intentions of the central government.

the Mexican crisis erupted in 1994 it was argued that *"the upsetting of the external financial balance became a genuine threat"* (*Kornai 1996*).[10]

In response to the dramatic deterioration in external balance, measures were first introduced in March 1995 (*Bokros Package*), which was continued in several stages until 1996. A turnaround in monetary policy was marked by the immediate devaluation of the forint by 9 per cent, which led to unexpected inflation, as well as the announced introduction of the crawling peg. Fiscal policymakers first introduced a temporary surcharge on imports for consumption (1.7 per cent of GDP), which reversed the revenue-decreasing effect of the customs duty-reduction process stipulated in international agreement.[11] This generated revenues for the government and also lowered imports, and, along with the devaluating exchange rate policy and the dramatic increase in administered prices (pharmaceuticals and energy), it also caused an unexpected additional inflation of 9–10 percentage points in 1995, followed by another 4-percentage point unexpected rise in 1996. Most public sector spending did not follow inflation for the remainder of the year, and therefore it was reduced in real terms and declined as a percentage of GDP.[12] The extraordinary contraction in public investments was somewhat offset by other capital transfers, for example the increase in housing subsidies (*Table 1*). But social benefits shrank by even more, as the measures affecting sick pay and the family allowance resulted in cuts amounting to 0.7 per cent of GDP. In 1995, pension increases were linked to the wage index of the current year, and thus the rise in wages that did not offset inflation reduced pension expenditure relative to GDP. Starting from 1996, pension increases were based on the previous year's wage index, so the pension rate was reduced again as wages were not raised in line with inflation. In two years, this expenditure-decreasing effect amounted to 1.3 per cent of GDP. In addition to the reduction in the pension rate, previous developments continued after the adoption and implementation of the budget for 1996. Inflation was slightly underestimated for that year, and the effect of the reduced real value exerted on spending (together

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[10] The panic that spread throughout the international money market and exchanges following the devaluation of the Mexican peso was called the Tequila Effect. According to an analysis in the 6 February 1995 issue of *Time* magazine, Hungary seemed to be the most vulnerable in the Eastern European region, because its external debt exceeded that of Mexico, which was coupled with a major twin deficit. Yet there was no negative effect because most financial investments were long-term. In the first half of 1995, some also predicted a potential temporary and highly risky situation. The 13 February issue of *Newsweek* cited economists and market-watchers while claiming that Hungary's vulnerability was similar to that of Mexico, but that Hungary could change its economic policy to improve the situation (*Pethő 1995*).

[11] The announcements clearly focused on revenues. The expenditure appropriations for 1995 were hardly planned to be reduced in nominal terms, and only some of the plans were actually realised, because the implementation of the measures cutting family benefits was delayed due to the decision of the Constitutional Court (*P. Kiss 1998*).

[12] Half of the non-payment of compensation for inflation (1.7 per cent of GDP) was the decision of the independent, decentralised general government (local governments and central institutions) (*P. Kiss 2007*). In 1995–1996, the central government reduced the intra-governmental transfers to the decentralised general government by 1.8 per cent of GDP. In contrast to previous years, this could not be offset by the affected group, who reduced their spending by another 1 per cent of GDP, although 0.6 per cent of this was caused by the usual adjustment following the typical peak in municipal investments prior to elections. The largest reduction was realised in wages and the purchase of goods and services (totalling 3.7 per cent of GDP), reflecting the already reduced intra-governmental transfers as well as the absence of compensation for inflation.

with the effect of pensions for 1996) may have been as high as 1.7 per cent of GDP in that year, too. In addition, the measures affecting sick pay, social benefits and the family allowance reduced spending by 1.1 per cent, and capital expenditure also contracted more (by 0.5 per cent) than what would have been caused by the drop in real value.

Table 1				
Main taxes and expenditure as a percentage of trend GDP in 1994–1996				
	1994	**1995**	**1996**	**1994–1996**
Cyclically adjusted private taxes	**31.3**	**32.8**	**32.5**	**1.2**
Cyclically adjusted private indirect taxes	13.8	15.4	15.1	1.2
Cyclically adjusted net primary expenditure	**37.6**	**32.6**	**29.0**	**−8.6**
Cyclically adjusted net social benefits	20.0	18.1	15.7	−4.3
Net wages	6.4	5.6	4.8	−1.6
Net purchase of goods and services	7.2	6.1	5.6	−1.6
Net investments and capital transfers	6.2	5.7	4.9	−1.3
Cyclically adjusted primary balance	**−6.3**	**0.1**	**3.5**	**9.8**

Note: The table does not include items with lower dynamics such as current corporate subsidies and sales revenue and fee income. These would influence the shifts across individual years, but have a minimal effect overall among the changes in two years.

The economic policy consolidation reduced the general government deficit and also mitigated government debt with the rising, albeit controversially assessed, proceeds from privatisation. On the other hand, it brought the domestic absorption of the national economy closer to economic output in such a way that it led to a huge fall in households' disposable income, consumption and standard of living. While the private wage bill and consumption were 3 per cent higher than their trend in 1994, the wage bill and consumption had fallen below the trend by 8 and 5 per cent, respectively, by 1996.[13] A partial analysis has shown that the unexpected inflation, as the quickest way to enforce adjustment, actually proved to be costly from a fiscal perspective. As households' wages and consumption represents the largest tax base, their reduction in real terms also considerably decreased tax revenues.[14] Surprisingly, according to methodology used for inflation as shown in *Tables 4* and *5 of the Methodological Annex*, savings of 0.5 per cent were seen on the expenditure side, while a loss of 2.1 per cent was detected on the tax side due to the price gap, as shown in *Tables 6* and *7 of the Methodological Annex*.[15] This is partly because the lost tax revenue arising from the decoupling of the real trends of consumption

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[13] The methodology for establishing the trend values used in the paper can be found in the online *Annex*.
[14] According to the estimate by *P. Kiss* (*2007*), the tax revenues lost in 1995–1996 amounted to 1.5 per cent of GDP, contrasted with the loss in real value due to the improvement of the balance (2.8 per cent of GDP).
[15] The deviation of actual nominal GDP from the trend (*Figure 9 of the Methodological Annex*) means that the same improvement in the balance is reflected in a different distribution of expenditure and revenue rates if the nominal values are divided by actual nominal GDP rather than trend values.

and wages from GDP amounted to 0.9 per cent of GDP, and the cyclical gap in consumption and the wage bill changed more than the output gap; therefore, the cyclical component deteriorated by 1.3 per cent of GDP on account of the composition effect. In other words, decoupling along with the composition effect resulted in lost tax revenues of 2.1 per cent.

3. Restructuring on the expenditure side: 1997–2001

From 1997, economic growth stabilised in a more favourable structure. First, investment became the driver of growth, which only started to rely on household consumption growth towards the turn of the millennium. While consumption fell short of its trend by 5–6 per cent between 1996 and 1998, it did so by only 2–3 per cent in 1999–2001. This was facilitated by the gradual increase in the private wage bill, which was also well below its trend. And by 2001 the wage bill had reached its trend value. Confidence in economic policy and the exchange rate regime increased in tandem with the improving economic performance. Besides the disinflationary developments on the global market, this also contributed to the reduction in consumer price inflation, which had been over 30 per cent in the middle of the decade, to below 10 per cent by the turn of the millennium. Although the improvement in the balance of payments deficit proved to be temporary after the consolidation, its structure changed considerably. Although the trade deficit was markedly reduced, this was offset by the deterioration of the income balance, which can be primarily attributed to the repatriation of profits linked to increased FDI and other income outflows. This was the period when the domestic product (GDP) and national income (GNI) gradually became decoupled. Although the direct impact of the Southeast Asian crisis that started in 1997 was minimal (the share of Asian exports was below 3 per cent), there were indirect effects as the affected countries were Hungary's competitors on the export market and they achieved competitiveness gains through devaluation. In 1998, the effect of the Russian crisis was felt acutely, as the share of Russian exports decreased from 5 to 3 per cent between 1997 and 1998. This negative effect was offset by the drop in oil prices. A significant boom began in the external economic environment in 1999, the positive implications of which were mitigated by the massive rise in energy prices in the second half of 1999. By the turn of the millennium, steady economic growth and the fiscal developments that had entered a sustainable path had significantly improved Hungary's competitiveness. In the IMD Competitiveness Ranking, the country moved up 10 places between 1997 and 2000 to secure the 27th position, overtaking the Czech Republic (37th) and Poland (40th). In terms of the indicator measuring economic performance within the index, Hungary performed even better: by the turn of the millennium, the country's rank had changed from 38th to 20th.

In 1997, fiscal policy was still only concerned with preserving the achieved balance, and this goal was later complemented by the support of sustained economic growth.

The countercyclical fiscal policy as an objective was not mentioned in draft laws, although it was referenced in the preliminary EU accession document in 2001.[16]

The structural problems should have been resolved to ensure sustainable growth. The most important issue was low employment, which should have been addressed since the transformation crisis, as many of the 1 million people who lost their jobs after the political transition permanently left the labour market. Some of them tried to take advantage of the various options for early retirement. However, many people found themselves without any meaningful social benefits and were unable to find employment in the absence of skills. This was part of the reason why Hungarian society became highly polarised towards the turn of the millennium.[17] However, tensions were caused in connection with government duties by the gradually widening gap between the private and the public sector in terms of efficiency and the wages of employees. Another important aspect was to raise the number of births, which was one of the objectives of the new family policy programme, under which family benefits were no longer means-tested from 1999 (exerting a fiscal effect of 0.3 per cent of GDP), changing a system introduced in 1996. This is because the ageing of society can be slowed by raising the number of births, although the pension system will still reflect the additional costs arising from ageing. The pay-as-you-go system is flexible in terms of distributing the burden between the currently active contribution payers, those just retiring and pensioners. In a funded system (which was introduced in Hungary as a second pillar with Act LXXXII of 1997), the balance is achieved because along with the slowdown in economic growth due to ageing, the return on capital also diminishes (and the fund fees should also be deducted from this), therefore the pension of retirees is increasingly decoupled from wages. Between 1998 and 2010, the official deficit and government debt were both steadily increased by the transfers of those that changed to the second pillar, but this did not affect household demand, and therefore it is reclassified to among the government's contribution revenues in our analytical approach.

The sustainability of the consolidation in 1995–1996 is difficult to assess simply based on the subsequent evolution of the deficit and debt. Thanks to the continuous improvement of the budget balance, the proceeds from privatisation and economic growth, the debt-to-GDP ratio fell from 90 per cent by 30 percentage points in a few years, reaching 55 per cent in 2000. Meanwhile, the deficit of 6.4 per cent in 1996 decreased to 4.4 per cent in 2001, but only the structure of revenues and expenditure can reflect whether the situation was sustainable.

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[16] *"By nature, the Hungarian fiscal system is countercyclical, as a major portion of expenditure is set in nominal terms, while revenues adjust to nominal GDP growth if output or inflation differ from the forecasts."* (*Government of the Republic of Hungary 2001*).

[17] The Gini coefficient, which captures income differences and stood at 0.25 at the time of the political transition, rose to around 0.3 by the early 2000s, which was nevertheless still low by international standards.

The 2-percentage point improvement in the balance is fully attributable to the fact that the interest balance improved from 8.3 per cent to 4.4 per cent between 1996 and 2001. Meanwhile, the primary balance changed in the opposite direction, as the 2-per cent primary surplus in 1996 had disappeared by 2001. This is attributable to the 1.8-per cent growth in the GDP ratio of investment expenditure. For years, the unsustainably low investment rate of 1995–1996 fell short of the levels necessary for replacing fixed assets, and it only started to cover for amortisation in 2001. In other words, consolidation was not sustainable in investments, but the additional expenditure attributable to this was more than offset by the gradual improvement in the interest balance.

However, according to the assessment by *Hornok et al.* (*2008*), apart from the extraordinary change in interest and investment expenditure, most fiscal policy variables remained fairly stable between 1997 and the turn of the millennium (*Table 2*). The trend-like changes of most fiscal variables remained steady in 1997–2000, and the general trend was that cuts of tax rates (for example customs duties) were offset by measures broadening the tax base. The public wage bill did not change much either, because most pay rises were offset by cuts in the number of employees.

Table 2
Main taxes and expenditure as a percentage of trend GDP in 1997–2001

	1997	1998	1999	2000	2001
Cyclically adjusted private taxes	**30.9**	**31.3**	**31.7**	**32.3**	**30.9**
Cyclically adjusted profit taxes	1.9	2.1	2.3	2.3	2.3
Cyclically adjusted private wage taxes and contributions	15.3	15.4	15.0	15.2	14.8
Cyclically adjusted private indirect taxes	13.7	13.8	14.4	14.8	13.7
Cyclically adjusted net primary expenditure	**28.8**	**29.6**	**29.8**	**29.2**	**30.6**
Cyclically adjusted net social benefits	15.3	15.8	16.1	15.7	15.7
Net wages	4.9	4.9	4.9	4.8	5.0
Net purchase of goods and services	5.6	5.5	5.4	5.4	5.4
Net investment	2.3	2.5	2.8	2.9	3.3
Cyclically adjusted primary balance	**2.1**	**1.7**	**2.0**	**3.1**	**0.2**

4. Fiscal expansion and delayed adjustment: 2002–2006

The Hungarian economy and the general government were in a favourable position at the turn of the millennium. That was the only year after the economic transition when the official debt-to-GDP ratio did not exceed the 3-per cent Maastricht threshold, and the debt ratio was lower than 60 per cent of GDP. Corporate and household indebtedness was among the lowest in the European Union. In the

early 2000s, the growth rate of the Hungarian economy was steadily around 4 per cent. In 2000–2001, net exports and domestic demand, especially consumption and investments, increased GDP. In 2002–2003, the entire euro area, in particular Germany, one of Hungary's most important trading partners, was in a crisis. This reduced the growth rate of Hungarian exports, and *per se* this would have reduced economic growth. That was the time when growth financed from credit, based on domestic demand and resulting in a current account deficit, began, which temporarily concealed the economic and structural issues. All economic actors accumulated debt at the same time, and fiscal policy played a key role in this.[18] Meanwhile, the private sector also failed to assess the risks and became increasingly indebted as lending conditions were gradually eased. The sector's indebtedness was at the EU's average when the global financial crisis hit. Owing to the fiscal expansion and private indebtedness, consumption, which had been 2 per cent below its trend in 2001, was 6–7 per cent above its trend in 2003–2006. In the meantime, the private wage bill that had been in line with the trend in 2001 was 5–9 per cent above its trend in 2002–2006.

Table 3					
Main taxes and expenditure as a percentage of trend GDP in 2002–2006					
	2002	**2003**	**2004**	**2005**	**2006**
Cyclically adjusted private taxes	**29.2**	**28.3**	**28.8**	**28.8**	**29.5**
Cyclically adjusted profit taxes	2.4	2.2	2.0	2.0	2.3
Cyclically adjusted private wage taxes and contributions	13.8	12.6	12.8	13.2	13.5
Cyclically adjusted private indirect taxes	12.9	13.4	13.9	13.6	13.6
Cyclically adjusted net primary expenditure	**35.3**	**34.1**	**32.9**	**35.3**	**36.9**
Cyclically adjusted net social benefits	17.0	17.9	18.4	19.6	20.4
Net wages	5.7	6.4	6.2	6.3	6.1
Net purchase of goods and services	5.6	5.6	4.9	5.2	5.6
Net investment	4.4	3.8	3.6	4.2	4.5
Capital transfers	3.3	1.8	1.1	1.2	1.7
Cyclically adjusted primary balance	**−6.2**	**−5.8**	**−4.0**	**−6.4**	**−7.4**

The fiscal expansion offset the negative impact that the slump in external demand had on growth. However, this was motivated by the electoral cycle, rather than a countercyclical fiscal policy. In 2002, taxes were cut (personal income tax, tax-free minimum wage), and in a few years public wages were raised by one-third,[19] and social benefits steadily increased after 2001 (e.g. the gradual introduction of the

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[18] Monetary policy failed to offset the dominance of fiscal policy (*Matolcsy – Palotai 2016*).
[19] As mentioned above, public wages did in fact fall short of private wages, but this was addressed without dealing with the shortfall in efficiency; a structural problem.

13th-month pension) (*Table 3*). In 2002–2003, investments and capital transfers (e.g. housing subsidies) reached record highs. All in all, the size of the expansion caused an unsustainable deficit and growing debt. Since 2004, convergence programmes have included an estimate for the output gap, but stabilisation of the economic cycle could not be included among the objectives, due to the high deficit and indebtedness. In 2004, the balance was temporarily improved, mostly due to curbed investments and capital transfers, and the rise in social benefits was halted. After this, in 2005–2006, capital items reached their earlier levels and social benefits also started to rise rapidly. This was once again the end of an electoral cycle.

The economic impact of the fiscal expansion was estimated by *Hornok et al.* (*2008*) using a model and two scenarios. The baseline for the estimation was established with a no-policy-change, neutral scenario, covering the revenue and expenditure variables listed at the end of *1.3 section of the Methodological Annex*.[20] The differences between the actual and the neutral values of these variables were considered individual shocks.

According to the results, without the shocks (expansion), economic growth in 2001–2003 would have been lower by 1 per cent in each year. In this period, the stronger growth was partly attributable to consumption, which came in 1.8 per cent higher than the neutral fiscal path. This was due to the fiscal measures boosting households' income, cash transfers, public wages and higher net private wages (PIT cuts). Growth was also stimulated by the above-neutral growth in household and public investments and the increase in government consumption. Of course, domestic demand also had an import content, and therefore only two-thirds of that had any impact on growth.

According to *Hornok et al*. (*2008*), GDP levels in the two scenarios continued to diverge by 2.5–3 per cent in 2004–2006. Their results showed that in 2004–2006 the growth rate would have been similar to the path not continuing the fiscal expansion that was actually realised due to the earlier shock, and for example in the case of a no-shock baseline scenario the decline in investments was the result of the trends from earlier years, namely the expansion in housing investments.

The consolidation of the unsustainably high deficit did not begin until 2006. Tax increases or cuts to household expenditure (wages, transfers) were out of the question, and only investments were curbed temporarily. The actual size of the deficit and the absence of the measures genuinely reducing the deficit were sought to be concealed with creative accounting and the planning errors in the Budget Act.

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[20] A publication of the *MNB* from *2007* discusses in detail the scenario of a lower potential growth rate arising from a neutral fiscal path. The actual evolution of the neutral expenditure scenario differed from what the authors would believe recently based on the latest estimate of potential GDP, because potential GDP, the basis for the neutral path, was assessed differently in past convergence programmes (see *Methodological Annex, Table 3*).

In order to understand how the Hungarian budget deficit could remain exceptionally high for years and why the debt ratio increased, the planning process should be reviewed, just like the differences between the various accounting methods. In principle, there was a need for consolidation because Hungary had been under the so-called Excessive Deficit Procedure (EDP) since its accession to the EU in 2004.[21] Accordingly, the government could only determine a gradually decreasing deficit path each year in the period under review, but it failed to meet its objectives until 2007. This was not attributable to negative exogenous factors, as GDP growth, which determines tax revenues, was relatively high, and interest expenditure slightly declined due to investors' large risk appetite. The deficit was above the target partly because of the errors in planning, and partly because of the measures implemented during the year that increased the deficit,[22] and also because "loopholes" in fiscal statistics were sought.

Figure 1
Convergence programmes and meeting the deficit targets

Source: HCSO and convergence programmes

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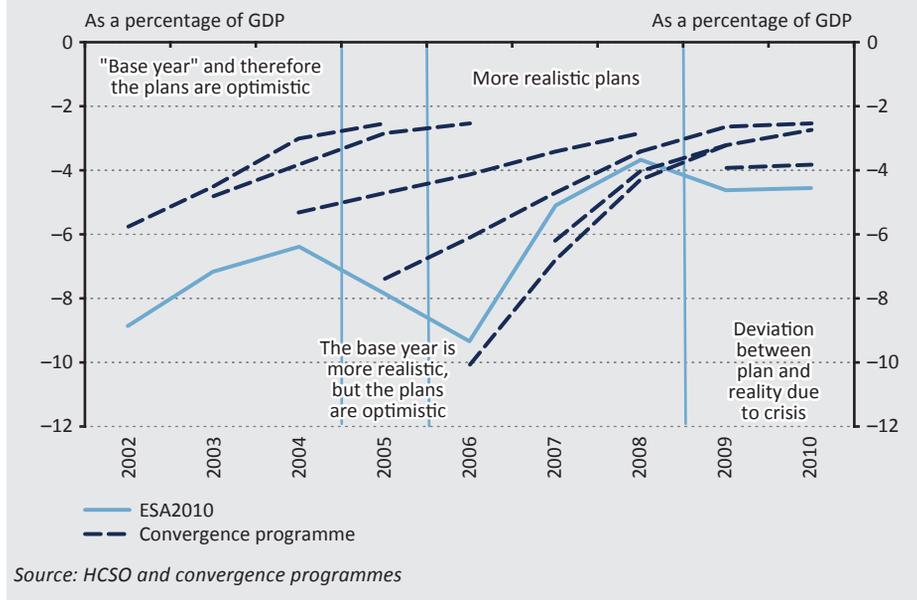
[21] For more on this unsustainable fiscal policy, see: *Győrffy* (*2007*); *Orbán – Szapáry* (*2006*).
[22] An example for the deficit-increasing measures implemented during the year is that in 2002, following the elections, public employees' wages were increased by 50 per cent, and the personal income tax was reduced.

First, between 2002, when the extra spending measures started, and 2004 the deficit-to-GDP ratio of the "base year" used for planning was underestimated by 2 percentage points (*Figure 1*). Second, there were also errors regarding the developments and measures of the next year. Between 2003 and 2005 the deficit slippage was largely caused by the revenues falling short of their targeted values by 1.1–1.5 per cent of GDP. In 2005, the foreseen values finally became more realistic, because it was admitted in the Convergence Programme that the government's balance deteriorated in the base year of the planning. Nevertheless, the difference between the plans and the actual figures was of record proportions: instead of an almost 2-percentage point improvement, the deficit grew by almost 2 percentage points.[23]

The difference between the plans and the actual figures was also influenced by the fact that until 2006 decision-makers sought to reduce the deficit by using methodological loopholes that turned out to be unfeasible. Overall, these statistical adjustments increased the deficit by 1–2 per cent of GDP each year, and so they explain much of the difference between the plans and the actual figures:

• Between 2003 and 2005, Eurostat temporarily allowed private pension funds to be shown under the government sector, and so the temporary, so-called "national balance" was improved by 0.9–1.4 per cent, but later this option expired.

• Road construction would have been outsourced to public corporations outside the general government in a legal sense, but in line with EU statistics rules, Nemzeti Autópálya (National Motorway) Rt. had to be included in the statistical government sector from 2004, and the same applied for Állami Autópálya Kezelő (Public Motorway Management) Rt. from 2006, so no "savings" were realised from this after that.

• In 2005, the transformation of the 13th-month wage to a "0th-month" wage was not a success, as it had to be recorded in 2004 instead of 2005 in statistics, contrary to the original intention of the government.

• The government sometimes held back the VAT refunds to temporarily improve the budget balance, but in line with EU rules the statistical methodology was soon amended so that this could not impact the ESA balance.

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[23] Between 2006 and 2008, the much-delayed adjustment was partly completed, and the plans became more realistic. After this, the crisis resulted in another negative surprise, but the balance still improved by almost 5 per cent until 2010. But within that, as demonstrated later, investments realised from own funds (rather than EU funds) were reduced by 2.5 per cent, which is an unsustainable and unfavourable way to improve the balance when investments fall short of amortisation.

Figure 2
Augmented SNA balance and ESA indicator in 2002–2006

Note: Without adjusting for the loss of pension contributions
Source: MNB

However, even after the statistical adjustments made at that time, some improving factors remained in the budget, such as the lump-sum concession revenues, "savings on investment" arising from public investments outsourced to private firms (e.g. the form of PPP) or the quasi-fiscal deficit of public transportation, caused by underfunding. The augmented (SNA) indicator calculated by the MNB also filters these distortive effects (*Figure 2*). Based on this, in the period between 2002 and 2006, only 2004 saw a minor, temporary deficit reduction, due to curbing investments.

5. Adjustment in two phases: 2007–2008 and 2009

In the middle of the decade, the global economy became overheated, without any countercyclical response from fiscal policymakers in the individual countries to restrict demand. When this is examined in real time (when the decisions were made), it can be seen that they often failed to realise even the signs of economic growth, falsely identifying a cyclical upswing as trend growth (*Forni – Momigliano 2005; Cimadomo 2008; Caudal et al. 2013; P. Kiss 2017, 2020*). Due to the subsequent downward adjustment of estimated potential growth after the crisis, the fiscal policies that were intended to be countercyclical only turned out to have contributed to overheating in a procyclical manner later on.

In Hungary, net exports once again became one of the drivers of domestic growth thanks to the favourable economic developments in Europe. But the economy's performance after 2008 was mainly influenced by the reduction of the debt accumulated prior to the crisis. The MNB's estimates show that by that time lending processes had become decoupled from the economy's performance, meaning that a credit bubble had formed. According to the estimates, unsustainable indebtedness was most typical of households (*Bauer et al. 2013; Endrész et al. 2014; Kiss et al. 2006; MNB 2010a*). As all economic actors (including the government) increasingly financed their consumption from loans, by 2008–2009 the amount of outstanding borrowing was 16–18 per cent higher than the equilibrium level of debt relative to GDP (*Matolcsy 2015*). The resulting vulnerability was exacerbated by the fact that the indebtedness was partly linked to real estate investments and occurred in FX. Therefore, the unexpected international financial crisis of 2008 hit Hungary in a vulnerable position.

The combined debt reduction of households, companies and the government persistently reduced domestic consumption and investments. Consumption was 6–7 per cent above its trend in 2007–2008, but in 2009 it was 1 per cent below the trend. The effects on the labour market were similarly negative: while private wages gradually declined from a 2-per cent surplus to the trend value between 2007 and 2009, unemployment decreased from 1–2 per cent above the trend to 3 per cent below it in 2009.

The fiscal adjustment announced after the elections in 2006 (*New Balance Programme*) increased inflation from 3.6 per cent in 2005 to 6–8 per cent in 2007–2008 through tax hikes,[24] and it also contracted domestic demand (consumption and investments). As a result, economic growth declined to less than 1 per cent in the next two years. Some of the measures relied on tax increases (VAT, simplified business tax (eva), contributions, solidarity tax, contributions by the financial, energy and pharmaceutical sectors), but a large portion of expenditure was also reduced (wages, purchase of goods and services and especially investments). The neutral expenditure path used as a reference point for expenditure measures could not be established in real time due to the estimation error of potential GDP (*Table 3 in the Methodological Annex*).

When the crisis hit, government debt stood at 72 per cent of GDP (according to 2021 data), and the ESA deficit of the budget was still relatively high, at 3.8 per cent, despite the ongoing fiscal adjustment underway from the second half of 2006. In that situation, the economic downturn was not offset by countercyclical fiscal policy; on the contrary, further deficit-reducing measures had to be implemented in the absence of market financing and as a condition for the immediate financial assistance requested from the International Monetary Fund. These measures reduced the

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[24] The partly unexpected inflation improved the balance by 0.2–0.3 per cent each year, in particular on the expenditure side (methodology: *P. Kiss 2007*).

disposable income of the private sector, just like the demand of the government sector from companies, thereby deepening the recession. Since consumption and wages represent the largest tax base, their contraction in 2009 meant that the cyclical component deteriorated to a great extent, which *per se* increased the financing requirement of the general government. Since the economic impact of the crisis was gradually exerted on consumption and wages, the negative fiscal effect resulting from the smaller tax bases reached its trough in 2010. The employment rate of 57.4 per cent among 15–64-year-olds measured in 2006 dropped to 54.9 per cent by 2010 due to the crisis, which was the lowest among EU countries.[25]

In 2009, another mid-year VAT increase took place, which had a full-year effect in 2010. In parallel with this, contributions were cut, first applied to those earning up to twice the minimum wage in 2009, and then to everyone, regardless of wage levels, in 2010. While the combined effect of the two tax measures in 2009 pointed towards consolidation, it had a neutral effect in 2010. On the expenditure side, wages (13th-month wage) and investments were cut further, and household transfers were also markedly reduced (phase-out of the 13th-month pension, cuts to sick pay, tightened family benefits) (*Table 4*).

Table 4					
Main taxes and expenditure as a percentage of trend GDP in 2006–2009					
	2006*	**2007**	**2008**	**2009**	**2006–2009**
Cyclically adjusted private taxes	**29.5**	**32.5**	**33.1**	**31.6**	**2.1**
Cyclically adjusted profit taxes	2.3	2.5	2.4	2.0	−0.3
Cyclically adjusted private wage taxes and contributions	13.5	15.6	16.4	15.2	1.7
Cyclically adjusted private indirect taxes	13.6	14.3	14.2	14.4	0.8
Cyclically adjusted net primary expenditure	**36.9**	**34.3**	**33.4**	**31.3**	**−5.6**
Cyclically adjusted net social benefits	20.4	19.8	20.3	19.3	−1.1
Net wages	6.1	5.4	5.3	4.9	−1.2
Net purchase of goods and services	5.9	5.3	5.9	5.7	−0.2
Net investment	4.5	3.4	2.9	2.5	−2.0
Capital transfers	1.7	1.5	0.7	0.9	−0.8
Other current expenditures	1.9	2.1	1.6	1.1	−0.8
Cyclically adjusted primary balance	**−7.4**	**−1.8**	**−0.2**	**0.2**	**7.6**

Note: *2006 differs from the values shown in earlier tables, as in mid-2007 the passenger services of MÁV (Hungarian State Railways) were reclassified to outside the statistical government. As a result, other expenditures declined, as the subsidy had to be consolidated within the sector. But at the same time wage expenditure and the purchase of goods and services increased due to the classification. To ensure the analytical comparability of the time series, the effect of this being realised already in 2006 was also calculated, which can be seen in this column.

[25] For more on the employment situation, see: *Kátai* (*2009*); *Scharle et al.* (*2010*); *Fazekas – Scharle* (*2012*).

6. A new approach to consolidation: 2010–2012

The international conditions seemed to suggest that a recovery cycle would follow the crisis in 2010, but in 2011 another international economic downturn occurred. Accordingly, Hungarian exports temporarily increased in 2010, followed by another decline. Private sector demand was also unfavourable, largely because the pre-crisis indebtedness was followed by protracted debt reduction. While private borrowing increased by 14 per cent of GDP on average annually between 2002 and 2009, it fell by 6.5 per cent of GDP on average each year between 2009 and 2013. All factors in private sector demand declined: the investment rate reached its lowest point in 2012, even though the EU funds received for private investments increased by 0.3 per cent of GDP in that year. Household consumption reached its first trough in 2010, by dropping 4 per cent below its trend. It fell short of the trend by only 3 per cent temporarily in 2011, before falling short by 6 per cent again in 2012–2013. Private employment was persistently 4–5 per cent below the trend, while private wages were 1 per cent lower than the trend in 2010, before returning to it in 2011, only to fall below it by 4 per cent for several years.

Since from the perspective of the major tax bases (wage and consumption) the budget reached its cyclical trough in 2010, this was a difficult starting position. Regarding 2010, it is hard to distinguish between the consequences of the original appropriations and tax laws (balance-neutral tax shift between VAT and contributions) and the impact of the measures implemented during the year. For example, the forecast in the *MNB's* (*2010b*) Inflation Report did not assume that the original appropriations in expenditure would be realised based on what had been achieved up to that point during the year.[26]

Fundamental structural measures were implemented in this period. The *Széll Kálmán Plan* sought to reduce the debt ratio, through a series of measures aimed at transforming the labour market, the structure of society, the entrepreneurial environment and the operation of the government. Several measures were implemented based on a tax reform consistent with the employment policy objectives and reducing the taxes on labour[27] as well as on reducing certain transfers to households.[28] This is because the labour market participation rate was partly

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[26] The expenditure cuts foreseen for budgetary authorities did not seem to be realistic, and they estimated an additional deficit amounting to 0.3 per cent of GDP (ultimately they overshot the target by even more). Budgetary transfers provided to local governments were also underestimated by 0.3 per cent of GDP, and that was also exceeded by the end of the year.

[27] According to official ESA statistics, wage taxes and contributions were reduced less because of an apparent increasing effect, when the contributions paid to the private pension funds in the funded system were channelled back into the public pillar. This is only apparent because it did not increase the tax burden, as this contribution revenue was always included in our analytical figures presented so far, albeit statistically it is shown somewhere else (see the *Methodological Annex*).

[28] Furthermore, social benefits were also reduced relative to GDP by pension parameters, such as the gradual increase in the retirement age from early 2010, the missing valorisation of the family support expenditure, related to the fact that family support increased considerably among tax allowances.

raised by the fact that instead of unemployment benefits, job opportunities were provided in public employment schemes, and sick pay and early retirement and disability retirement benefits were cut. In addition, the tax reform also included tax cuts to support businesses, and a new system of family tax allowances to promote family policy objectives. During the transformation of the government's operation, savings were also realised in the purchase of goods and services (*Table 5*).

Table 5
Main taxes and expenditure as a percentage of trend GDP in 2009–2012

	2009	2010	2011	2012	2009–2012
Cyclically adjusted private taxes	**31.6**	**31.0**	**30.1**	**31.4**	**−0.2**
Cyclically adjusted profit taxes	2.0	1.3	1.2	1.3	−0.7
Cyclically adjusted private wage taxes and contributions	15.2	14.0	13.2	13.5	−1.7
Cyclically adjusted private indirect taxes	14.4	15.6	15.7	16.6	2.2
Cyclically adjusted net primary expenditure	**31.3**	**29.9**	**30.8**	**28.0**	**−3.3**
Cyclically adjusted net social benefits	19.3	18.4	18.3	17.2	−2.1
Net wages	4.9	5.2	5.3	5.0	0.1
Net purchase of goods and services	5.7	5.4	5.3	4.9	−0.8
Net investment	2.5	2.0	1.1	1.5	−1.0
Cyclically adjusted primary balance	**0.2**	**1.1**	**−0.7**	**3.3**	**3.1**

The expenditure cuts were not enough to offset the tax reduction, and therefore it was mainly covered by raising the consumption taxes and the crisis taxes levied in the retail, telecommunication and energy sectors. The shift in taxes from production to consumption improved Hungary's competitiveness in trade. The results of the measures – an increase in employment – were gradually felt on the labour market, making the steps taken to improve the balance sustainable. After 2010, the employment rate gradually converged to the EU average, and looking at the first period of this process up to 2016 the number of people in employment increased by 600,000.

Estimates show that the immediate real economy impact of tax cuts and tax hikes partly offset each other, and they exerted a positive effect on the economy in the long run (*Baksay – Csomós 2014; Palotai 2017*). According to the simulation of *Szoboszlai et al.* (*2018*) examining major tax measures and changes in transfers (without other expenditure items), the introduction of the 16-per cent PIT increased the effective labour supply by 3 per cent in the long run, largely due to intensive-side adjustment, while 0.6 per cent was the result of employment growth. As a result, the negative fiscal effect could fall to one-fifth of its original value in the

long run. The phase-out of the super gross tax base (gross wage plus employer's social contribution) reduced the tax burden to a similar extent, and this measure was able to increase employment by 1.5 per cent in the long run, and its immediate negative effect on the deficit dropped to two-thirds. The phase-out of the tax credit system had a positive fiscal impact, but in the long run it can reduce employment by 1.9 per cent as a combined result of several effects: it decreases the labour supply through the rise in the effective tax rates, while increasing it due to the fall in the marginal tax rate. The simulation did not find any significant long-term effect of those measures implemented in 2010–2014, which affected the corporate tax, special taxes and turnover taxes.

The reduction of the debt ratio was achieved, and the decreasing debt, coupled with a credible economic policy and the low financing requirement, steadily reduced the interest expenditure relative to GDP. Between 2012 and 2016 the net interest expenditure as a ratio of the GDP improved by almost 1.5 per cent of GDP, which created room for manoeuvre that allowed a structural transformation and an increase in primary expenditure items in the next period.

7. Restructuring on the expenditure side: 2013–2016

The global economic environment started to improve in 2013, but growth was somewhat delayed in the EU. In 2015 the process slowed down, but the sluggish recovery from the crisis continued in the developed region, while emerging economies faced declining growth prospects once again. In 2016, the global economy expanded at a moderate rate, even slowing down temporarily and, emerging markets showed a mixed picture.

After 2012, Hungarian growth converged to the Visegrád region and started deviating from the heavily indebted countries as external debt was reduced. Domestic indebtedness contracted, while not only government debt but also household indebtedness decreased. By 2013, in aggregate, this probably approached the equilibrium level which was in line with the income and wealth situation (*Bauer et al. 2013*). After this, there was an upswing in housing loans, and by mid-2016 lending exceeded repayments for the first time since 2008. Due to the deleveraging of the accumulated debt and the slowly improving credit conditions,[29] the propensity to save was high, and consumption was low. In 2013, consumption was still below its trend by 6 per cent, but it gradually converged to it until 2016, at which point it only fell short of the trend by 1 per cent.

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[29] The central bank launched the Funding for Growth Scheme to avoid a credit crunch, and after that was terminated the bank used the Market-Based Lending Scheme from 2015 to facilitate risk management and liquidity management, improving banks' willingness to lend (*Matolcsy – Palotai 2019*).

Corporate investments also started to pick up after the trough in 2012, and so its adjustment ended around 2013, and the capital stock achieved levels consistent with current output and capital costs (*MNB 2014*). In 2013–2015, EU capital transfers for corporate investments fluctuated at 1–1.3 per cent of GDP, before declining to 0.3 per cent of GDP due to the phase-out of the earlier programmes in 2016. However, the effect of the central bank's programmes appeared in the year when EU funds declined, and therefore SME lending expanded by the targeted 5–10 per cent.

Favourable developments were seen on the labour market as well, as private employment, which had been 4 per cent below its trend in 2013, was 2 per cent above its trend in 2016. Meanwhile, between 2012 and 2015, the average private wage was 3.5–4 per cent lower than the trend in real terms, with this negative gap falling to below 2 per cent by 2016. To some extent, this may have been affected by the unexpected disinflation, during which inflation came in 2 percentage points lower than market analysts' expectations in both 2013 and 2014, and the actual figures also fell short of expectations by 0.6–0.9 percentage points in 2015–2016.

Overall, fiscal policy was neutral or marginally loosening. Minor demand-expanding and demand-tightening years alternated, with the focus on the continued transformation of the tax structure and greater realignment of expenditure.

Developments in the labour market were also significantly affected by government measures. The elimination of the personal income tax (PIT) credit would have led to a loss in households' income, and therefore the government provided a compensation in contributions in 2012, which was gradually decreased in 2013, to protect the net value of lower wages. This general compensation was replaced by the *Job protection Action Plan* in 2013–2014, which provided an employer's social contribution allowance for the employment of disadvantaged groups exhibiting low levels of employment. As a result, the affected groups, otherwise characterised by a low propensity to work, adjusted flexibly to the situation, which boosted employment by 0.7 per cent. According to estimates, the immediate loss in contributions is almost fully recovered in the long run (*Szoboszlai et al. 2018*). However, with respect to private wage taxes and contributions, the larger loss in 2013 was also more or less offset by the gradual phase-out of the 2012 compensation and the elimination of the cap on the pension contribution, which benefitted higher wage earners (*Table 6*). Another reduction in PIT was implemented in 2016.

Table 6

Main taxes and expenditure as a percentage of trend GDP in 2013-2016

	2013	2014	2015	2016	2012–2016
Cyclically adjusted private taxes	**31.2**	**31.3**	**32.0**	**32.1**	**0.7**
Cyclically adjusted profit taxes	1.5	1.7	1.9	2.3	1.0
Cyclically adjusted private wage taxes and contributions	13.3	13.1	13.4	13.3	−0.2
Cyclically adjusted private indirect taxes	16.4	16.4	16.7	16.5	−0.1
Cyclically adjusted net primary expenditure	**28.3**	**29.0**	**29.3**	**29.7**	**1.7**
Cyclically adjusted net social benefits	16.9	16.3	15.8	15.6	−1.6
Net wages	5.2	5.5	5.8	6.0	0.9
Net purchase of goods and services	4.6	5.1	5.3	5.3	0.4
Net investment	1.3	1.8	2.0	2.4	0.9
Capital transfers	1.6	1.6	2.0	1.8	0.6
Other current expenditures	1.9	1.9	1.9	2.2	1.0
Cyclically adjusted primary balance	**2.9**	**2.3**	**2.7**	**2.4**	**−1.0**

In the case of profit taxes, temporary windfall revenues were generated in 2016. All in all, the aggregate result of various changes was that the sum of indirect taxes hardly changed. The crisis taxes affecting the financial, retail, telecommunication and energy sectors were partly replaced by new, turnover-type taxes, and some of them were also reduced. In the case of VAT, the rates were reduced in a targeted manner, but this was probably exceeded by the whitening of the tax base resulting from the introduction of online cash registers (*Lovics et al. 2019*).

As expenditure increased, its focus shifted from social benefits towards other items. Social benefits were reduced, while effects increasing and decreasing these transfers took hold at the same time. Pensions were raised by the allowance in women's service time and the unexpected disinflation, because the pension increase based on the inflation projection and performed at the beginning of the year turned out to be higher than the actual inflation. However, the pension parameters (e.g. the gradual increase in the retirement age from 2010) reduced expenditure, as did the tightening of the eligibility conditions for disability retirement and the absence of the valorisation of the family subsidy (in parallel with which families' tax and contribution allowance expanded to a larger degree).

Net wages were increased by the growth in public work schemes, as well as a larger pay increase in education and a smaller one in healthcare. In 2013–2015, the effect of the unexpected disinflation could also be felt, due to which appropriations for wages and purchases of goods and services were overestimated by 2–2.5 per cent. As this surprise was smaller in the case of the GDP deflator, no downward

denominator effect occurred in the GDP ratio (*Tables 4 and 5 in the Methodological Annex*).

Investment from own funds and EU funds exceeded the depreciation of state-owned fixed assets in 2012, and in 2013–2015 investments financed by either own funds or EU funds continued to grow. The size of the EU capital transfers absorbed by the government increased from 1.6 per cent of GDP in 2012 to 3.6 per cent in 2015, which allowed fiscal policy to stimulate the economy without increasing the deficit. However, in 2016 EU capital transfers temporarily declined to 0.2 per cent of GDP, and this was offset by the growth in government-financed public investments only to a small extent (0.4 per cent of GDP). This was the lowest level of investment in the past period, but it still more or less covered the depreciation of fixed assets, in other words it was not unsustainable.

Capital transfers and other current expenditure items exhibited significant growth. This broad group of expenditure items comprises corporate transfers, the capital injections to public enterprises, the funds provided to agriculture, public transport, sport, research, churches and the non-resident sector (Homeland Fund) as well as the active labour market subsidies. This item continuously fluctuates due to idiosyncratic factors, so it was not presented in most episodes, only when the extent of the shift was significant for the episode as a whole.[30] Other current expenditures relative to GDP exceeded their value compared to the previous period. The volume of capital transfers stabilised in 2013–2014 from their earlier lower levels, before increasing substantially in 2016 due to idiosyncratic factors, such as spending items decided at the end of the year, some of which comprised investment grants given for religious and, to a smaller extent, sport-related objectives. Some of these transfers would be represented in a later period of the actual effect on demand in our adjusted analytical indicator, but that falls outside the scope of this study.

8. Conclusion

In line with the aim of the paper, the most important episodes of Hungarian fiscal policy were determined. In connection with the methodological solutions of the analysis, four sets of issues were identified in the literature.

Two of these focused on the method used for filtering the exogenous factors from tax revenues, and removing the impact of temporary items on the revenue and the expenditure side. This problem was solved by creating a fiscal indicator divided by a nominal trend GDP that filters the effects of exogenous factors (business cycle) and creative accounting.

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[30] *Szemere* and *P. Kiss* (*2011*) applied a 4-year backward-looking average for these items to smooth out the effect of idiosyncratic factors.

The third question concerned the factors that could explain the change in tax revenues. To this end, the content of the individual tax revenue and public expenditure categories was clarified: for example, the affected taxes and expenditure items were adjusted for the tax content of expenditures. Based on the characteristics of the annual revenue-expenditure structure adjusted in line with the three questions, six episodes can be distinguished. Following the fiscal adjustment in 1995–1996, the structure of spending was changed between 1997 and 2001. In 2002–2006, adjustment was delayed after a major round of fiscal expansion. After this, the situation was consolidated in several stages and using different approaches (2007–2009 and 2010–2012, of which only the latter yielded lasting results). Finally, between 2013 and 2016 the structure of spending was changed once again.

The fourth methodological question concerns the stability over time of the estimation of the trend GDP used as a reference point for expenditure-side measures. The filtering of the financial cycle produces a more stable estimate. Based on this, the paper used an updated, subsequently revised estimate, but the real-time estimate in the given years based on the adjustment with the business cycle deviated from the result. It can be stated that the output gaps included in the convergence programmes since 2004 were significantly revised, similar to the experience of other countries, and the real-time perception about potential GDP was different. This could have introduced a distortion to the definition of the neutral expenditure level and the trend tax revenue level. However, fiscal policy did not explicitly include these indicators. This may be attributable to the fact that the countercyclical fiscal policy smoothing economic shocks was not in the focus during the expansionary period, nor when the budget was consolidated or when the structural transformation was implemented.

It would be worthwhile to expand the six fiscal episodes analysed in the article by examining the episodes since then. This could be done in the future, if the methodological problems mentioned at the end of the introduction are solved.

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The Effect of a Stronger Bargain Position on the Perfection and Completeness of a Contract*

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With a stronger bargain position, it is possible to achieve more favourable conditions for the potential conclusion of a contract. Although a dominant position is commonly associated with a stronger bargain position, their relationship is neither required nor common. A relatively stronger bargain position usually results from the parties' reliance and dependence on each other. Reliance is generally based on the lack of alternatives and reserves. The effect of basic factors affecting reliance may be influenced by the relevant knowledge and negotiation techniques of a party. Even the conclusion of a so-called perfect contract may be hindered by an intent to abuse a stronger bargain position, and after conclusion, it may lead to performance problems. The conclusion of a so-called complete contract may be hindered as well, since higher risk exposures increase the number of future alternatives. A certain degree of exploitation of a strong or relatively stronger bargain position gained through business successes is an important driving force in market economies, but it is challenging to adjust this to the demands for perfect or complete contracts.

1. Introduction

Under market conditions, business partners voluntarily enter into economic interactions with each other. Their corresponding relationship is primarily manifested by the fact that none of the parties can use force or coercive power in order to establish an economic relationship, i.e. to conclude a contract. Coordination is precisely expressed in the assent embodied in the contract (*Markovits 2020*), as each party has their own unique intent to conclude the contract. An assent is considered to be an assent even if the parties are not able to impose their will on each other to the same extent during the determination of the assent. However, if the potential contractual parties are not able to adjust or harmonise their own

individual will with their counterparties to the necessary extent to determine the assent, the contract will not be concluded.

A contract is therefore not necessarily concluded on a voluntary basis, even if all of the possible parties have a contractual intent. Nonetheless, the assent, and thus the conclusion of the contract, will not guarantee that the contractual terms are executed without problems, i.e. whether each party will intend or be able to comply with their contractual obligations, or will be able to exercise their rights. Insofar as the parties do not fulfil their obligations immediately after concluding the contract, they may have to face a number of problems later on. Typically, the longer the parties' performance period is, the higher uncertainty and risk they need to expect in terms of performance. Both legal and economic disciplines try to handle such uncertainties and risks of contracts, which are significant in terms of the performance of contractual terms. A perfect contract in the legal sense, hereinafter referred to as the "perfect contract", aims to guarantee by any means that the assent established in the contract is executed according to the contractual terms (*Bag 2018*). On the other hand, a perfect contract in the economic sense, hereinafter referred to as the "complete contract", aims to achieve that any possible realisations of the future become separate elements in the contract, and each of them are individually assigned with the legal consequences of the parties' rights and obligations (*Arrow 1963*). In fact, both approaches, which are discussed in greater detail in *Section 4*, aim to minimise the uncertainties and risks arising from the performance of the contract with their own set of tools. However, neither of the approaches provides a detailed analysis of the manner of determining the assent established in the contract, and as such, how the features of this determination may later affect the approach to the ideal conditions in the conclusion of a perfect or complete contract.

Credit institutions place great emphasis on a high level of legal compliance of the contracts they conclude, as well as on being able to realise an adequate amount of income through them, regardless of the future. With regard to financial performance, which is the essence of credit products, it can be stated that performance problems mostly arise on the clients' side and mainly involve repayment. In the case of perfect contracts, it is ensured at all costs that clients perform in the correct manner and to the correct extent; in the case of complete contracts, the obligations of the clients are clearly defined for any future situation, as well as the obligations of the credit institution. It is important to note that both types of contracts ensure these conditions in such a way that the contract is not modified after conclusion, as this is unnecessary. In the absence of the possibility of amending the contract, which possibility is otherwise provided in the case of necessity by the theory of the perfect contract, the perfection and completeness of the contracts become particularly vulnerable in terms of uncertainty and risks.

Contracts appearing to be perfect or complete before conclusion (ex ante) can only be determined to be indeed perfect or complete after the conclusion (ex post). In the case of an unfavourable turn of events, even a ten-line "rough" contract can be perfect, or complete, if there is no problem with performance, and the future develops in a way the parties expect it and conclude it in writing. Yet, even a contract concluded with great attention and care may subsequently prove to be imperfect or incomplete because of unexpected future events, and performance cannot be properly ensured by the contract for the credit institution.

In the conclusion of a loan contract, the bargain position of the parties is also a determining factor. Credit institutions can select their clients, within the framework of the provisions of the relevant legislation, but the reverse is also true. A loan contract can be concluded when the intent of both parties becomes compatible in the form of an assent. However, further factors also obviously matter, among other things, for example, the size and profitability of the credit institution, the level of risk of its credit portfolio so far, and whether the client is another credit institution, or a petroleum industry giant, or a hairdresser launching his/her business. The parties are neither obliged to enter into a contractual relationship, nor required to conclude a contract with the same conditions as with another potential partner. Therefore, even in the case of credit institutions, the reconciliation of individual wills in an assent depends on the bargain position of the parties.

As such, it is worth taking a step back from the conclusion of contracts and examining the determination of the assent, and its effect on the extent to which the contract is able to approach the ex-ante perfect or complete condition. The question is how the use of a stronger bargain position affects the conclusion of a perfect or complete contract via the nature of the assent expressed in the contract.

Many factors may influence the appropriateness of contracts and the full performance of their conditions. This study does not undertake to account for and analyse all of these factors. The study aims to present the nature of relatively stronger bargain positions and the effect of taking advantage of such positions on the conclusion and expected performance of the contract. The achievement of a stronger bargain position is in itself an interesting topic as it does not necessarily mean having a dominant position, as the study will also later reveal. On the other hand, it is also possible to use the previously achieved, already existing stronger bargain position to varying degrees, or even refuse to take advantage of it. The study does not intend to take a normative stand on how and to what extent it is "worth", just or fair to exploit an existing stronger bargain position. In a purely descriptive and analytical manner, it aims to shed light on the achievement of bargain positions and the most possible consequences of taking advantage of such, as an independent variable.

Sections 2 and *3* of the study present the nature of a bargain position and a stronger bargain position. *Section 4* reveals how the perfect or complete contract can be related to the use of a stronger bargain position, and from this point of view, to each other.

2. The concept of bargain position

First of all, we need to clarify the reasons why potential contractual partners intend to enter into an economic relationship with each other. Why do they wish to extend their existing rights and obligations "into a package" by concluding a contract? Of course, having additional rights may be attractive, but it is not possible to gain them without taking on certain obligations. At the same time, we should not forget that concluding a contract, i.e. undertaking a specific combination of rights and obligations, is not an end in itself. In a market economy, an economic operator obviously aims to reach a more favourable economic situation due to a contract.

Contracts for the supply of goods or provision of services, or exchange contracts, with loan contracts belonging to this common group, typically involve a relatively less complex situation. In these cases, only prices may seem to be primarily important, and the parties share their possible gains based on the determination of the prices. If the cost price of a melon farmer is 100 HUF/kg, while the retail chain wants to sell melons to its customers at 250 HUF/kg, apparently, 150 HUF forms the pie that is divided between the parties by determining a price. With a contract price of HUF 100/kg, the melon grower does not benefit from the profit, and with a contract price of HUF 175/kg, the profit is halved. However, melon farmers do not have many days to pick and deliver ripe melons, and therefore, if they make an agreement with the retail chain only a couple weeks or days before ripening, they may only intend to cover the costs of harvesting and delivery, i.e. 20 HUF/kg. Thus, it is possible that the retail chain can reach a price of 21 HUF/kg through the contract. So, the size of the pie for a customer with such a perspective will be 230 HUF/kg. However, this is only an apparent pie. In fact, there are two pies in question. One of the pies symbolises the rights, and the other one represents the obligations (*Markovits 2020*). The payment of the price is only one of the obligations, which is obviously charged to the purchaser, and one of the rights, which the seller can clearly claim.

In a loan contract, several details are defined besides the date of loan disbursement for the credit institution and the repayment schedule including the interest rate for the debtor. A loan contract can also provide many rights, for example, in terms of contract amendments, and it can incur many obligations, such as obligations on providing information. The two pies are of course related to each other, since the right for one party is ensured by imposing an obligation on the other party.

However, the sizes of the pies, i.e. the scope of rights and obligations can only be approximated, even theoretically. Determining the value of the pies is even more challenging, as the value of many rights and their use can only be estimated in advance, as well as the value of obligations as their counterpart (*Rudolph 2006*). Nonetheless, regardless of the sizes of the pies, a finite number of possibilities for rights are contrasted against a finite number of possibilities for obligations. Rights can only be acquired at the expense of the other party, and obligations can only be transferred to the other party. The same applies to their value. Thus, using game theory terminology, the distribution of rights and obligations also corresponds to a zero-sum game (*Rudolph 2006*). In the example of the melon farmers above, the size of the pie could only be precisely determined because both the rights and the obligations were narrowed down to the price to be paid.

Cooperation, association, investment and other similar contracts are usually more complex. In these cases, firstly, it is necessary to produce or create a certain value, or at least make an attempt at it; secondly, provisions need to be made for any benefits arising. Let us examine the case of a fattening pig raised in a backyard farm but received from the producers' cooperative, which provided feed materials and other things for the farmer, then the cooperative later took over the animal at a set price and either resold it or processed it. In this case, we can actually talk about four pies since there are rights and obligations related to the added value and the potential gains as well. Therefore, the bargain must cover both areas.

In everyday life, in the case of a retail loan product, for example, it is common that one of the parties offers a ready-made, non-negotiable contract to any potential party that belongs to a certain customer group. But even in such "take it or leave it" situations, it can be seen that the party facing the ultimatum has a strong bargain position in terms of either accepting the offer or rejecting it (*Binmore 2007*). Rejection can be the sign of a weak bargain position as well, which is often connected to the client's recognised partial lack of performance expected in the "take it or leave it" offer. However, with a strong bargain position, it can also mean a realistic alternative for decision if the client has a better offer compared to the one received. Nonetheless, it is common in business, just as much as for credit institutions' major clients, that the parties can influence the contractual terms ex ante with respect to what obligations will be imposed or what rights will be granted to which party. Having a strong bargain position, i.e. the possibility of greater influence can result in concluding a contract with more favourable conditions (*Berz 2015*). Thus, for example, a large, well-capitalised, profitable company with a good banking history can obtain more favourable loan conditions from a credit institution for a major investment project with promising prospects, especially if the company subsequently becomes a client of the credit institution and uses other services as well. But let us examine the concepts of a strong or a weak bargain position.

A position, related to a bargain, means a set of relevant attributes that one of the parties considers important about the other party's negotiating power, but in the meantime, they also have an inventory type of value judgement on their own relevant attributes (*Berz 2015*). In this sense, position means a kind of relation to the other party, which results from the overall set of one's own and the other party's relevant characteristics. In other words, for example, if good reputation plays any role in the rights and obligations expected to be regulated by the contract, and a potential customer considers the credit institution to have the best reputation possible, while considering his/her reputation to be average, then we can talk about some kind of position (*Binmore 1994*). Of course, a position consists of several features like the above, and each feature may have different significance. With regard to their own position, one of the parties tries to secure an advantageous position or relation compared to the other party in order to achieve favourable contractual terms. One party positions the other party, but at the same time it also positions itself, and also compares its own perceived position with the assumed position of the other party (*Lovry 1976*). We can talk about objective and subjective elements with respect to one's own and the other party's position (*Rudolph 2006*). In both positions, the best alternative to a negotiated agreement, or BATNA, which serves as a potential safety net, can be considered objective, and the greater certainty and information on the resistance point of the other party can also reinforce the bargain position (*Bakacsi 2017*). Other objective elements in the conclusion of a contract are the additional, measurable and relevant reserves available to a party, such as the amount of time and financial reserves (*Lovry 1976*). The initial positioning attempt of the parties, when the expectations do not necessarily meet the other party's perspective, is only the starting point of a bargaining process (*Krajcsák – Kozák 2018*). Provided there is any room for bargaining. If so, the bargaining process will not start if at least one party positions the other and itself in such a way that it excludes the possibility of cooperation and the conclusion of a contract. If, however, the bargaining process starts, the parties have the opportunity to obtain more information about how the other party positions itself and its potential contractual partner (*Barnhizer 2005*). For both parties, including themselves, the number of positions is dependent on the number of parties aiming or actually starting the bargaining process. Therefore, in terms of two parties, there are a minimum of two positions, assuming they have the same opinion on each other and themselves; or a maximum of four positions if their opinion on themselves and the other party does not match at all.

The positions declared by the other party, for itself and for the others, are perceived and noted by each party in a certain way and degree at the start of the bargaining process and during it. It may be good or bad as there is no guarantee that the parties can read each other's signals in the right way. At the same time, there is no guarantee that the other party will not show, intentionally or unintentionally,

misleading or incomplete signals in terms of positioning. As a result, it cannot be made sure that one party relates to another in a way that the other signals or shows it (*Berz 2015*). Primarily, the actual relationship is the one that matters from the two options, and not the external indication or perception of it for the other party. After all, it is the actual relationship that influences the contracting parties' behaviour vis-à-vis each other in terms of the bargaining process (*Binmore 2007*). When one of the parties tries to position itself in a way that does not match the other party's perspective on the first one, the other party may consider it unreliable, or a bluff. At the same time, if a position wished to be acquired is considered to be a bluff and its degree is estimated by the other party, it can have an influence on the party's attitude and the future progress of the bargaining process (*Rudolph 2006*). Bluff as a technique, however, is fairly wide-spread in a bargaining process (*Barnhizer 2005*).

How do the strengths and weaknesses of a bargain position manifest themselves? If we assume that concluding a contract is potentially advantageous for both parties, we can claim that the stronger a bargain position is, the less reliant the party becomes on the performance of the contract. It will be less important or significant to gain a potential advantage by means of the contract, considering the passage of time or any other important aspect (*Scott 2020*). In the event of having a stronger bargain position, the party possesses a relatively wider scope for negotiation, even when it starts or goes through the bargaining process. With a stronger bargain position, the other party treats the given party in a more favourable way. This means that there is a relatively better chance for the given party to regulate the rights and obligations in a more advantageous way in the contract, regardless of how strong the other party's bargain position is. Thus, a stronger bargain position is simply better and more beneficial for the given party. As a result, basically, the most rational act of the parties is if even prior to the bargaining process, they can take the strongest position compared to the other party (*Scott 2020*). On the other hand, they should not only attempt to maintain the initial position during the bargaining process, but also to strengthen and improve it, even using the technique of bluffing. In theory, taking a bargain position by bluffing that is weaker compared to the one the party thinks of itself can also be part of rational behaviour, but as opposed to poker, it is exceptional in business practices. The behaviour, the signals shown and information provided during the bargaining process usually represent additional knowledge for the other party, which can be the basis to continuously confirm or re-evaluate its initial relationship towards the given party (*Barnhizer 2005*). A weak bargain position, as the next Section also reveals, means that it is necessary to become relatively more lenient in terms of entering into a bargaining process or discussing questions related to it, it is also necessary to take on more obligations in order to gain fewer or less valuable rights.

Positions may vary several times during the bargaining process, especially in case of a longer process, as the parties may obtain more and more information on each other (*Scott 2020*). Both parties can have an equal bargain position compared to each other, which is called equal footing. Apart from this, only one situation can occur, i.e. only one of the parties can have a stronger bargain position compared to the other. The extent to which one party will be able to more effectively achieve its goals through the contract, at the expense of the other party, depends to a significant extent on the bargain positions, so even when it seems they are discussing the contractual conditions, in reality, they are still clarifying their bargain positions (*Berz 2015*). So only after their rivalry on bargain positions comes to a halt, even temporarily, can the real negotiation start on the conditions of the contract.

The concepts of a dominant position and a strong bargain position are often confused. Similar to other developed market economies, the *Fundamental Law of Hungary*[1] also has provisions on dominant positions. Pursuant to *Article M (2)*, Hungary takes action against the abuse of a dominant position. With respect to this, according to *Article 22 (1) of Act LVII of 1996*[2] *on the Prohibition of Unfair and Restrictive Market Practices* "a dominant position shall be deemed to be held on the relevant market by persons who are able to pursue their economic activities to a large extent independently of other market participants without the need to substantively take into account the market reactions of their suppliers, competitors, customers and other trading parties when deciding their market conduct." A dominant position in a given market is possessed by those that pursue economic activities in a way that they can unilaterally define the terms of a contract while staying within legal limits (*Këllezi 2008*). The concept of a dominant position is directly associated with a bargain position in the so-called Five Forces model of *Porter* (*1989*). According to his view, a dominant position in a given market is held by those who individually have a strong bargain position vis-à-vis their clients or suppliers; furthermore, they do not have to fear direct competitors, new entrants or indirect competitors producing a substitute product. As a result, in this case, depending on the number of suppliers and customers, we may state that it is a matter of a strong bargain position, supplemented by a dominant market presence. It seems that a strong bargain position vis-à-vis other relevant market players is a natural consequence of a dominant position.

Indeed, taking advantage of a dominant position is manifested in taking advantage of a stronger bargain position. In this case, the party having a dominant position makes it clear for the business partners during the bargaining process that it has a stronger bargain position and intends to make use of it, and the partners will relate accordingly. However, many operators with actual dominant positions do

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[1] *Fundamental Law of Hungary:* https://net.jogtar.hu/jogszabaly?docid=a1100425.atv
[2] https://net.jogtar.hu/jogszabaly?docid=99600057.tv

not aim to achieve this in every case, or not vis-à-vis every party (*Binmore 1994*). Companies that are at the forefront of social responsibility, but at the same time have a dominant position, are also able to voluntarily limit themselves in such a way that they do not take a strong position in contracts in many areas (*Hopkins 2003*). In other cases, the dominant party intends to take a stronger bargain position, but the business partners do not accept it or relate to it in the right way in the bargaining process, or at least until they face the consequences of their inappropriate relationship. As we will see in *Section 3*, it is also possible that the clearly measurable characteristics of the party in the dominant position that make it likely to achieve a strong bargain position are not combined with such important components as a high degree of proficiency in certain special bargaining processes. If, on the other hand, the other potential contracting party possesses the latter skill, the situation can change, i.e. it becomes doubtful that a stronger bargain position can be reached by the dominant position. At the same time, it should not be forgotten that a strong bargain position can be obtained even without the economic operator actually having a dominant position. In the previous parts of this Section, we could see that a strong bargain position is ultimately determined by the fact how the other parties involved relate to it. It is therefore not necessary for the other party to actually have a strong position, it is sufficient if the other parties believe it or accept its illusion. Information asymmetry, or having greater knowledge on the subject of the potential contract, and the advantage of proficiency in the bargaining process can be possessed by such parties as well that otherwise do not have any dominant position. In this way, however, they are able to put themselves in a strong bargain position (*Spread 2018*).

3. Factors influencing the strength of a bargain position

Except for the use of a dominant position, no information has been provided so far on the actual achievement of a strong position on a bargain. As *Section 2* presented, this relationship does not emerge automatically, not even for a party in the dominant position. At the same time, we must also see how the bargain positions of the parties are also related to each other during the bargaining process. Any participant can even have a strong bargain position, which provides a lot of room for manoeuvre, but in this case the advantage arising from strength disappears in relation to each other as the positions become balanced. Not all parties, usually two parties, can have a relatively stronger bargain position. In this sense, it is approximately a zero-sum game (*Berz 2015*). If one of the parties has a relatively stronger bargain position, the other will inevitably have a weaker one. We can only speak of an approximately zero-sum game, because the relationship between the parties is not strictly mathematical or based on some kind of formula. Consequently, the party possessing the stronger bargain position does not necessarily seem to be as much of a stronger negotiator to the other party, as the other party seems to be

weaker compared to it. The benchmark for a stronger or weaker bargain position is the case when they consider each other to be mutually equal negotiators and treat each other in this way during the bargaining process (*Table 1*).

Table 1				
Determination of relative bargain positions with respect to two parties				
		Party A's position in itself		
		Strong	**Medium**	**Weak**
Party B's position in itself	**Strong**	Balanced	Party A is stronger	Party A is stronger
	Medium	Party B is stronger	Balanced	Party A is stronger
	Weak	Party B is stronger	Party B is stronger	Balanced

However, balanced bargain positions (*Table 1*) do not always result in the same bargaining process or in the conclusion of a potential contract. When the possibility of an agreement arises in the case of two parties with a weak bargain position, they are strongly dependent on each other, there is a mutual willingness to make concessions, so there is a high probability for the conclusion of a contract concluded between the parties, moreover, in a balanced manner. Nonetheless, it is possible that a weaker bargain position results from the lack of reserves (as well), and thus the performance risk increases. Two parties with a strong bargain position have little need for the performance of the given contract; it is not rational for either party to make concessions, and so there will be little room for manoeuvre in the bargaining process (*Spread 2018*). In this case, there is a small chance that a contract will be concluded, but if one is concluded, it will have a balanced distribution of rights and obligations between the parties.

Before we take into account the possible factors influencing the achievement of a stronger bargain position, let us review why and in what way the parties intend to establish an economic relationship or contract with each other.

1. Mutual interest: the ability of both parties to perform a potential contract in such a way that, subject to each party's own contribution to performance, both parties are in a position to benefit from it.

2. There is essentially a market coordination mechanism prevailing between the parties (*Kornai 1993*), which may, however, be complemented by ethical and family coordination to some extent. In any case, the parties enter into a relationship voluntarily, and they have a coordinative relationship.

3. The parties do not have all possible information and knowledge at their disposal. They have limited rationality. The information they have is evaluated and processed in a more or less subjective way as well.

4. Although in everyday life, some parties intend to enter into a contractual relationship maliciously, in this case, we are only discussing the one that intends to follow the related legislation, also in terms of good faith and fairness.

The degree of reliance on the other and on each other is a key factor in the relationship system of the parties. This is the main driving force that acts towards the conclusion of the contract (*Berz 2015*). However, many other factors are manifested in their reliance on the other or each other. With respect to a bargain before the conclusion of a potential contract, the bargaining power is relatively stronger for the party which is less dependent on the other party's contractual performance, which is obvious to the other party as well. Consequently, although the degree of actual reliance on the other party obviously matters, if it can be defined in an objective way at all, what is more important is to know how much the other party perceives from this. The party that seems to be less reliant on the other will gain a stronger bargain position, besides having dominance in the market coordination mechanism (*Lovry 1976*). For the party less reliant, from the viewpoint of the other party, the potential conclusion is not that essential, as it is not in such a position that would require it to accept any conditions (*Binmore 2007*). It is necessary to make the agreement attractive for the less reliant party by means of ensuring more favourable conditions in terms of rights and obligations. On the other hand, the person who is more in need of the other party's performance on the potential contract must make concessions by securing additional rights and taking on additional obligations, in order to be able to ensure the other party's performance through the contract.

As seen, a dominant position is strongly related to the stronger bargain position vis-à-vis the business partner, but the two are not necessarily entailed by each other. As a result, it is not necessary to have a dominant position, in order to gain a stronger bargain position in a negotiation. Hence, it is worth taking those factors under scrutiny that affect or may affect the achievement of a strong bargain position.

These factors can be divided into two groups (*Table 2*). One of the groups includes those factors whose combination is vitally important in achieving a stronger bargain position, without which it may be impossible. Modifying factors which go above

and beyond these basic factors are also very important, but they can have less of an effect on their own (*Spread 2018*).

Reliance also means a certain type and degree of vulnerability in terms of the performance of the potential contract by the other party. Vulnerability can basically arise from the lack of adequate reserves, including financial and time reserves, or the lack of alternatives. The lack of alternatives, i.e. of possible additional appropriate contractual options, may be specific to the type of potential cooperation, the type of business partners involved, or the goods to be acquired and/or sold. The time factor can also be crucial, because if the value of the goods involved in the cooperation decreases rapidly over time, not many agreement alternatives will be available. The appearance of excessively specialised goods and activities for any of the parties also narrows the scope and probability of agreements (*Williamson 1979*). However, it does increase the room for manoeuvre, and thus strengthens the bargain position if the given party has a stable safety net of BATNA, for example, by having option rights independent of the cooperation (*Fisher et al. 1983*). The time factor can be crucial with respect to a longer cooperation, as the parties' knowledge about the future may become more valuable. Furthermore, the longer a cooperation is, the more rarely parties conclude such a contract, which further increases vulnerability. It is expected that frequent and consecutive, regular cooperation will somewhat reduce the gap between stronger and weaker bargain positions (*Berz 2015*).

Factors modifying the effect of basic factors are basically relevant bits of knowledge. With this special knowledge, a party may significantly change the degree of reliance determined by the basic factors. Insider trading is known to be illegal, but at the same time, it is the transfer, acquisition and use of several pieces of business information that can provide serious additional bargaining power. Even proficiency in the bargaining process may result in a significant advantage, which can also improve an initially weaker position (*Bakacsi 2017*).

It is a common saying among the clients of credit institutions that the only ones that can get easy loans with good conditions are the ones that do not even need them, as they have an advantageous financial background. Apart from the obviously ironic exaggeration, this view has some truth to it. After all, as we have seen above, if a party has sufficient reserves, favourable prospects, a large margin of manoeuvre, and also a high level of knowledge and expertise in lending practices, a relatively strong bargain position will make it likely to be able to obtain a loan on favourable terms.

Table 2	
Basic and modifying factors affecting reliance	
Basic factors affecting reliance **(For a certain party)**	**Factors modifying the** **effect of basic factors**
A. Importance of the property the other party intends to acquire	I. Access to additional rele- vant information;
B. Specificity of the property the other party intends to acquire	
C. Warranty of the property the other party intends to acquire	II. Knowledge needed for the correct interpretation of information;
D. Importance of the property intended to be acquired through the cooperation	
E. Specificity of the property intended to be acquired through the cooperation	III. Proficiency in the method- ology of bargaining.
F. Warranty of the property intended to be acquired through the cooperation	
G. Advantage of a contract that can be concluded with a third party	
H. Potential availability of other third parties	
I. Availability of other types of cooperation alternatives	
J. One-off nature or planned frequency of the cooperation	
K. Planned duration of the cooperation	
L. Level of reserves required for the proper future operation of the party	
M. Level of reserves required for the proper future operation of the other party	

From the perspective of credit institutions, regarding corporate loans, it is also significant to know what bargain position the company is able to take with its business partner during its operation. If the company generally has a weak bargain position, for example due to its profile, financial situation or the strong bargaining power of its business partners, and it has few reserves and future alternatives, it means that it is forced to undertake relatively too many obligations in exchange for relatively few rights in its concluded contracts. This clearly makes any loan that it may be granted more risky.

4. Effect of a stronger bargain position on certain types of perfect contracts

In this Section, we attempt to make a connection between taking advantage of a relatively stronger bargain position and contracts with uncertain performance, which thus become problematic. In order to do this, first of all, we need to identify why contracts previously considered to have realistic performance conditions and concluded in good faith between the parties may become problematic later on. By a problematic contract, we mean that the assent of the parties expressed in the contract is at least partially not performed according to the predetermined time

schedule (*Rudolph 2006*). In this definition, we also included such possibilities when the original assent is never performed in any way.

Basically, problems can arise for two reasons (*Rudolph 2006*):

 I. On the one hand, the internal and external relevant circumstances of the parties may change significantly over the course of time.

II. On the other hand, these circumstances may have not changed or changed as expected, but the contract did not appropriately express these or the assent.

Group I includes changes in circumstances affecting management that may negatively affect the ability to perform according to the contract. At the same time, it can also incorporate changes that may negatively affect the intent to completely fulfil the obligations set in the contract. These may include changes in preferences, and as a result, in interest as well, in addition to the so-called time inconsistency (*Fömötör et al. 2017*).

Group II includes shortcomings of the contract concluded between parties in good faith but having information asymmetry and their consequences, which themselves can result in performance problems (*Rudolph 2006*). Due to the hidden information, the contract is incomplete or partially unilateral even when it is concluded. The shortcomings of the contract provide possibilities to one or both of the parties to engage in such so-called disguised actions that affect the performance of the assent set but not regulated in the contract. Finally, the contract may also provide some parties with hidden unilateral gains that were not disclosed in the contract bargain, i.e. the parties have allocated the contractual rights and obligations between themselves without taking them into account. Upon fully revealing all three hidden elements when concluding the contract, i.e. providing symmetric information, the parties would have not concluded the contract, or with different conditions.

In both groups, it is obviously significant to understand the legal and economic capacity of the contract concluded between the parties to express the real assent of the parties, and furthermore, whether the parties can perform this assent in the correct manner and to the correct extent, despite all uncertainties and risks of the future.

We can distinguish two types of perfect contracts. Perfect contracts in the legal sense put emphasis on the extent to which the parties' assent set in the contract can be performed without any problems. A perfect contract in the economic sense, which we refer to as a complete contract in this study for the sake of clarity, contains all possible future alternatives and their related legal consequences in connection with the parties' assent expressed in the contract. No matter how the future evolves, the contract clearly defines the rights and obligations related to that

alternative. In this Section, further analysis is provided on how the use of a stronger bargain position can influence the performance of the assent set in the contract, i.e. the perfect contract, and how it influences the scope of future alternatives and legal consequences set in the contract, i.e. the complete contract.

In the legal sense, the key point is the full enforceability of the assent of the parties (*Bag 2018*). A perfect contract means that the contract complies with the parties' contractual intents and the provisions of all related legislation, these provisions can be fully performed, there is no need for enforceability, and its effective alternatives are otherwise included in the contract, so no legal proceeding can be expected (*Hevia 2013*). As a result, compared to the bargain position and negotiation skills of the parties, a perfect contract can provide a relatively effective solution for the parties to gain mutual advantages and establish a new status quo. An imperfect contract can be relatively efficiently made perfect by replacing its shortcomings, i.e. by supplementing or amending the contract, which will help to avoid undesirable legal consequences arising from the lack of perfection (*Bag 2018*). According to *Bix (2012)*, a perfect contract can reach the optimal harmonisation of mutual interest the most when it is fair. In other words, during the conclusion process, neither party abuses its dominant position, which may also result from an information asymmetry in its favour. Whether the contract can be considered perfect largely depends on the type and the flaws of the relevant legislation, and as a result, what tools the law, the community, or the government can provide for the enforceability of the assent defined in the contract (*Bag 2018*). In order to reach the goals established by the assent in the contract, after the conclusion, there is no economic method which is more effective (*Eisenberg 2018*), in principle, the conclusion aims to ensure that the provisions of the contract will be performed if it depends on the will of the parties. However, this does not mean that prior to the conclusion of the contract, it would not have been possible to conclude a contract that could have better served the interests of the parties individually or even together (*Knapp et al. 2019*).

It is a significant factor in the conclusion of the perfect or almost perfect contract in the legal sense if the bargaining process involves parties with unequal bargain position as the distribution of obligations and rights can change significantly. The party with the stronger bargain position acquires additional rights during the establishment of the contract, while obtaining partial exemptions from certain obligations (*Eisenberg 1982*). Meanwhile, the party with the weaker bargain position has to undertake additional obligations and waive certain rights. As an overall result, the party that has and uses a stronger bargain position transfers some additional value to itself from the other party, as opposed to a situation where the stronger bargain position would not have been used or the parties would have been equal (*Eisenberg 1982*). In other words, although the contract still reflects the assent, it is less favourable for the party with the weaker bargain position. Such a party is less

interested in complying with its obligations under a less favourable contract, and so in this case it is necessary to strengthen the contract in order to realise its related performance. Contractual performance is risky in any case, but it is questionable whether the party with the weaker bargaining power will find the additional performance it is forced to undertake, we assume in good faith, consistent with its performance capacity at the time of performance. In any case, requiring additional performance increases performance risk (*Eisenberg 2018*). The partial withdrawal of rights significantly increases the performance risks of the party with a weaker bargain position if it involves a decrease of its income or profit. These additional risks remain risks even if the contract can appropriately motivate the party with the weaker position to perform, which results in the contract diverging from a legally perfect contract (*Knapp et al. 2019*). This problem can only be resolved in a way that other parties join the party with the weaker bargain position in the performance. These can be direct contracting parties or underlying contracting parties, for example, insurance companies, if the nature of the performance allows it (*Eisenberg 2018*).

The theory on complete/incomplete contracts is clearly a subfield of economics, according to the work of *Arrow* (*1963*), among others. From an economic point of view, the focal point of a contract is the harmonisation of the parties' activities and their additional gains received by it (*Bag 2018*). The entire contract defines all of the possible facts that are likely to occur in the future, thus having a probability of 100 per cent, and sets out the legal consequences for each of them. As a result, the parties are not burdened by the uncertainty arising from the contract's shortcomings, which allows them to make more effective decisions regarding the contract. In principle, they do not have to make amendments because of the lack of options and consequences in the future in any part of the contract concluded, as it contains the rights and obligations of the parties with regard to all alternatives for the future (*Baker – Krawiec 2006*). However, in everyday life the prevalence of incomplete contracts can generate additional problems such as moral hazard. An incomplete contract cannot be made complete by supplementing or completing it, unless the parties renegotiate it (*Bag 2018*). The reason for this is that new future alternatives can only emerge by redefining the risks, which otherwise should have been fully assessed by the parties when they concluded the contract (*Eisenberg 2018*). The conclusion of a full contract is a very time-sensitive question in terms of the duration of the contract, as the longer the contract is, the less likely it becomes that the future alternatives can be fully predicted. However, much also depends on the information and hidden but legitimate intentions of the parties. The question of the completeness of the contract is of particular importance for the parties in this case because a certain extent of the incompleteness of the contract could mean that the parties would not have concluded the loan agreement or not on such terms.

As opposed to the bargain of equal parties, the fact that the party with the stronger bargain position acquires additional rights, while its obligations are reduced, naturally has a major impact on the complete contract. As seen in the earlier discussion of the perfect contract, this increases the performance risk of the party with a weaker bargain position, even if it is fully committed and acts in good faith. It may result in further risks that the value extracted from a party in the weaker bargain position reduces its motivation to fully perform its obligations as undertaken (*Eisenberg 2018*). It may be possible to try to build additional incentives into the contract to create a legally perfect contract, but the so-called moral hazard is likely to prevail by exploiting existing loopholes (*Arrow 1963*). The longer the term and the more complex the combination of rights and obligations are, and the more unpredictable the methods of performance become, the greater and more diverse the risks are that need to be taken into consideration as a result. Moreover, certain risks can also have an impact on each other. All in all, we can claim that the more diverse and the more complex or interconnected risks the performance of a contract involves, the more future alternatives must be taken into account in a perfect contract in the economic sense (*Eisenberg 2018*).

Based on the above, taking advantage of a stronger bargain position results in additional risks. All of this increases the number of alternatives that need to be addressed in the contract. Assuming good faith in terms of maximum bargain and the conclusion of the contract, when the party with the weaker bargain position faces these, its attitude towards the performance of the contract can change. This changed attitude has not been taken into consideration as a potential risk when concluding the contract; therefore, such future alternatives, or loopholes, can be realised in the conduct of the party with the weaker bargain position that are not addressed by any factual circumstances, nor legal consequences in the contract (*Knapp et al. 2019*). On the other hand, the party with the weaker bargain position actively influences the realisation of an alternative which, because of its low, negligible probability originally assumed, has only relatively favourable legal consequences for it. The more the party with a stronger bargain position uses its power to determine the contract, the more additional value it transfers from the other party, and thus, it needs to consider that the contract inevitably grows further and further from being complete, especially in terms of the increased moral hazard.

5. Conclusions

In most cases, when one of the parties has a strong bargain position related to the conclusion of a contract, a dominant position is not or cannot be involved. The possession of a strong bargaining position is much more widespread, especially because its establishment is also influenced by factors such as greater relevant knowledge or proficiency in bargaining processes. In general, credit institutions

could only have a dominant position over their clients if they joined forces. On the other hand, they have an absolutely strong or relatively stronger bargain position vis-à-vis most of their clients, even in terms of the previously described basic factors or the attributes of their modifying factors. The creation of a strong or stronger bargain position and its use are basic features and driving forces of market economies (*Spread 2018*).

The present study does not wish to provide a normative definition on how and to what extent a party having a strong bargain position or a stronger one compared to the other party should take advantage of its bargaining power. However, it definitely aims to point out that the extent to which the provisions of the possibly concluded contract can be fulfilled without any problems may depend significantly on the way and the extent the party with a stronger bargain position uses its bargaining power when defining the terms of the contract. Because the increased use of a strong bargain position is a double-edged sword: although it increases the likelihood of gaining a relatively larger share of advantages in the contract, it also increases the problems of performances. This relationship is recommended to be taken into account when determining how to use a stronger bargain position.

In the context of two theoretical "extremes", i.e. the perfect and the complete contract, the study examined the effects of the increased use of a stronger bargain position on the ability of the contract to be performed without problems. The theory of the perfect contract that focuses on the performances to be realised by any means is barely sensitive to the information asymmetry arising between the parties. Regardless of the development of future circumstances, the contract intends to ensure the performance of the parties at all costs, even in the event of unforeseen changes. Therefore, it aims to achieve this even in those cases when preferences or interests change in the meantime, regardless of the extent of the parties' asymmetry at the conclusion of the contract (*Fömötör et al. 2017*). The theory of the complete contract primarily aims to eliminate information asymmetry, its consequences, hidden information, disguised actions and hidden returns, in order to reduce uncertainty. If this effort is successful, all future outcomes will be regulated in the contract. It is a different issue how it can improve the full performance of the assent under the contract. Therefore, the completeness of the regulation does not necessarily mean that performance will be fulfilled without any problems, only if the legal consequences assigned to the factual circumstances completing each other are appropriately harmonised.

Hungarian credit institutions seem to be more committed to the conclusion of perfect contracts, rather than complete contracts, which can also be seen in the ruling of the *Curia of Hungary* (*2019*) on the validation of foreign currency loans. Certain future alternatives also appear in loan contracts, but they do not require the conclusion of a complete contract at all. In accordance with the theory, the Curia

also prescribed the retroactive amendment of contracts with regard to creating a perfect contract. In terms of the complete contract, shortcomings revealed after the conclusion of the contract cannot be replaced in hindsight.

Obviously, by taking advantage of their stronger bargain position on concluding loan contracts, credit institutions do not aim to put such burdens of additional risks and obligations on clients that would negatively affect their ability or willingness to perform. However, as we saw from the example of foreign currency loans, they need to act with greater care in terms of the conclusion of contract and the bargaining processes. The Central Bank of Hungary (Magyar Nemzeti Bank), as a supervisory body, also encourages them to do so, but the credit institutions can also commit themselves to implement such changes.

Naturally, credit institutions, as successful market economy operators, do not have to and should not give up their absolutely strong bargain positions. At the same time, most clients do not have a strong bargain position in the absolute sense, but it is possible to change it. As seen, the basic factors that affect the bargain position are inherent features of market operators that arise from their previous activities and their nature. Credit institutions do not have any significant influence over these. On the other hand, they are able to influence the factors that change the effect of basic factors. They are able to provide more information to clients and help them understand and evaluate the information. As such, based on the theory of a complete contract, reducing information asymmetry between the parties shifts the contract to becoming more of a complete contract. Obviously, it also requires that more relevant information be shared with clients, as well as their interpretation and evaluation, appear in the contracts themselves, in the form of possible alternatives for future circumstances, or the legal consequences assigned to them. Nonetheless, clients could also strive more in order to solve the problem of information asymmetry as it would be mainly in their favour, but this would be the topic of another study.

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The Rise of Central Bank Digital Currencies*

János Müller – Ádám Kerényi

The revolutionary rise of digital financial innovations has heralded a new era in the operation of the banking system and central banks, which has brought about the digital transformation of money. Central banks must respond to challenges profoundly affecting and transforming the financial system. Central banks have been exploring the introduction of central bank digital currency (CBDC), in order to promote stability and sustainable development, to preserve competitiveness and to bolster the effectiveness of their monetary policies. In addition to smooth operation, the preservation of sovereignty and the effectiveness of the monetary policy also need to be ensured. Along with its expected advantages, the paper also discusses the risks relating to CBDC. CBDC appears in the international financial system, generating competition among global currencies. The rivalry between the dollar, the euro and the yuan may alter positions in the global financial system. A rearrangement of international power relations is at stake. Against this background, the paper also provides insight into Hungarian news on preparations for the introduction of CBDC.

1. Introduction

In the recent past, digital economic development has affected nearly all facets of life, including the functioning of the financial and banking system. Digital financial innovations have transformed the payment system, as various forms of electronic payments have continuously gained ground, and at the same time, the use of cash has declined. Central banks – the institutions in charge of protecting legal tenders as

Our vision

the issuers of money – were also quickly affected by this rapid development process (*Adrian – Griffoli 2019*). Digital financial services, electronic payment instruments, indeed, private digital moneys, posed a challenge that needed to be tackled. The solution found by central banks was the creation and introduction of the central bank digital currency (*Dolan 2021*; *Margulis – Rossi 2021*).

In our analysis, we follow the process of central banks' work on digital currencies (CBDC) that has led from some initial trial applications to more than half of the world's central banks now exploring the concept underlying the introduction of such a payment instrument, together with its potential benefits.

To put it simply, CBDC is most like a digital banknote issued by a central bank. Such digital money does not, in principle, differ from traditional money or units of account conventionally issued by a central bank, backed by its reserves and the country's legal system making such money its legal tender. In fact, it is a dematerialised central bank money constituting a receivable from the central bank, available in digital form for all users. In other words, a person's or a company's receivable form the central bank takes on a digital form, as a new form of money.

The use of CBDC has some clear benefits but, depending on the way it is implemented, it may involve some risks, and some elements may even jeopardise financial and monetary stability. We will deal in more detail with the positive impacts: at this point, we only highlight that CBDC could enhance cooperation, the efficiency of the financial system and trade financing at the international level. On the one hand, this opportunity calls for international cooperation on the introduction of CBDCs and on the other hand, it generates competition among CBDCs functioning as key currencies, for dominance over the international market. Another important role of a central bank digital currency is to provide protection against the challenges posed by BigTech companies and private digital moneys and to safeguard the financial sovereignty of the country concerned.

First, we review the current international central bank digital currency landscape and then analyse the situation as regards the introduction of the digital dollar, the Chinese central bank digital currency and the digital euro. The likely impacts of the introduction of central bank digital currency should also be explored from a Hungarian perspective, particularly because this matter is also relevant in the national sphere of competence, as an EU Member State which is not a member of the euro area.

2. Processes necessitating the introduction of a CBDC

The fourth industrial revolution, including digitalisation, has become part and parcel of development over the last two decades. Digital financial innovations first appeared in the financial markets surreptitiously,[1] but then their impact and influence became explosive, forcing incumbent banks to change their business models and transforming payment and money use practices as well as the habits of banks' customers.

While these developments result in new challenges for central banks and incumbent banks, the roles they play in the economy still remain essentially unchanged. With the accelerating competition in innovation, central banks had to support and regulate the enterprises deploying financial innovations, while incumbent banks had to stand their ground in a competition in which they found it difficult to keep up with new rivals in terms of digital development.

Digital financial services transformed the financial intermediary system to such an extent by the end of the last decade that all market participants, including central banks, financial regulators, incumbent banks as well FinTech and BigTech type service providers could not but realise that the penetration and transformative impact of digital developments had become unstoppable.[2] The introduction of CBDCs was also driven by (i) cryptocurrencies, (ii) stablecoins, (iii) BigTech payment systems, and (iv) digitalisation enforced by the coronavirus pandemic (*Auer et al. 2021*).

A form of market referred to as an amazonised financial marketplace[3] emerged in the future vision of development with the forerunners of digital moneys looming on its horizon. Bitcoin and stablecoins entered the scene, and Facebook announced its intent to introduce a digital money called Libra, to which they wanted to assign a global role. The international – and some national – financial systems reached a milestone when in addition to digital moneys the first attempts at the creation of CBDCs were made (*Müller – Kerényi 2021*; *Pistor 2021*).

The following is an overview of the situation and roles of CBDCs today, without discussing FinTech companies' digital currencies or BigTech companies' electronic payment instruments.

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[1] The idea of retail accounts kept by central banks is not a new idea; the concept of cash in deposit appeared in professional circles as early as in the late 1980s.

[2] Transformation of the financial system was accelerated by the dynamically growing proportion of electronic payments and the decrease in the use of cash.

[3] An amazonised financial marketplace is a customer-oriented interface on which retail and corporate customers can seek and find the products and services they need, with the most favourable terms and conditions. Such a digital financial marketplace may come to be a dominant element affecting the development of CBDCs (*PWC-LfF 2019*).

Central banks have been providing societies and economies with reliable, value-storing money, for hundreds of years. A reliable money is a public good. It provides a common unit of account and functions as a means of exchange for the sale of goods and services and for the settlement of financial transactions. The provision of public cash is an important instrument in the hands of central banks.

Initially, cash was an essentially precious metal-based commodity money in commodity-producing societies, which was gradually replaced by paper money.[4] Even the latter however were backed by elements determining their value, such as, for instance, gold, and the safe existence of value was guaranteed by states. Paper moneys have so far appeared exclusively in the form of banknotes. Over time, central banks and commercial banks gradually introduced so-called credit moneys besides commodity money. For hundreds of years these were used as means of payment and savings; their value was guaranteed by central banks, whether in the form of cash or bank account money. The wide variety of monetary policy instruments used by central banks included, for instance, the quantity of money, its velocity and open market operations.

In retrospect: a generally accepted, stable and efficiently functioning system evolved over decades in international financial and trade relationships. Gold played a key role in the reserves of central banks before World War II, while the British pound was the key currency of international trade. After the war, the US dollar took over the role of the No. 1 global currency under the Bretton Woods Agreement, but the British pound also remained a dominant currency. They were "joined" by the Japanese yen somewhat later, and by the euro a few years ago. The emergence of the yen and then the euro were still not regarded as a serious warning sign of the possibility of any profound change taking place in the global financial system. In 2016, the first warning signal was the appearance of the Chinese renminbi (also known as the yuan, or CNY) in the International Monetary Fund's SDR (Special Drawing Rights) currency basket, taking the third place after the dollar and the euro in terms of weighted averages, overtaking the Japanese yen and the British pound.

This historical background confirms that the instrument for financing the international financial system and trade relationships needs to be found, and the digital currencies of central banks have to be created, made accepted and secure, during the new digital age. The introduction of CBDCs poses a new challenge to the national and international monetary systems and the roles and competitive positions of central bank moneys remain to be seen for now.

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[4] Paper moneys were, however, already credit moneys to a large extent (with some exceptions: banknotes issued on the basis of gold deposits) because they were issued by banks by discounting trade bills, or by central banks by discounting bankers' bills.

3. What is a CBDC?

Let us take a closer look at what a central bank digital currency actually is. There is no fully, generally, widely accepted definition for what CBDC is, for the time being. A central bank digital currency is an official currency issued by a central bank in electronic form, "*universally available and is, like cash, suitable for peer-to-peer transactions without central intermediary*" (*Bech – Garratt 2017:56*).

In a recent study, senior experts at the Central Bank of Hungary (Magyar Nemzeti Bank, MNB) also applied the definition of the Bank for International Settlements (BIS) (2020): "a *central bank digital currency is a digital form of central bank money that is different from balances in traditional reserve or settlement accounts. It is a digital payment instrument denominated in the domestic currency and a direct liability of the central bank*" (*Fáykiss – Szombati 2021:104*).

According to a discussion paper released by the Bank of England, being systemic is an important feature of a digital money. The definition of what systemic is, however, still needs to be clarified in regard to such digital moneys (*BoE 2021*).

The introduction of CBDC will have a profound impact on users, central banks, financial institutions and the international monetary system. This will largely depend on the conditions developing in connection with the introduction and the model of the central money. The very name "central bank digital currency" contains the concept of money, i.e. it must fulfil the functions conventionally fulfilled by money, so it must have attributes relating to settlement, payment and value storing. Since central bank digital currencies have so far been issued under national jurisdictions, their status of legal tender is ensured by the laws of the countries concerned.

Depending on the issuing country's legislative framework, CBDCs appear in three basic types: one is account, another is token, the third is hybrid based (*Auer et al. 2021*). In parallel with the introduction of a CBDC, the central bank concerned, and the incumbent banks, equally should be tasked with preparing the users, primarily the local population and with developing their digital awareness.

In China, where the money called eCNY (the abbreviation of the electronic Chinese yuan, hereinafter referred to as "digital yuan"), was intended to be used even before the 2022 Winter Olympics, the government and the central bank set about assessing the conditions for introduction and use early on. The People's Bank of China (PBOC) distributes the yuans it has issued among the six largest commercial banks operating under its control, which in turn make the money available for smaller banks, people and companies. According to the PBOC's analysis the commercial banks already have the infrastructure required for the spread of the digital yuan and thus the central bank does not need to develop a new system.

4. Factors motivating and calling for the urgent introduction of CBDC – Advantages of a central bank digital currency

As a result of the rapid spread of digital financial innovations, the use of physical cash is quickly decreasing, confirming at the same time the transformation of payment and banking habits. Speed, i.e. effecting transactions immediately and without presence in person, has come to be generally required. This was promoted by the Covid-19 pandemic by the suggestion that physical cash could function as a carrier of the virus and that contacts in banks' customer areas should be avoided. However, the impact of the pandemic could be clearly felt in several areas (e.g. number of cash payment transactions, cash withdrawal turnover of credit institutions in the branches and through ATMs, cash-in-transit company data) (*Deák et al. 2020*). It should be noted at the same time that transactions actually diminished, but the pandemic triggered a significant increase in liquid forms of savings, including savings in cash, and not only in Hungary (*Végső – Bódi-Schubert 2020*). The appearance of central bank digital currency is at least as profound a change as was the introduction of paper money, that is, banknotes, as well as metal coins.

Competition intensified through the increasing market penetration of digital financial services, triggering urgent steps at two levels. First of all, a growing demand for improving efficiency and speed, and for reductions of costs and thus service fees, appeared in the national money and banking markets, and the need for meeting these requirements became a motor for innovation. FinTech and BigTech companies using digital financial innovations appeared in and conquered the market so quickly and dramatically that in most cases it jeopardised financial stability and the effectiveness of monetary policies in the absence of adequate national and international regulations, creating situations that needed to be responded to.

The nominal value of a central bank digital currency is guaranteed, and reliability is one of the key benefits of its introduction. On the other hand, digital private moneys are exposed to operating, credit, liquidity and market risks and their reliability and convertibility must be ensured by external institutions and regulators.

Another major benefit of the introduction of CBDC is that it can be an efficient instrument for whitening the grey economy and fighting money laundering. This, however, greatly depends on whether the model of its introduction does or does not guarantee the anonymity of use.

Another important element of its introduction is a defence function of two key components: on the one hand, protection from the risks posed to the financial market and the monetary policy by BigTech companies and cryptocurrencies, and the protection of sovereignty at a national level, or – in the case of the European Union – even at the EU level. Another advantage for central banks during the

introduction of CBDC is that they can closely monitor the quantity of money in circulation, the demand for it and its circulation velocity.

These factors are supplemented by considerations of sustainability and environmental protection, as both printing paper money or minting coins require the use of many harmful materials and their storage, shipping and protection are expensive. This, however, does not mean that the introduction and operation of a CBDC has no costs; indeed, surveys conducted by the European Central Bank (ECB) and other central banks have found that a central bank digital currency and physical cash need to coexist in the financial market side by side for a long time.

The overwhelming majority of central banks are scrutinising the possibilities and ways, as well as timing of introducing CBDCs. The various participants have different motivations and factors encouraging or urging this. For example, one of the People's Bank of China's objective is to boost competition and eliminate certain systemic risks stemming from much of the payment transactions being controlled by Alipay and WeChat Pay. By taking such a step they will, at the same time, enhance the stability of the financial system.

Some central banks have found themselves in a situation where they are forced to take action, as the efficiency and effectiveness of their monetary policies are threatened by crypto instruments such as Bitcoin, the above-mentioned Libra – launched by Facebook – or currencies and private digital moneys of other BigTech companies. At the same time, central banks are risk-free guards of value, and as such have a comparative advantage over the above issuers of other digital or crypto instruments, in which regard they are thus in a monopolistic position.

"Availability" is another motivating factor since with the introduction of CBDC a variety of innovative financial services make quick and efficient payments and banking transactions possible in certain countries or in some under-banked parts of the world. Accessibility and availability boost innovation in the banking system in that the technology and functionality of the experimental nature of CBDC enables the use of smart contracts and can help reduce the amount of cash in circulation.

Thus, according to analyses and trial applications to date, the introduction of CBDC can offer a variety of benefits, some of the most important ones of which primarily include an increase in the efficiency and effectiveness of monetary policy, the strengthening of financial innovations, and at the same time, a reduction of volatility in the banking system through competition, a reduction of the use, and thus the quantity, of cash, resulting in improved cost effectiveness and environmental protection, more effective protection of personal data and, consequently, banking secrets, and enhancing the security of bank deposits and savings, since they are kept in the central bank's

own money. Finally, it may also help improve the efficiency and effectiveness of international financial relations and the financing of international trade.

A more long-term objective of the introduction of CBDC is to create an ecosystem in the economy and in the financial market, which might enable – without prejudice to monetary policy, and in observance of the principles of the functioning of a two-tier banking system – efficient cooperation between the international financial system and those financing international trade. In such an imaginary framework of cooperation, the operation of today's corresponding banking systems would become easier; for instance, exchange rates and fees would become more transparent and manageable.

The establishment and operation of a wide-ranging retail DJBP system requires cooperation between institutions and continuous service. Among the institutions, the central bank, operator(s), payment service providers and banks play a prominent role in terms of functionality (*Fáykiss – Szombati 2021*).

Competition in international markets – i.e. how dominant the future roles and functioning of the digital dollar, the digital yuan and the digital euro will be in the future – is just as important as the positive principle of future cooperation. It is worth referring back to the fact that financial planners and regulators started to deal with the idea of CBDC during a real competitive situation (where the question was who overtakes whom in the first position), during a period of trade wars, when global economic growth was slowing down, right before the outbreak of the coronavirus pandemic. One aspect of the future vision is the question of which CBDC gains more ground and influence in the international financial market; in other words, power and security considerations of the future international financial system are also clearly taking shape.

5. Potential risks of the introduction of CBDC

The introduction of CBDC may pose risks to the stability of the monetary system at both the international and national level. The planning and preparation of its introduction should be such that its operation is regulated and that governments and the competent authorities control the monetary policy, exchange rate and financial stability, as well as the development of capital flows. Efforts should be made to ensure that the introduction of CBDC strengthens international cooperation and integration and does not lead to a digital divide. The introduction of a central bank money may impact the economic and financial stability of the country concerned. It should be ensured that the central bank money is reliable and equally available for all users.

The first potential risk from the aspect of the banking system is participants turning away from financial intermediaries and disruption of the normal chain of the financial intermediary system (disintermediation) when customers transfer their bank deposits to CBDC accounts.[5] In this scenario banks have no choice but to pay higher interest rates if they are to keep deposits or to raise more expensive funds and thereby reduce their profits, which will eventually increase the costs of lending or force them to reduce collaterals.

Such a situation might occur if the central bank digital currency is much more reliable for users as a payment instrument, a value store or a guarantee of convertibility than private digital moneys or any other electronic money. This is why particular attention is to be paid to the banking sector, lest banks suddenly lose a large number of customers to the attraction of a very successful CBDC, lest they convert bank deposits *en masse* into CBDCs and lest the process of bank lending be jeopardised. This risk might be mitigated by the currently operating system of bank deposit insurance.

Some of the incumbent banks may oppose the introduction of CBDC because it might increase their financing costs, reduce capital investments financed by banks and this new form of value storage, provided by the CBDC, and available for all, might make large numbers of customers quit their banks, i.e. trigger a bank panic. These are potential risks; the impacts on banks and financial stability largely depend on the conditions of the application of the given CBDC and the relevant monetary policy (*Andolfatto 2021*). In the case of a bank run, however, CBDC makes it possible for a central bank to quickly take more targeted action to prevent or mitigate the risks that occur.

Another potential risk in the introduction of CBDC is that in the case of economic or financial shocks it might significantly amplify their spillover effects and thus their international combinations. Such impacts – or their likelihood – largely depend on the nature and conditions of the operation of the CBDCs to be introduced (*BIS 2020*).

6. CBDCs in the international financial environment

As noted above, plans for the introduction of central bank digital currencies quickly emerged as a consequence of the rapid penetration of digital financial innovations. This was followed by increasingly intensive analyses of the conditions and requisites of their application and preparations of schedules. The next step was the test introduction of CBDCs, primarily in national jurisdictions. After the first

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[5] It should also be noted that analyses preparing the introduction of CBDCs do not envisage CBDCs without any limitation whatsoever; they are based on assumptions of instruments with quantity limits to mitigate this risk.

successful trials, the so-called Digital Sand dollar was introduced on the Bahamas.[6] The central banks of an increasing number of countries started thereafter to assess the conditions for, and the urgency of, the introduction of CBDCs.

Because of the continuous progress, we review the developments without intending to provide an exhaustive overview of the international landscape. All of the central banks that have currencies of global relevance are prioritising the possibilities of introducing and using central bank digital currencies. The first concrete steps in this field were taken by the People's Bank of China, but the European Central Bank and the competent financial authorities of the USA are also assessing the conditions and requisites for the introduction of the digital euro and the digital dollar.

As the situation is changing continuously, we only make note of some of the central banks that have, according to literature, achieved results in this field. The Bank of Japan (BoJ) started the introduction of the digital yen in 2020 (*BoJ 2022*). The electronic money intended to be introduced by the Bank of Indonesia is in an advanced research phase. The Bank of Canada is scrutinising the possibility of the introduction of the CBDC in the context of its programme entitled "Model X Challenge". The central bank of Sweden (Sveriges Riksbank) is in the vanguard with its pilot programme of introducing its central bank digital currency (*Sveriges Riksbank 2018*). Similar endeavours have been reported by the Russian central bank (Bank of Russia).

In a survey conducted by BIS in late 2020, some 86 per cent of central banks were already analysing the benefits and drawbacks of the introduction of CBDC and its effects on the monetary policy and financial stability. 60 per cent of them were conducting trial projects and 14 per cent had started preparations for pilot phases of the introduction of their CBDCs (*Boar – Wehrli 2021*).

Given the continuous evolution process it would be difficult to provide a clear picture of the real international penetration of CBDCs, but this brief overview is suitable for drawing some conclusions. Besides the fact that the introduction of CBDC in the financial system is inevitable, for the time being central bank digital currencies are introduced, for the most part, in national contexts and systems and under national conditions, with the exception of the European Union, particularly the euro area.[7]

In national jurisdictions, in the countries where CBDCs have been introduced, the experiences of its use are mostly positive. At the same time, as already mentioned, going beyond national boundaries is not merely a possibility inherent in the nature

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[6] In 2021, Nigeria also launched its own digital currency, called e-Naira.
[7] Mention should also be made of the East-Caribbean monetary union which has – besides People's Bank of China – come the closest to the introduction of a central bank digital currency. They have been testing the conditions and requisites for introduction since early 2021.

of CBDCs, but in many cases it is a conscious effort towards the acquisition of markets and enhancing power.

The introduction of CBDCs in the international financial market may have a profound impact on the stability of the monetary system. Therefore, the conditions of its use and regulation should be so designed when it is launched that the various countries have the instruments required for controlling in order to preserve their monetary policies and exchange rate stability. It should be accomplished at the same time that CBDCs strengthen the integration of payment systems and do not result in fragmentation into regional blocs.

International organisations are closely monitoring the cross-border impacts of CBDCs and are making efforts to outline the framework for prospective international cooperation. The finance ministers and central bank governors of the G7 countries issued a joint declaration in 2021 on compliance with the requirements expected to be met by central banks' digital currencies (*G7 2021*). They pointed out, *inter alia*, that every CBDC must operate in accordance with the conditions of the existing public commitment and meet the requirements of transparency, the relevant legislation in place and effective economic governance. A CBDC must not only not impede but should actually support central banks in their monetary policies and in their efforts aimed at fulfilling their obligations to preserve financial stability. The introduction of a CBDC must be accompanied by simultaneous application of strict norms of data protection, ensuring the protection of customer data, guaranteeing the security of information and the transparency of its use. The conditions for the use of a CBDC should generate user confidence. A CBDC should be resistant to cyber fraud and attacks (*G7 2021*).

A position statement issued by the IMF Executive Committee, summing up the mandate the International Monetary Fund does and should have in this process, is of particular relevance to the expected development of the international environment and the future cross-border use of CBDCs. The strategic goal of its operation is to ensure and strengthen international financial and economic stability. The appearance and spread of digital forms of money is and will pose new tasks and challenges for the Monetary Fund, since they have an impact on the international monetary system and their spill-over effects and cross-border penetration affect the stability of national and international economies.

Since the IMF has a well-nigh universal membership, it has unique relations with the member states, it is mandated to closely cooperate with other organisations in the shaping of macro-level financial policies and in matters relating to the international monetary and financial system. This is why it can provide guidance concerning the international use of CBDCs, the elaboration of policies, while it should facilitate processes by providing consultancy.

The International Monetary Fund may function as a bridge; it may intermediate between its member states' experiences and the shaping of international financial policy. The Executive Committee's position statement points out that the new digital forms of money must not jeopardise the integrity of the international financial system. Public and private partnership (PPP), the smooth transition of banks' roles and equal and fair competition (or *level playing field*) must be ensured during the planning process. The Monetary Fund regards the prioritisation of the tasks, and the provision of adequate funds to assist its members as its mission in order to mitigate the risks stemming from the penetration of digital money and its spill-over effects (*IMF 2021*).

The international monetary system (IMS) needs to remain stable and effective; the digital money must be so designed and regulated that the various countries can retain control over their own monetary policies, financial conditions and exchange rate policies. Payment systems also have to become more and more closely integrated even after the introduction of digital moneys; the digital divide must be avoided.

The Bank for International Settlements (BIS) set itself a goal of helping research activities of central banks scrutinising the conditions and requisites of the introduction of CBDCs and of facilitating the sharing and exchanging of the results and findings of trials and pilot projects. To this end, they created a centre for assisting the promotion of innovative research, called CBDC Innovation HUB (*Carstens 2021*), one of whose projects is Dunbar. In December 2021 the French and the Swiss central banks – in close cooperation with the BIS Innovation Hub – implemented a remarkable "test operation" of a CBDC's international application. The experiment is named "Project Jura", and was joined by Accenture, Credit Suisse, Natixis, SIX Digital Exchange and UBS (Union Bank of Switzerland). The hitherto unparalleled experiment was a test of public and private cooperation where wholesale digital securities, tokenised under the French law, were issued against EUR wCBDC. At the same time, digital EUR- and CHF-based transactions were also effected between banks having their registered offices in France, and ones having theirs in Switzerland (*Project Jura 2021*).

These brief episodes in the international arena clearly illustrate that CBDC will not, and cannot by its very nature, in the long run, remain confined within national boundaries; therefore the possible conditions of its performance in the international arena are being intensively researched, and the regulation of its operation is the subject of focused analyses. The likely benefits of international application are not disputed by analysts. Central banks and international financial organisations are working on elaborating guidelines for regulation, transparency and risk mitigation. This is the context in which high level international principles are being worked out to help achieving consensus on matters of regulation, finance and economy,

because the development of mutually acceptable technical and regulatory standards is indispensable for the smooth international and cross-border operation of CBDCs. There is, however, a considerable distance to be covered before this goal can be reached. The distance to be covered also depends on the number of CBDCs that will be operating alongside one another, or competing with each other in the international arena and on their respective shares and weights in international financial transactions or in international trade financing. And the latter might trigger a strategic interaction that might provide one or another participant with benefits, cutting their costs.

The likely weight of the appearance of CBDCs in the international arena might be forecasted by the ratios of the currencies of international trade and financing in the SDR currency basket of the International Monetary Fund. Recent data show that the Chinese yuan, which joined the SDR basket in 2016, has taken the third position after the US dollar and the euro, surpassing the British pound and the Japanese yen.

As already noted, a considerable number of central banks are examining the possibilities of, and planning, the introduction of CBDCs, but in the international arena it is competition, or possibly cooperation, among the United States, the euro area and China, that is, the digital dollar, the digital euro and the digital yuan is what we need to be prepared for. Fabio Panetta, a member of the ECB's Executive Committee, quoted a Latin saying when he said that in this fight "*one has to be a lion*" (*Panetta 2021a*).

At least as important as the positive principle of prospective cooperation is the aspect of competition, i.e. the question of which CBDC gains more ground and influence in the international financial market. In other words, the power and security considerations of the future international financial system are also clearly taking shape. Competition in international markets – i.e. how dominant the future roles and functioning of the digital dollar, the digital yuan and the digital euro will be in the future – is just as important as the positive principle of future cooperation. The initial conditions characterising this competition are well illustrated by *Figure 1* which first appeared in an ECB analysis.[8]

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[8] International trade and financial exposures were measured based on 2019 data. Trade exposure is established in view of the extent to which the combination of export and import, the processes of supply and use, affect international and global processes in international value chains. Financial exposure is established in view of the total portfolio of investments, and liabilities, that are related to the USA, the euro area or China (the financial exposure to China includes in this case exposures to Hong Kong as well). All data were calculated in dollars. The supply and use data in the tables reflect the entire economy in a breakdown by industry and product. They link the various institutional sectors of the economy with the details of the imports and exports of goods and services, public spending as well as those of households and non-profit institutions that serve households and capital accumulation.

Figure 1
International trade and financial exposures of the countries of the world to the United States, the euro area and China (2019)

Trade exposure
(highest-ranked partner country)

Financial exposure
(highest-ranked partner country)

USA   China   Euro area   No data

Source: Panetta (2021a)
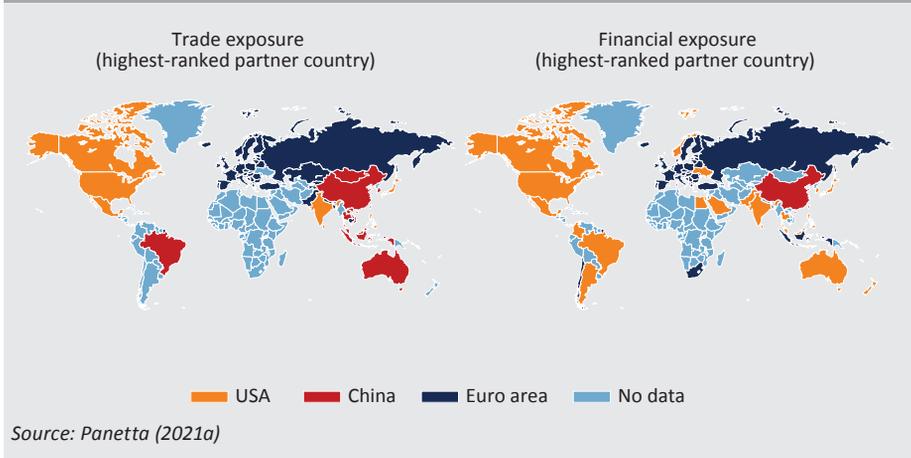
Figure 1 illustrates the expected materialisation of competition among the above digital currencies, their potential integrative capability and their risks as digital money surrogates, by showing the trade and financial exposure to, and dependence on, relations with the euro area, the USA and China, based on 2019 data. In terms of trade exposure, the euro area and the USA have nearly equal shares, while China is in the third position behind them. It should be noted, however, that China is the dominant player not only in the Far East, but also in Africa and Australia. In terms of financial exposure, on the other hand, the USA is first, the euro area is second and China is again in the third position. The coming years are likely to be a period of intense competition, the outcome of which is difficult to predict.

A CBDC can – by its very nature – be used not only in the country or jurisdiction, in which it was issued. And if this is true, it might increase the risk of digital currency substitution. For instance, if the digital dollar is widely used in another country, a phenomenon referred to as "*digital dollarisation*" occurs, entailing the risk of the domestic currency losing its conventional roles, such as storing value, being used as a unit of account or an instrument of conversion. This, in turn, will impede the effective functioning of the domestic monetary policy and weaken financial stability. This problem might intensify in the case of international reserve currencies, because international trade and financing are interlinked and mutually complement one another.

7. The Chinese central bank digital currency

Planning for the early introduction and trial use of a central bank digital currency has been prioritised in China. The key factors driving this process were, on the one hand, that China is a country pioneering the use of digital financial innovations, and on the other hand, that during the past decades China has become a major participant in the global economy and global trade. Against this background, China has been sparing no effort to make its currency, the renminbi, a dominant factor in the international financial market and international trade financing. China's international economic relations have definitely grown stronger in Asia, among the Arab countries and in Africa as well. A major role in strengthening China's international economic and trade influence was played by its "One Belt, One Road" economic policy initiative, in the framework of which they have created strong bonds with a number of countries through infrastructure development and long-term lending. It became clear in this situation that it would be more beneficial for China if these relations were not financed in US dollars; emphasis was laid on the international use of the renminbi as a vehicle for a breakthrough with the digital yuan.

The spread of mobile payments has even started to replace the use of cash in some places in China. It is now indisputable that China plays a ground-breaking, leading role in the world in the development of a national digital currency, on which they started working in 2014. The official name of the Chinese CBDC is the Digital Currency of Electronic Payments, and it is issued by the People's Bank of China.[9]

China kicked off the introduction of the digital yuan with a testing process, for which they used a number of different scenarios. The Chinese central bank reached a milestone in the development of the e-RMB in the spring of 2020 – in spite of the coronavirus crisis – when the testing of the central bank digital currency was launched in four major cities (Shenzhen, Suzhou, Chengdu, Xiong'an) in actual payment transactions: use of the digital money is being tested for the second year now in these four cities (*Boros – Horváth 2021*).

Against this background, in April 2021 the PBOC announced the experimental introduction of the digital currency, after the above cities, in four provinces as well. "In the future, digital money issued by the central bank is likely to compete and compliment the private sector's electronic payment platforms. The digital currency trials are now being conducted in a "closed environment" and are not connected to the existing sovereign currency issuance and circulation system," according to a senior official from the PBOC (*China Daily 2020*). At the same time, the Chinese

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[9] It should be noted that the PBOC's key motive in the introduction of the Chinese CBDC is to boost competition in the market of digital payments and reduce the system-level risks posed by Alipay, WeChat Pay and Tencent.

central bank announced that a new trial of the regulation would be launched in the provinces concerned (*Xinhua 2020*). In doing so, China was among the first countries where in parallel with the introduction of a digital money, its regulation was also started.

At the time of the introduction of the so-called e-yuan, the most profound question was how this digital money would work. The ways of distribution and use were scrutinised primarily. The digital yuan is used in a so-called two-tier system, where the PBOC distributes the digital yuan to commercial banks, which, in turn, will be tasked with passing the digital currency on to consumers. This might include services enabling consumers to convert their coins and cash into digital yuan. Chinese commercial banks already have the necessary efficient infrastructure for delivering the digital yuan into the hands of consumers.

The digital yuan functions in the economy as cash, i.e. as the instrument of final settlement. The issuers and operators charge users no fee for conversion or use for payment, nor do they pay interest on the balances. One particular feature of the digital yuan is that, unlike other cryptocurrencies, it is not issued in a blockchain environment; instead, it retains its "controllable anonymity", enabling the People's Bank of China to control and monitor financial transactions, including the personal identity of those executing transactions. This attribute of the digital yuan provides the central bank with a number of possibilities. On the one hand, it is effective in the fight against money laundering and terrorist financing, and on the other hand, unlike other crypto moneys, it does not permit speculation against the digital yuan. Moreover, it will be impossible to counterfeit, as only the PBOC will be able to issue it. The PBOC will strictly control to make sure that there can be no difference between the value of the digital yuan and the banknotes and coins and that price movements do not trigger volatility. The PBOC also announced that during the introduction phase it would limit the amount of digital yuan private individuals are permitted to have, so they can monitor velocity and strengthen user security (*Areddy 2021*; *O'Grady – Waters 2021*).

China was encouraged by the rapid development of its international trade relations to enhance the international role of the renminbi as well, which might provide a strong support to the digital yuan's global role, in spite of the fact that at present it is intended primarily for domestic use. Trials on its use in cross-border transactions have been started. One suitable venue for this is provided by the cooperation launched between the PBOC and the Hong Kong Monetary Authority for the technical testing of the cross-border use of the digital yuan. Similar forms of cooperation are underway with the central banks of Thailand and the United Arab Emirates. In February 2021, China joined the Multiple CBDC (mCBDC) project coordinated by the BIS and conducted by the above-listed central banks.

8. The digital dollar

In light of the digital financial innovation process of the fourth industrial revolution, there can be no doubt about the inevitability of the introduction – or rather preparation for the introduction – of the digital dollar. Its implementation will profoundly impact not only the financial system and monetary policy of the United States of America, but also global financial processes.

One of the requirements at the end of World War II was to stabilise the financial systems. This was the aim of the conclusion of the Bretton Woods Agreement in 1944. The values of the global currencies were fixed on the basis of the US dollar, the value of which was tied to gold, at a fixed exchange rate. The position of the dollar is bolstered, as well as by the United States' global economic, trade and financial power, also by the fact that the SWIFT (Society for Worldwide Interbank Financial Telecommunications) is the world's largest cross-border clearing house which settles transactions in US dollar, with at least one "leg" of each transaction being an American financial institution.

The dollar retained its role as a reserve currency for decades and developed into a global currency. One of the big questions in the years to come is whether the digital dollar will be able to preserve and strengthen this position, as the system of international payments and transactions are being forced to go digital. Preparation and planning of the digital dollar's introduction is greatly facilitated by the existence in the United States of a forerunner of the CBDC in the form of the Federal Reserve Bank's accounts. Those accounts are completely secure and pay interest. Payments through those accounts take place through the real time gross clearing system, called Fedwire operated by the Federal Reserve (*Andalfatto 2021*).

The US dollar is still considered by many as an actual global currency. As regards international financial payments and transactions this is undoubtably true. On the other hand, the introduction of central bank digital currencies, including the digital euro and the digital yuan, is expected to generate some strong competition, particularly in international trade financing. Trade wars, the US's sanctioning of major trade participants, or for instance the prevention of the execution with the EU of the Transatlantic Trade and Investment Partnership Agreement, restricts the use of the dollar in the financing of trade in the areas concerned. The introduction of the digital euro will also lead to its growing use not only in the euro area but also other member states, as well as third countries maintaining close trade relations with them. The digital yuan will also very likely play a significant role in areas that are under growing Chinese economic and trade influence, for example in the Far East, Australia and Africa.

Nonetheless, if and when the digital dollar appears in the international financial system, it will have some positive impacts: it may strengthen international cooperation, stability and predictability, as well as the security of financial funds (*Greenwald – Margolis 2021*). The digital dollar may, however, also entail risks and negative impacts. Owing to its major role in the international financial system for example in the case of financial shocks it might aggravate the situation, accelerate the process and generate spillover effects. This, however, will largely depend on the legal background and regulatory framework of the digital dollar.

The dollar's role as global key currency has already been a source of problems such as the USA's ability to refuse transactions requested by foreign banks when it presumed that legal regulations had been violated, illegally acquired funds were to be moved or national security risks were involved. Some years ago even Swiss banks were forced to do away with part of their traditional bank secret system, but similar situations occurred in connection with the USA's opposition to Iran's and North Korea's nuclear programmes. The US Treasury – i.e. the finance ministry of the United States of America – created a database called Specially Designated Nationals and Blocked Persons List which it can, at its discretion, apply against any country or person. With a digital dollar in place, such sanctions can be applied more widely and virtually immediately.

The Fed, functioning as the US central bank, initiated a public dialogue in early 2022 concerning the possible introduction of a CBDC by preparing studies and discussion papers, reviewing and discussing CBDCs in general and analysing in a transparent and detailed way the possible benefits and risks of the introduction of an American model (*Fed 2022a*; *Fed 2022b*). The penetration of the digital dollar in the international financial system might trigger a dual effect: on the one hand, it might strengthen international cooperation and improve the efficiency of international financial processes, and on the other hand, it might force certain nation states affected by its use, to give up the sovereignty of their monetary policy.[10]

9. The digital euro

The rapid progress of international digital financial innovation developments forced the European Union to face the challenge of the inevitable and complex task of the introduction of a digital euro. The complexity of the task stems from the need to strengthen the euro itself, together with the euro area, while maintaining the Union's digital competitiveness. The Union must not become dependent on American and Asian digital financial infrastructures. After its introduction, however,

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[10] "*In exchange for the advantages of dollarisation, nation states must relinquish their monetary policy sovereignty*" (*Horváth – Horváth 2021:24*).

the digital euro must be made available in all EU Member States under the same terms and conditions; therefore all member countries need to be consulted regarding each and every phase of the preparations. These considerations require the participation of the member countries in the preparation of the introduction, planning and design of the digital euro. Time is an important factor because the Union cannot afford to fall behind in the digital race. Accordingly, the preparation process is also a race against time.

The definition of the concept and content of the digital euro is still in the making. The digital euro will be a central bank money offered in a digital form, for use by private individuals and businesses for payments in small amounts, supplementing the existing cash supply. The digital euro might contribute to a rapid transformation of the market of small amount payments, provided the Eurosystem has the means for its prospective issuance (*ECB 2020*). The ECB defines the digital euro as a risk-free form of central bank money, a digital currency that can only be issued by a central bank and that constitutes a receivable from that central bank. Similarly to the euro currently in circulation, its stability and purchasing power is guaranteed by the ECB through its monetary policy (*Maan 2021*).

The following is a brief overview of the main steps taken so far in preparation for the introduction of a digital euro. In April 2020, the *European Commission (2020)* launched two comprehensive consultations entitled Digital Finance Strategy and Retail Payments strategy. During the preparations, the Union's decision-making bodies take into account a wide variety of perspectives, including the importance of the time factor.

A document released by the Council in June 2020 started the conscious process of the EU's digital transformation, including the introduction of a digital euro. This was followed by steps by the EU's competent institutions, whose objective is to introduce the digital euro in 2025 at the latest and to start within this time frame an extensive, 24-month consultation. In the guideline summing up the basic principles and cornerstones of the preparation process, the Council underlines that "*the Member States and the EU institutions should continue to intensify efforts to foster the digitalisation of the Single Market in which the digital economy is characterised by a high degree of trust, security, safety and choice for consumers, as well as strong competitiveness based on a framework which promotes transparency, competition and innovation, and which is technology neutral.*" It also stresses "*the importance, in the post-crisis environment, of protecting and reinforcing digital sovereignty in the EU and leadership in strategic international digital value chains as key elements to ensure strategic autonomy, global competitiveness and sustainable development*" (*European Council 2020*).

Ferreira et al. (*2021*) and *Reynolds* (*2020*) also point out the strong emphasis that the first comprehensive report published by the European Central Bank places on the time factor. The latest comprehensive report on the possible introduction of a digital euro, which came out in October 2020, is fully in line with the Council's guidelines quoted above. The report underlines that the digital euro must be designed and elaborated, and the legal grounds for issuance must be established in a manner that it has no negative and unwanted impacts on the Eurosystem. For this very reason, the Eurosystem should analyse the legal framework and consequences of introduction, along with the applicability of the EU regulations to the Eurosystem as an issuer (*ECB 2020*).

Events relating to the introduction of a digital euro accelerated in 2021, due to the above time factor and temporary easing of the Covid pandemic. In the spring of 2021, the ECB published the results of the public consultation that had been conducted on the digital euro (*ECB 2021*). The feedback shows that respondents support the introduction of a digital euro, but they consider the protection of privacy and financial stability as very important preconditions. The protection of privacy does not necessarily mean anonymity. The suggestions call for the digital euro and regular cash to function alongside each other and that their relationship with the traditional banking systems should be smooth and undisturbed. The digital euro would supplement cash without replacing it, and the Eurosystem would continue to issue cash. For the sake of security – including that of the banking system – some suggested that the amount of the digital euro that can be stored by private individuals should be limited, but no agreement on such a limit amount has been reached so far in the wake of the consultation.

The suggestions aiming at tackling this problem included limiting the convertibility of the CBDC in situations threatening financial stability, to prevent sudden withdrawal of bank deposits. Setting limits per user might be possible in order to protect the financial intermediary system and prevent bank runs. Stability can be similarly protected by setting up limits for users above which all payments or transfers are credited to the account of a financial intermediary or bank. Such an account is referred to as a "waterfall" account (*Bindseil et al. 2021*).

The next important step was an analysis by the ECB's expert working group, in which experts from the 19 national central banks of the euro area worked out scenarios outlining conditions and prerequisites for the introduction of a digital euro. This operation, launched in October 2021, is called "Digital Euro Project"; a time frame of 24 months is available for analysing the conditions, with the aim of providing EU citizens and businesses with the safest and most secure form of money, central bank digital currency, in the digital age. One important element of the project is to highlight the changes that may need to be adopted in the Union's legislative

framework and that need to be continuously coordinated among European co-legislators.

Other tasks in the analysis phase include an assessment of the digital euro's potential impacts on the financial market and the identification of the planning conditions that ensure the protection of privacy and help avoid risks that might threaten the citizens of the euro area, the financial intermediary system and the economy as a whole (*Panetta 2021b*). Planning of the digital euro's operating principles is facilitated by the existence of an infrastructure enabling digital access to central bank moneys in the TARGET system[11] (*Panetta 2021c*).

The European Banking Federation, representing the national banking associations of 31 European countries, published the standpoint and recommendations of the European banking community regarding the introduction of a digital euro. The community of European banks unanimously accepts and supports the idea, the preparation and the implementation of a digital euro.[12] The European Banking Federation has specified the guidelines that should, in the banking community's opinion, be taken into account in planning the introduction of a digital euro. These include the protection of financial stability and the financial and monetary system, the promotion of financial innovations, uniform regulation and supervisory conditions, and cost effectiveness, as well as safe and secure infrastructure.

Analyses so far confirm that the introduction of a digital euro will profoundly transform the entire European payment environment. European payment service providers must offer competitive payment methods for users; this is the only way to preserve Europe's financial sovereignty. This will require the creation of a single payment market, including electronic payments.

10. Assessment of the central bank digital currency in Hungary

A variety of different currencies in different versions have been in circulation in Hungary during the country's tumultuous history (e.g. the korona and the pengő, in the past; the currently used forint was first issued in 1946, became partly convertible in 1996 and has been fully convertible since 2001). The appearance and development of digital financial innovations has also made it imperative for the MNB and the Hungarian banking system to monitor the possible consequences of this process.

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[11] The services of the TARGET (Trans-European Automated Real-time Gross settlement Express Transfer) system are developed and managed by the Eurosystem. It guarantees free movement of cash, securities and collaterals across the whole of the European Union. Such transactions are accounted in central bank money finally and irrevocably (*Panetta 2021c*).

[12] "*A central bank digital euro should first and foremost be a viable and optimal solution to a clearly defined unserviced need in the market, for which no other more efficient solution exists. In addition, it should benefit private individuals and corporates and the economy as a whole, while avoiding destabilising the financial system.*" (*EBF 2021:1*)

Consequently, the introduction of a Hungarian central bank digital currency has been put on the agenda. The MNB assessed domestic digital developments and evaluated the level of digitalisation in the Hungarian banking sector in April 2020 (*MNB 2020*). The result was a 'strong medium'. Since then, however, the digital capabilities of the banks and the FinTech companies have continued to develop and catch up with the international mainstream (*MNB 2021a*).

The MNB's analyses continuously monitor international research and the results of trials on the introduction of such currencies. The conditions for the introduction central bank digital currencies and their likely impacts on payments were published by the Hungarian central bank in a comprehensive volume of studies[13] (*MNB 2021c*) and a payment systems report (*MNB 2021b*), which analysed the impacts of the introduction of a CBDC on payments turnover. *"Based on the characteristics of electronic payments in Hungary, making CBDC widely available may theoretically contribute to the development of electronic payments in various respects. At the same time, it also needs to be considered that the development objectives may be achieved by other means as well, and therefore, this issue requires further analysis"* (*MNB 2021b*: *p. 65*).

Accordingly, the assessment of a possible introduction of a CBDC might also be of relevance for the promotion of international competitiveness and convergence, as well as the fine-tuning of the regulation of digital financial innovations.

11. Summary and conclusions

As a result of the digital revolution, digital financial innovations have penetrated the banking system, generating profound, fast-moving impacts. Digital financial innovations have transformed the payment system; various forms of electronic payments have spread continuously, driving the transformation conventional banks' business models. Giant digital technology companies have evolved, crypto currencies, stablecoins, digital private currencies and for example Bitcoin found their way to the market. In order to protect economic stability and competitiveness, monetary policy has had to respond to these digital challenges. The idea of creating central bank digital currencies appeared on the agenda. This will result in a gradual, but inevitable digital transformation of conventional money. This process of transformation is already underway in the financial system. In this study, we assessed the progress made in the preparation of the implementation of CBDCs and the possible impacts in the international arena.

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[13] *"The study volume is also unique internationally, as in addition to the conceptual and design considerations of the possible forms of central bank digital currency, it also covers their monetary policy, financial stability, and cash flow effects, as well as the issues of infrastructural implementation."* (*MNB 2021d*)

According to the generally accepted, permissive definition, a central bank digital currency is a digital form of central bank money, denominated in the domestic currency, embodying the central bank's direct liability. Accordingly, CBDC is a new, third type of central bank money, which may operate alongside cash and central bank account money. A new milestone has been reached in the history of money in accordance with the requirements of the digital age. The digital transformation of money has commenced, along with the preparation of monetary policy for this turn of events. According to international surveys, most of the world's central banks are examining the conditions and prerequisites for the introduction and use of CBDCs. The basic conditions of regulation are being analysed in national contexts and legal systems, and in some countries, for instance in China, trials have started on the use of the national central bank digital currency. CBDC has its likely and indisputable benefits, such as transparency, security, and strengthening the competitiveness of the economy and the effectiveness of monetary policy. Its defensive capability should also be emphasised: it affords protection for the financial system, the payments system and the banking system, against impacts of private digital moneys, stablecoins and giant tech companies which threaten stability. Another important defensive capability is that of guarding the sovereignty of the national financial and monetary system. CBDCs may, however, involve risks as well. The regulatory conditions under development and the operating trials are aimed at mitigating those risks.

In view of the development of digital financial innovations, CBDCs are expected to appear in the international arena before long, where they will play an important role in the financing of the international financial system, the capital markets and international trade. This process may take place based on a variety of scenarios. The first one certainly involves competition among global currencies, i.e. the US dollar, the euro and the Chinese yuan, where the financial and power positions that the digital variants of these currencies can secure themselves in the international markets are at stake. The CBDC variants of the global currencies may bring about highly positive results, for which, however, rules on their international use need to be formulated and introduced. From this aspect, the three key participants have certain advantages stemming from their particular geopolitical positions and financial market roles, as discussed in our analysis.

In this digital financial development process, we also provided a brief overview of the Hungarian central bank's publications and informative materials concerning the central bank digital currency. The Hungarian central bank continuously updates its analyses of the results of relevant international research and trial applications.

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Potential Advantages of Retail Central Bank Digital Currency*

Balázs Kóczián

The emergence of central bank digital currency will cause a radical change in the relationship between central banks and users. At present, cash is the only way for users outside the central bank's financial market customer base to hold claims on the central bank. By comparison, central bank digital currency will provide users with a safe, versatile and multifunctional instrument, which will be a novelty in many respects. Central bank digital currency may also provide the option of interest remuneration, through which the central bank's decisions may reach consumers directly. As a result of this, the central bank may achieve its goals more efficiently, and competition may increase in the banking sector. The instrument supports the penetration of new, innovative solutions and broadens the range of customers in the banking sector, while the risks inherent in the introduction of the instrument can be addressed by proper design.

1. Background of central bank digital currencies

Digitalisation gives a wider range of users access to new services, which may also influence the form of payment instruments issued by the central bank. Financial services have undergone a significant transformation since the 2008 economic crisis. Owing to technological progress, crypto assets have emerged – Bitcoin being the best known of these – which created payment infrastructures without a central issuer. With varying degrees of success, these instruments intend to provide an alternative to the traditional payment systems that practically dominated payments for a long time. In addition, a number of new digital solutions have emerged, making financial services available to a much wider range of consumers more cheaply and efficiently compared to previous solutions. As a result of these innovations, central banks also started to assess the digitalised form of cash, which can combine the positive features of deposits and cash for consumers. This new instrument is referred to by central banks as central bank digital currency, which may fundamentally determine the financial and payment system of the future.

Central bank digital currency is the digitised form of cash, combining and supplementing the advantages of bank deposits and cash. According to some of the more detailed definitions, it is a form of digital money, denominated in the national unit of account, which is a direct liability of the central bank (*BIS 2018*). At present, private individuals may hold claims on the central bank only in the form of cash. However, due to the spread of technology and digitalisation, the question of why private actors should not be able to hold such assets in digital form has arisen. In this way, present holders of cash could possess central bank currency in another form as well, one of the main advantages of which is security compared to commercial bank deposits. This is because central banks always have unlimited solvency in their own currency, and thus there would be no associated counterparty risk, even in the absence of a deposit insurance fund, which provides protection for bank deposits. The central bank digital currency would supplement the currently available services and would coexist with the present financial instruments as a symbiosis.

Central bank digital currencies projects can be categorised as retail or wholesale, depending on the users that have access to the instrument. Central bank digital currencies may serve a number of purposes, and these may differ significantly depending on who has access to the instrument. In some of the existing projects, the instrument may become available to retail actors, which is usually supplemented by the corporate sector as well. According to another method of use, primarily the financial institutions – a broader range than the institutions that currently have access to the central bank accounts – would be the anticipated main users of the instrument. In the first case, central banks essentially assess solutions meeting household demands, which may be particularly important in domestic payment turnover, with some international relevance. In the second case, the instrument may play a role in higher volume payment transactions. This article focuses on retail use and the related aspects.

The introduction of central bank digital currency may be important for central banks for a number of reasons. In addition to preventing various forms of dollarisation (e.g. the penetration of crypto assets, and the potential spread of other countries' central bank digital currencies may also be regarded as such in the future), it also responds to users' demand for digitisation. Moreover, central bank digital currency may help to expand access to financial services, since – primarily in the emerging countries – new actors may also have access to it in areas where access to banks is currently limited by geographic or cost factors. Prior events that led to the development of the instrument are allocated into four main categories by the staff of BIS, also referred to as the "bank of central banks" (*Auer et al. 2021*). The first is the emergence of Bitcoin and similar crypto assets. The second includes the stablecoins issued by private actors, the exchange rate of which may be more stable than that of other crypto assets. The third category is the emergence of large technology companies in payment services, similar to the original idea of Libra, later Diem, which may

pose a threat to central banks due to their wide availability. And finally, as the fourth point, they cited accelerated digitalisation in the area of payment services as a result of Covid. In addition, in emerging economies, strengthening competition among financial institutions, which also increases the efficiency of monetary policy, as well as programmability, are also particularly frequent motives (*BIS 2022*). Some of these motives appear in almost all countries, as discussed by the MNB's staff as well (*Fáykiss – Szombati 2021*). In addition, if banks acquire funding from the financial market to a larger degree, the efficiency of monetary transmission may strengthen, since the prices of those funds are more responsive to central bank interest rates (*Panetta 2022*).

Most countries of the world are interested in central bank digital currencies, but so far only a few have introduced it (*Figure 1*). Owing to the wide range of motives, 90 per cent of central banks at the global level are dealing with the issue of central bank digital currency (*Kosse – Mattei 2022*), i.e. research and testing at various levels are being conducted in most parts of the world. To date only two countries – The Bahamas and Nigeria – have managed to introduce it officially, where the introduction was primarily fostered by the need to address common challenges of developing countries, such as the need to improve access to financial services. On the other hand, it should be noted that several countries, including China, Jamaica and the countries of the Eastern Caribbean Monetary Union, are on the imaginary starting line for an official launch. Apart from those, the Fed and the European Central Bank (ECB) are also actively exploring the question, and thus we may say that along with the developing countries, developed ones are also active in the development and introduction of such an instrument. *Figure 1* clearly shows that Hungary is also among the countries where the testing of technologies is in the experimental phase.

Figure 1
State of research on central bank digital currency

Research   Proof of concept   Pilot   Launched

Source: cbdctracker.org. Downloaded: 14 September 2022.
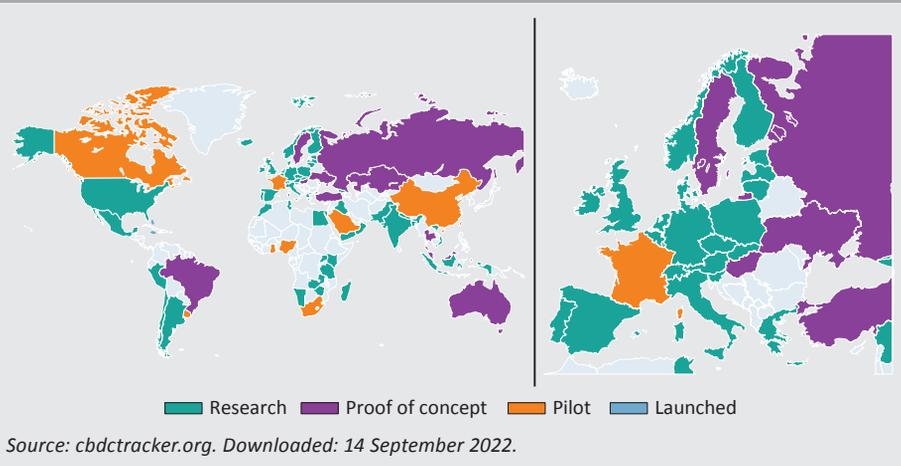
The key motives of retail central bank digital currencies include reducing cash usage, protecting monetary sovereignty and enhancing the efficiency of monetary policy. Remuneration of interest may be a particularly important feature of a central bank digital currency developed for retail actors. With this, the central bank digital currency may become a close substitute for bank deposits and may also be a key component of the central bank's set of monetary policy instruments, since it significantly improves the efficiency of monetary policy. Motives for retail central bank digital currency usually also include – particularly in the case of developing countries – the broadening of the range of financial services available through digital channels (*BIS 2022*). A further motive may be that the new instrument could, depending on the realisation, represent an additional payment method that is available even in the event of a potential disruption in current infrastructures, which makes it a more efficient substitute for cash. This may be particularly important in societies where cash usage has gradually decreased, but alternative payment solutions are still popular for security reasons. This motive was identified in the research concerning the instrument both in China and Sweden. In terms of retail usage, the maintenance of monetary sovereignty is also a key consideration. In parallel with the penetration of crypto assets, the emergence of currencies designed by large tech companies and central bank digital currencies issued by other countries, a new form of dollarisation may also appear in societies. As a result of this, monetary authorities may have less and less influence, which several central banks try to prevent and one way to achieve this may be the issuance of a central bank digital currency. Although it is less stressed in the case of retail use, it is also often mentioned as a motive that central bank digital currencies may accelerate international transfers to reduce their costs (*Kosse – Mattei 2022*).

The degree of the risks of a retail central bank digital currency for banking sector intermediation may be reduced by proper design. Contrary to the aforementioned advantages of a central bank digital currency, the emergence thereof may absorb deposits from the banking sector, due to which the volume of intermediation by the banking sector may decline or lending costs may increase due to the higher funding costs. On the other hand, in the case of a potential run on the banks, faster capital outflow may represent risks. The risk is mitigated by the fact that stronger competition among banks may attract new funds to the banking sector (*Chiu et al. 2019* and *Andolfatto 2021*), thereby increasing the banking sector's liabilities, which may also prevent a rise in lending costs. Additionally, central bank digital currencies may appear as an alternative instrument in the market of bank deposits. In this way, due to their competition-stimulating effects, they are able to exert positive impacts even without major utilisation, i.e. any outflow of funds from the banking sector (*Chiu et al. 2019*). Finally, it should be noted that the numerous restrictions influencing the stock of a central bank digital currency may efficiently regulate the volume of liquidity flowing out from the banking sector (*Bindseil 2020*).

## 2. Assessment of the introduction of the instrument in Hungary

Monetary policy goals are one of the key motives underlying research on this instrument in Hungary. As regards the situation in Hungary, it can be stated that, although a large part of the Hungarian population has a bank account (*Deák et al. 2022*) and thanks to the instant payment system a fast and efficient payment infrastructure is available to them, the ratio of those without a bank account is still around 13 per cent. The penetration of crypto assets among households is moderate, while the central bank digital currencies of other countries do not yet have a real influence outside the borders of the issuer countries. The key currency areas of the world – with the exception of China – most likely have years to go before they introduce their own central bank digital currencies. The cash holdings in Hungary as a percentage of GDP do not yet show a decreasing trend, and thus the demand for a new cash substitute managing the risk of the failure of electronic payment systems has not yet emerged from this perspective. However, from the central bank's monetary policy perspective the introduction of an interest-bearing central bank digital currency could provide particularly efficient support, the reasons for which we explain in more detail below.

Using their traditional instruments, by determining short-term yields, central banks achieve their price stability goals through different channels of transmission. The primary goal of the Central Bank of Hungary (Magyar Nemzeti Bank, MNB) is to achieve price stability, which means an average annual rise of about 3 per cent in the consumer price level. When relying on their traditional instruments, central banks achieve this in the inflation targeting system by influencing short-term yields and by monetary transmission. In simple terms, central banks exert an impact on financial market yields and the price of investments and credits by influencing short-term interbank interest rates, which in turn influence the growth rate of the price level. The central bank's most important channels of transmission include the interest rate, asset price, expectation, risk-taking and cost channels (*Balogh et al. 2017*). Of these channels of transmission, we briefly deal with the interest rate channel below.

The interest rate channel helps the central bank influence households' consumption and saving decisions. Relying on the interest rate channel, the central bank influences the conditions applicable to the borrowing and savings of households – and other market participants – by changing the central bank interest rates. For example, in a higher interest rate environment savings may become more attractive for households, while borrowing may become less attractive. As a result of this, households' savings rise, while – assuming steady earnings – household consumption declines, and the fall in aggregate demand reduces the growth rate of the price level. That is, central banks divert inflation towards their goals by influencing short-term yields. On the other hand, various frictions may arise in the channels of transmission, which may weaken the efficiency of transmission.

The rise in the central bank's interest conditions in the past quarters appeared in the retail deposit conditions only partially and with significant delay. As a result of the interest rate increases by the MNB, the interest rate on the one-week central bank deposit has risen significantly since mid-2021. The purpose of this instrument is to absorb excess liquidity in the financial market, which ultimately appears in this instrument. Accordingly, banks can invest this liquidity – from retail and corporate deposits – in central bank instruments, the interest rate on which has been steadily increasing in the past quarters. However, they enforce this rise in the conditions applicable to retail deposits only slowly and partially (*Figure 2*). From a monetary policy perspective, the co-movement of central bank interest rates and bank deposit rates is particularly important, as it indicates the efficiency of the aforementioned interest rate channel. While the central bank interest rate increases appeared swiftly in money market conditions (e.g. in interbank rates), and thus transmission is efficient in the case of money market actors, the interest rate increase had a moderate effect on retail deposit conditions.

Figure 2
Changes in various money market and retail deposit conditions

*Note: *The data of the household sector include the interest rate on new deposits, excluding the conditions applicable to non-profit enterprises supporting households.*
*Source: MNB*
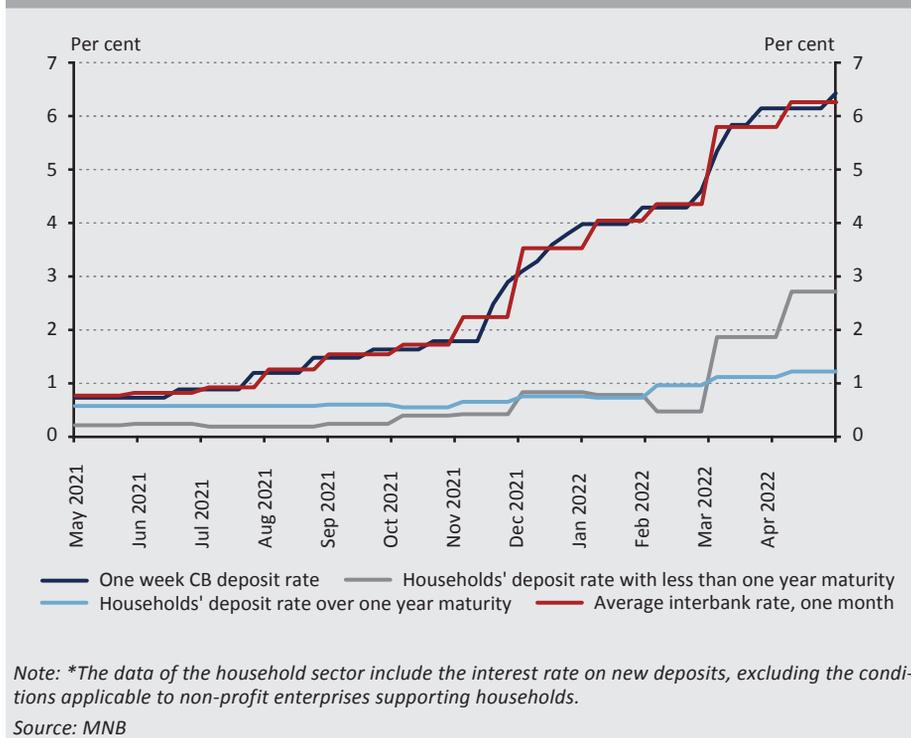
The introduction of an interest-bearing central bank digital currency could make the interest rate transmission of monetary policy direct, thereby significantly raising its efficiency. From a monetary policy perspective, the biggest advantage of introducing an interest-bearing instrument would be that the central bank interest effect would become direct. While the central bank can currently influence the interest rate conditions applicable to retail savings only indirectly, this instrument could help it exert a direct influence. Namely, relying on the central bank digital currency, the central bank could keep accounts for households similar to the present commercial bank accounts and directly set the interest rate on such. By controlling this interest rate, the central bank would be able to determine the conditions applicable to household funds placed with it, and thereby influence households' savings decision more efficiently, which would cause the efficiency of interest rate transmission to soar. Apart from the central bank determining the conditions of the deposits placed with it, it could also have greater influence on the interest rate on bank deposits, providing similar services, and boost competition among banks for acquiring deposits.

With regards to the structure of household savings, bank deposits account for a major part – 17 per cent – of the assets, as almost all households have this product, and if this is influenced more directly, it could significantly improve the efficiency of interest rate transmission. When assessing the efficiency of interest rate transmission, it is worth examining households' financial instruments (*Figure 3*). According to the financial accounts data, published by the MNB, the largest part – i.e. more than one-third – of households' financial assets, amounting to over HUF 76,000 billion, is invested in equities (shareholding in limited liability companies and limited partnerships, as well as in stock exchange and OTC equity). This is followed by the second largest retail asset, the holding of bank deposits, which accounts for 17 per cent of the assets. Government securities are ranked third, the stock of which, with a share of 13 per cent, which exceeded HUF 10,000 billion at the end of 2021. At present, within household savings, the interest rate channel is able to exert efficient influence primarily on mutual fund shares, which follow financial market conditions more closely, and on the price of government securities, but due to the penetration of retail government securities, this has a smaller effect. Naturally, other channels of monetary transmission – e.g. the asset price channel – may efficiently influence households' decisions in the case of business shares or mutual fund shares as well. However, according to the questionnaire-based survey of 2017, assessing households' assets, only a smaller part of households holds mutual fund shares (3.3 per cent) and government securities (5.8 per cent), while the vast majority of them (over 80 per cent) have bank deposits (*ECB 2021*). Accordingly, the savings instruments directly influenced by the interest rate channel are relatively concentrated, while almost all households have bank deposit savings, and thus strengthening the transmission on deposit rates could significantly improve

the efficiency of the central bank's monetary policy. If the MNB could directly influence the conditions of bank deposits, it would be able to achieve the central bank's goals more easily and quickly.

Figure 3
Key instruments of households' financial assets
(HUF billion and per cent, December 2021)

Equity
26,283

34%

Bank deposit
12,903

17%

Other
9,754

13%

Cash
6,463

8%

Government bond
10,110

13%

Investment
funds
5,602

7%

Insurance
5,336

7%
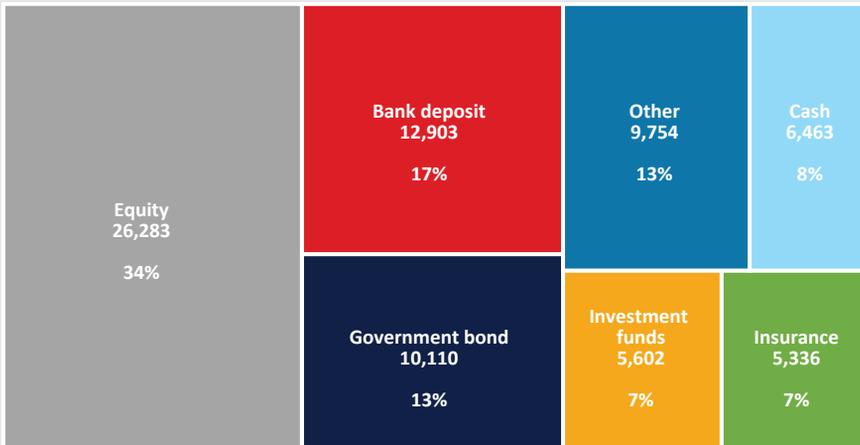
Source: Compiled based on MNB data

3. Conclusion

In addition to strengthening the interest rate channel, a number of other potential benefits could be achieved with the introduction of the central bank digital currency. The central bank digital currency may also serve as a tool to boost competition among the actors in the banking sector. Through this, the conditions provided by the central bank could prompt other market participants as well to adjust, thereby generating greater competition in the market of retail bank deposits as well. Moreover, the central bank digital currency may also be an important tool in prevention of digital dollarisation. Furthermore, although this bears utmost importance typically in developing countries, it may somewhat improve the range of financial services available to users in Hungary as well. Last but not least, through the central bank digital currency the central bank may implement innovations – e.g. through the introduction of smart contracts – that would represent a major progress compared to the currently available financial services, and thus the instrument may significantly contribute to the improvement of financial services.

Therefore, the central bank digital currency may offer wide-ranging advantages, also reaching several areas of the economy indirectly. As a result of the aforementioned impacts, the introduction of central bank digital currency would provide households with access to a safe instrument, interest rates on retail bank deposits may rise and thus households' interest income may increase, competition among banks may strengthen and bank deposit holdings may grow. Owing to the stronger interest rate transmission, the central bank's monetary policy may become more efficient, and it may also facilitate the application of targeted interest rates, thereby making monetary policy more targeted. This may help reduce the volatility resulting from the business cycles and allow for more stable economic growth.

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The Secret of Lasting Success – The Cases of Switzerland and Denmark*

Rafael Lipcsey-Andersson – Szabolcs Szentmihályi

In recent decades, the development of Switzerland and Denmark has mainly been characterised by intensive growth, pioneering in innovation and the development of green technologies, high employment rates and fiscal discipline. In this article, we discuss the background of these development factors as well as how these two economies have managed to remain highly advanced for such a long time. The paths taken by Switzerland and Denmark show plenty of similarities, from which Hungary can draw lessons regarding its efforts to catch up with Europe's more advanced economies. In certain areas, however, their success has been enabled by factors dependent on their unique conditions, resources and diverging economic policy approaches.

1. Common factors on the path to success

Switzerland and Denmark were already relatively well-developed economies at the beginning of the 20th century, and even after World War II they showed considerable progress towards catching up with the USA (Figure 1). The neutrality or partial neutrality of each of these two countries played a major role in their development. Switzerland has consistently managed to maintain its neutrality. Denmark was occupied by Germany in April 1940 despite its proclaimed neutrality, but it managed to largely avoid devastation during the war. The progress made by Denmark after the war was driven primarily by low import prices, an upswing in industrial production and the stabilisation of agricultural export prices.[1] Despite its rapid growth, Denmark received a generous share of the funds allocated under the Marshall plan, on a per capita basis (*Tarnoff 2018*). Switzerland was able to continue industrial production both during and after the war, without interruptions.


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[1] *Encyclopedia Britannica (2022)*

Figure 1
Development of Switzerland, Denmark and Germany relative to the USA between 1900 and 2018

Note: Per-capita GDP at 2011 prices, based on data at purchasing power parity
Source: Calculated on the basis of the Maddison database
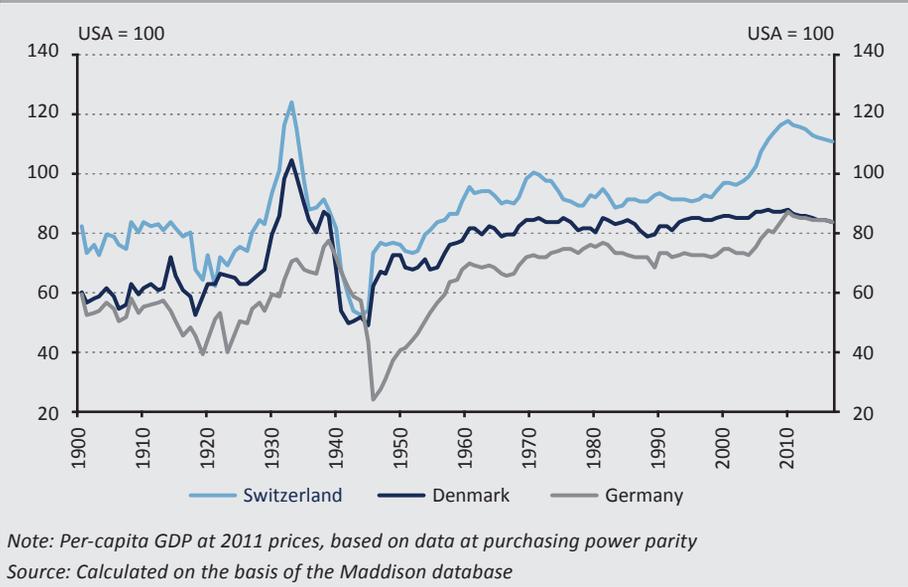
Switzerland maintained stable economic growth rate throughout the 1950s and 1960s. Denmark's growth rate fell short of the European average in the 1950s, partly because of highly regulated agricultural export prices, the devaluation the British pound in 1949, and the Korean war. In the 1960s and early 1970s, however, the Danish economy grew more dynamically and at the same time underwent a restructuring process, as agriculture lost its dominant position to the services sector (*Figure 2*)*.* The oil crisis of the 1970s slowed growth in both countries. Between 1971 and 1979, the development of Switzerland and Denmark fell by 11 and 3 percentage points, respectively, in comparison to that of the US. Moreover, unemployment increased significantly in Denmark (to over 10 per cent in 1980), and improvement in this regard was not seen until the early 1990s.[2] A significant rise in the Swiss unemployment rate was not observed.[3]

Figure 2
Background information on Denmark and Switzerland

Denmark	Switzerland
It has a population of 5.9 million people and an area of 43,000 square kilometers.	It has a population of 8.6 million people and an area of 41,000 square kilometers.
It has existed as a kingdom since the eighth century. Over the course of several centuries, it lost more territory than it gained, losing Norway in 1814 and Iceland in 1944. It remained neutral in the First World War and partially neutral in the Second World War.	It has existed in its current form since 1848, but some of the cantons that formed it started the centuries-long process of the formation of the federation as early as the 1200s. Switzerland remained neutral during the two world wars.
Efficient agriculture and rapid development of services sector play a major role in the Danish success.	Its economic success is due, among other things, to industrialisation, political stability and financial independence.

Shifting our focus to current times, recent analyses show that success in the economic catch-up game primarily hinges on the level of investments and the framework within which they occur (*Várnai 2022*). Both countries under review perform well in this regard: The rate of intangible investments is 8.3 per cent in Switzerland and 5.5 per cent in Denmark, in contrast to the EU average of just 3.4 per cent. To a large extent, this can be attributed to the high degree of digitalisation in both countries, which not only enhances the role of information and communication technologies, but also puts emphasis specifically on intangible investments. Such investments substantially improve productivity and corporate efficiency, as well as the optimisation of production and sales processes, and thus create opportunities for rising production levels.

Both Switzerland and Denmark are leaders in innovation. Switzerland ranked 1st and Denmark 4th in the 2021 EU innovation index (*Figure 3*). The index is calculated from several sub-pillar values by weighting them together. The areas taken into account include: innovative human capital, research-stimulating ecosystems, innovative finances, digitalisation performance and intellectual capital. Innovation potential is also reflected by patent statistics. The number of patent applications submitted per one million persons in Switzerland was 943 in 2020, more than six times the EU average of 147. The corresponding number in Denmark was 413, the third highest

in the EU (*Table 1*). From the sub-pillars mentioned, digitalisation performance deserves further attention.

Figure 3
EU Innovation Index 2021

Note: The European innovation scoreboard compares the innovation capabilities of all EU Member States and some non-EU countries. It covers a number of categories, including, inter alia, human capital, investments, innovation activities and innovation impacts (e.g. ecological sustainability).

Source: Eurostat
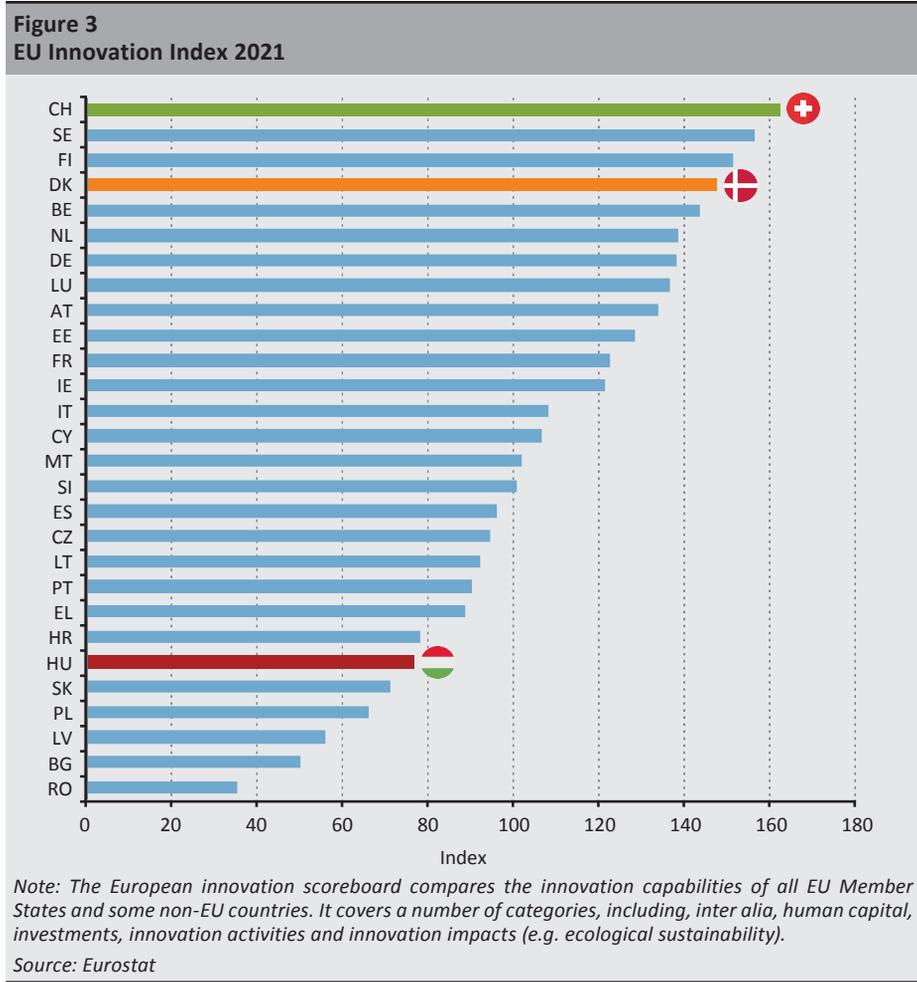
Table 1		
Patent applications per one million persons in EU countries and Switzerland in 2020 (TOP10 and Hungary)		
Countries	**Rank**	**Patents/million persons**
CH	**1**	**943**
LU	2	629
SE	3	428
DK	**4**	**413**
NL	5	366
FI	6	343
DE	7	312
AT	8	259
BE	9	208
IE	10	195
HU	**25**	**11**
Source: Eurostat		

Digitalisation and the technological progress it induces represent new opportunities, but also require adjustment by all economic agents. By harnessing the achievements of the fourth industrial revolution, a competitive advantage can be gained that may result in a long-term improvement in productivity, and thus boost welfare in a sustainable manner. The high level of digitalisation provided a significant competitive advantage during the Covid-19 pandemic as well. Lifestyle changes caused by the lockdowns posed new challenges to the corporate and the governmental sectors, as well as households, and digitalisation played a key role in addressing these. Companies already possessing advanced digital infrastructures enjoyed a competitive advantage in this situation and citizens with a high level of digital skills also found it easier to adapt. The pandemic gave an extraordinary impetus to the digitalisation of various elements of society and, as a result of the increasing role of big data and artificial intelligence, digitalisation is expected to continue spreading in the coming years as well. *Denmark and Switzerland were ranked 2nd and 6th, respectively, by the European Commission in terms of digitalisation in 2020* (*Figure 4*).[4]

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[4] The ranking order is made up of the weighted values of the following sub-indices: network quality, digital skills of the workforce, use of online services, corporate integration of digital technologies and digital public services.

Figure 4
EU digitalisation ranking in 2020

Connectivity
Use of internet services
Digital public services
Human capital
Integration of digital technology
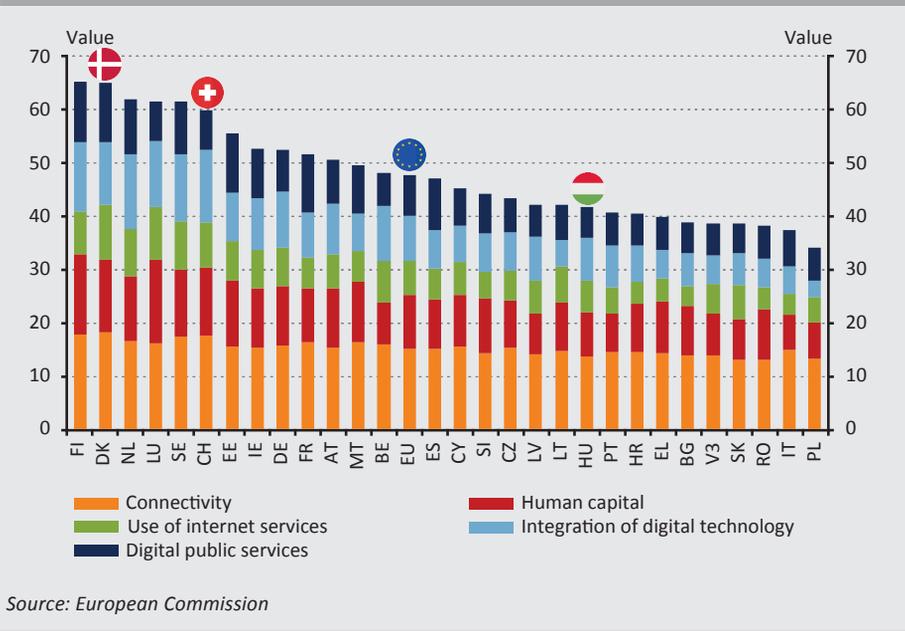
Source: European Commission

Both Denmark and Switzerland have well-established, highly developed start-up ecosystems. The number of start-ups per one million persons is three times and two times as high as the EU average in Denmark and Switzerland, respectively. Worth mentioning is for instance the Danish firm "Tradeshift" (with capital investment of USD 432 million) (*Irish Tech News 2018*), automating supplier invoicing processes, or "Trustpilot", an independent valuation platform (with capital investment of USD 193 million).[5] Noteworthy Swiss start-ups include "Planted Foods AG" (with capital investment of USD 38 million) (*Coldewey 2021*), which manufactures alternative protein products, and "Cutiss AG" (with capital investment of USD 32 million),[6] which develops robotised skin regeneration technologies.

Switzerland and Denmark are also in the vanguard in terms of green efficiency. GDP per unit of carbon dioxide emissions is highest in Switzerland and the 5th highest in Denmark among the OECD countries (*Figure 5*). Switzerland intends to cut its carbon dioxide emissions by one half by 2030 relative to 1990 and aims to achieve full carbon-neutrality by 2050 (*Jorio 2021*). The Swiss are planning a green energy revolution based on solar energy: the share of solar in the Swiss energy mix should rise from the current 4 per cent to more than 40 per cent within the next 30 years. Another important renewable source is hydropower, which currently supplies 60

[5] *Top 221 Startups from Denmark*. https://www.failory.com/startups/denmark. Downloaded: 13 June 2022.
[6] https://www.cipherbio.com/data-viz/organization/Cutiss%2BAG/news. Downloaded: 13 June 2022.

per cent of the power capacity. Switzerland is also a pioneer in the emissions-reducing method of carbon capture and storage (CCS). Climeworks AG, a company headquartered near Zurich, opened the world's first CCS plant, which will absorb 900 tonnes of carbon dioxide per year and use it in crop production. Although this is not a substantial amount in comparison with global emissions, this technology could potentially compensate for 1 per cent of global CO_2 emissions (*Marshall 2017*). Denmark has set itself a more ambitious short-term target, planning to reduce its emissions by 70 per cent by 2030 and achieve climate neutrality by 2050, just like Switzerland (*Ministry of Foreign Affairs of Denmark 2022*).

In Denmark, wind energy is the key factor in the green transition. Energy generated by turbines accounted for 50 per cent of energy production in 2021, a ratio that is planned to increase further in the years ahead. In line with this plan, Denmark will construct the world's first "energy islands". These islands will make it possible to erect wind turbines much further off shore than before. The turbines will generate a total of 5 GW energy, enough to supply at least 5 million households (in 2020, Denmark had 2.7 million power-consuming households) without consumers having to put up with the drawbacks of wind turbines operating in their neighbourhood. Switzerland and Denmark are also leaders in the number of green technology patent applications. Amongst the OECD countries, Denmark leads the way in terms of patent applications submitted per million persons and Switzerland also performs well, claiming the 7th spot *(Table 2)*.

Figure 5
GDP per unit of carbon dioxide emissions (PPP) in OECD countries

Source: OECD
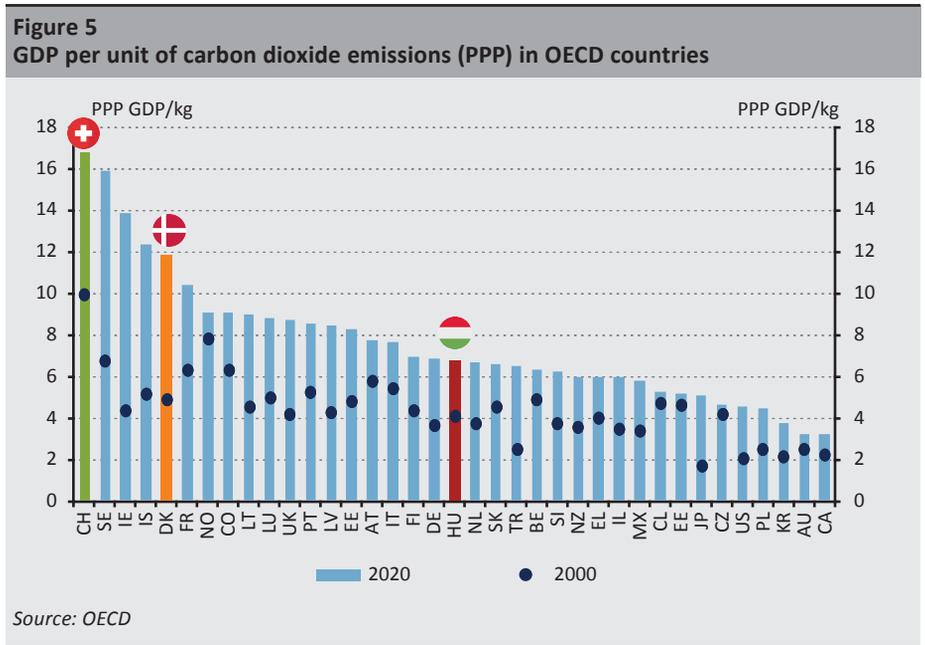
Table 2
Number of green patent applications per million persons in OECD countries in 2018 (TOP10 and Hungary)

| Countries	Rank	Patents/million persons
DK	**1**	**60**
SE	2	43
KR	3	42
JP	4	36
FI	5	33
DE	6	31
CH	**7**	**25**
AT	8	25
NO	9	24
NL	10	19
HU	**25**	**3**

Source: OECD

Both Denmark and Switzerland are characterised by fiscal discipline. Over the past 30 years, Switzerland's fiscal balance has fluctuated between –3.5 per cent and 2 per cent. Between 1995 and 2019, Denmark was able to generate fiscal surpluses of an average of 0.4 per cent of GDP. Government debt has always been low in both Switzerland and Denmark since the early 2000s. In 2020, this rate was 40 per cent of GDP in both countries; significantly below the 90 per cent EU average.

Both countries are work-based societies with high employment rates: at 75 per cent in Denmark and 80.5 per cent in Switzerland, both of which are much higher than the 68.5 per cent EU average. Moreover, the ratios of people with higher qualifications are higher (Switzerland: 43.3 per cent, Denmark: 39.1 per cent) than the 35.8 per cent EU average, indicating advanced, knowledge-based societies. It should be noted in this regard, however, that the so-called brain-drain mechanism might be functioning in both countries, as each have substantial proportions of highly trained workforce flowing in from other countries.

2. Differences – there's no single recipe for success

While there are numerous similarities between the two countries' growth models, in some areas they have opted for different paths towards economic development (*Figure 6*). It is clear from the foregoing that the economies of both countries managed to achieve, and thus far also maintain, high levels of development. Nonetheless, there are also major structural differences between them, which might

indicate that there is no single recipe for success. Rather, each unique economy's existing potential and opportunities must be exploited and utilised, in which active economic policy plays a key role.

Figure 6
Differences between Denmark and Switzerland

	Denmark	Switzerland
Economic History	At first, agriculture and later the service sector ensured prosperity.	Its economic success is largely due to early industrialisation.
Competitive advantage	Market and public services	Financial activities, export
Reallocation	High taxes, welfare state	Low taxes
Investment	Investment rate below the EU average in the last decade	High investment rate in the last decade

Source: OECD

The first such area pertains to the early achievements of both countries that can be traced back to their differing sectoral compositions. In Denmark, welfare was ensured first by agriculture and later by the services sector, while Switzerland has, for the most part, industrialisation to thank for its early achievements. Switzerland managed to boost its industrial output by exploiting the absence of patent regulation during the second industrial revolution. Moreover, as a small and open economy it became a dominant player in global value chains focusing on specific product categories and quality, riding the wave of globalisation at the end of the 1800s. Finally, its banking system, famous for confidentiality, stimulated capital influx. By contrast, economic growth in Denmark was – quite uncharacteristically – driven by industry only briefly. Agriculture remained dominant for quite some time, due to the effective and efficient smallholder-cooperative sector and a low customs tariffs policy. The latter enabled the import of cheap grain, which initially facilitated the switch from growing grain to raising livestock, and later a pivot towards the production of processed animal products. Only in the 1970s did agriculture lose its dominant position to the services sector, but it has remained an important part of the economy to this day. Agriculture in Denmark has become a sustainable, R&D-

intensive sector with a focus on green production, which makes up only a small part of GDP directly, but accounts for a significant share of Danish exports indirectly via production chains (*Figure 7*). Denmark's relatively small land area is cultivated as efficiently as possible, maintaining the highest quality standards. The country's food industry is vertically integrated (*Figure 8*); high value-added processed food products are much more significant in exports than unprocessed foodstuffs.

Figure 7
Significance of Danish agriculture

It contributes to **11 per cent of exports**.

The population of Denmark is 5.9 million people, but **the food industry is produced enough products for 15 million person annually**.

A third of Danish straw production is used for central heating and energy production.

Biogas accounts for 20 per cent of Danish gas production (EU average 2%)

66 per cent of Danish land is cultivated (EU average 41%)

11 per cent of Danish farmland is cultivated organically. (EU average 8.5 %)

Denmark **reduced food waste by 25 per cent** between 2015 and **2020**.

50 per cent of the grass and clover seeds produced in the EU are grown in Denmark.

EXPORT — 11%
PRODUCTION VOLUME — 15 MILLION
STRAW PRODUCTION — 1/3
BIOGAS — 20 %
LAND — 66 %
ORGANIC FARMING — 11 %
GRASS AND CLOVER SEED — 50 %
WASTE — -25 %

AGRICULTURE
GDP 1.4%

*Source: Danish Agriculture and Food Council, World Bank, Eurostat, IEA*

Figure 8
Ratios of exports of unprocessed and processed foodstuffs of various EU countries in total exports, 2019


Source: Based on Eurostat data
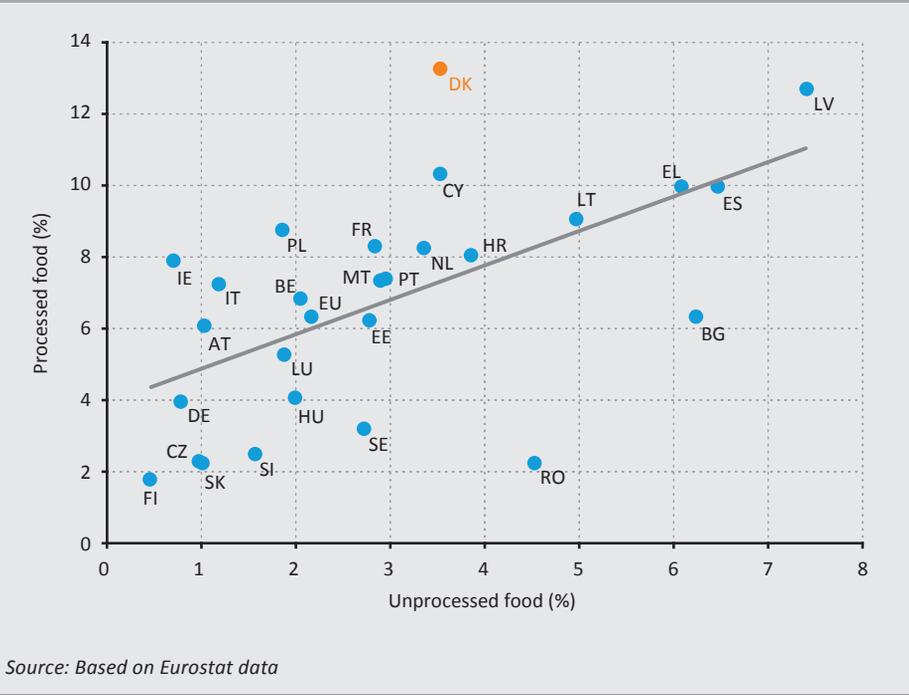
The competitive advantage enjoyed by both countries also stems from different sources. While growth in Denmark is generated by the effective and efficient operation of private and public services, Switzerland enjoys success due to its financial sector and export products. In Denmark, 24 per cent of the cumulative GDP growth between 1995 and 2019 was attributable to the governmental sector and 43 per cent was generated by household consumption. The corresponding ratios in Switzerland were 7 per cent and 45 per cent. During the same period, net export sales accounted for 30 per cent of Swiss GDP growth, while in Denmark they contributed only 7 per cent. Clearly, while household consumption is important in both countries, growth in Denmark is largely driven by the public sector, while in Switzerland a similar role is played by exports. The Danish public sector owes its significant role to the Scandinavian welfare model, while exports of goods play a dominant role in the foreign trade growth of the Swiss economy. Key Swiss export product categories include machines and electronic products (24.3 per cent), chemical products (20.7 per cent), wholesale and retail products (11.4 per cent), as well as financial and insurance products (10.5 per cent). A breakdown of 2019 GDP for both countries shows that financial services accounted for nearly 10 per cent in Switzerland and 5.5 per cent in Denmark. At the end of 2020, the portfolio

of financial instruments managed in the Swiss banking sector exceeded 500 per cent of Swiss GDP.

The two countries under review also have fundamentally different social redistribution systems in place. In Switzerland, a high investment rate based on low tax rates drives economic growth, while by contrast, in Denmark, high tax rates finance the Scandinavian welfare model. Danish tax revenue, amounting to 47 per cent of GDP, was the highest among EU countries in 2020. The revenue was significantly lower, at 28 per cent of GDP, in Switzerland (*Figure 9*). Meanwhile, the investment ratio relative to GDP was 21 per cent in Denmark and 26 per cent in Switzerland (EU average: 22 per cent) in 2019. Such diverging paths began to appear in the early 1950s, but became prominent only in the 1960s and 1970s. The timing of the process aligns closely with the evolution of the Danish welfare model which reached its peak relatively late, in the 1970s. As late as in the early 1960s, public spending in Denmark as a percentage of GDP equalled that of the United States of America. Only at the end of the 1960s did a transformation occur when two successive governments increased the tax burden by a total of 10 per cent which was then further increased to compensate for the effects of the 1973 oil crisis (*Brøns-Petersen 2015*). To this day, Denmark follows the Scandinavian welfare model, although public expenditures as a percentage of GDP have decreased somewhat during the past decade.

Figure 9
Total tax revenue in the EU countries and Switzerland, as a percentage of GDP (2020)

Source: OECD
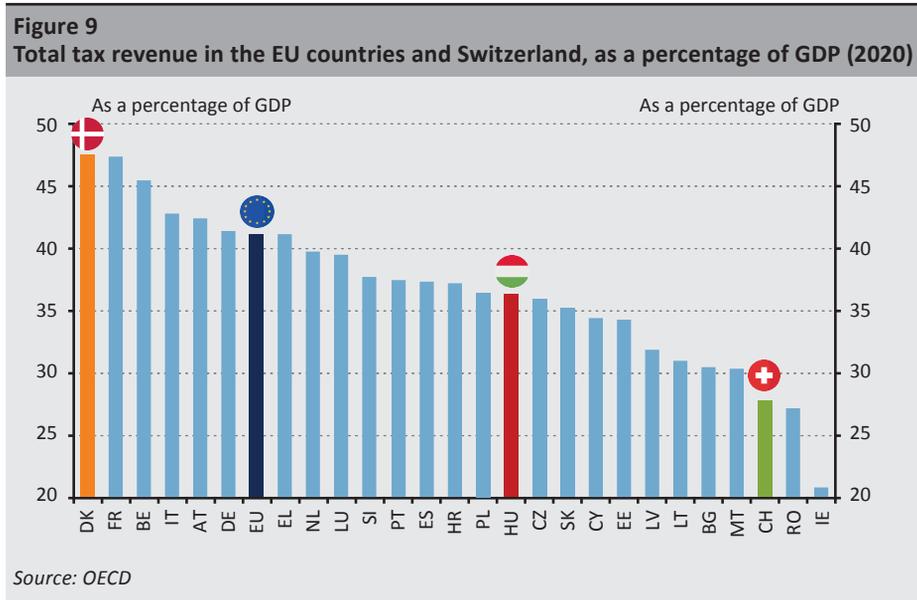
3. Conclusion

Overall, it can be concluded that stable economic catching up requires adequate performance in a number of areas, while the recognition of individual country specifics and the utilisation of their potentials is also a key aspect. Shared points, indispensable for success, and from which Hungary can also learn are the following: digitalisation, environmental sustainability (green effectiveness), smart capital and intangible investment, innovative economies, developed start-up ecosystem, work-based society and fiscal discipline. At the same time, each country may possess structural factors individual to them, and as such there is no single recipe for success; the potentials of each economy need to be exploited, in which an active economic policy plays a major role.

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Geopolitics of the "Belt and Road Initiative"*

Alexandra Zoltai

The main aim of the book is to provide insight into Chinese geopolitical thought and examine Chinese international cooperation from a Chinese perspective, compared to the Western understanding of it so far. In addition, it describes in detail China's "*Belt and Road Initiative*", about which no comprehensive book, doctoral thesis or study has been written in Hungarian so far, while press reports on the Chinese initiative appear almost daily. It also raises the question of the roots of Chinese geopolitical thought. Hence, how do the teachings of ancient Chinese strategists and sages (Sun Tzu, Kuan Tzu, Confucius, Lao Tzu, Meng Tzu, etc.) and the duality of yin and yang, one of the foundations of Chinese culture, affect China's foreign policy? Is the "Belt and Road Initiative" a new kind of colonialism?

Levente Horváth starts his introduction with an intriguing question: *Why is it that the world press is full of news that portrays China in a negative light?* After a thought-provoking introduction, the author outlines how, following the Cold War, the United States remained the only superpower, creating a unipolar world order in which the United States put its own principles in the foreground. Over the past two decades, however, new economic regions and centres of power of global importance have emerged, and China has become one of the most promising of these, with the prospect of becoming another superpower by challenging the United States' hegemony. The author examines the path of China's development in this new international context, analysing the Chinese "Belt and Road Initiative" and related Chinese geopolitical thought with geostrategic innovation, no longer from the perspective of Western states, but from the perspective of an Eastern society with a 5000-year-old culture based on Confucian teachings.

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Following the introduction, the work first describes *the historical background of the "Belt and Road Initiative" and then its announcement and its pillars*. Prior to the expansion of Europe in the 19th century, China had its own vision of a central role in the world order, in which it saw itself as the sole sovereign government of the whole world. This was a kind of universal hierarchy, as opposed to the balance of sovereign states competing with each other that was common in the West. It was the *Silk Roads* that brought a change in China's foreign policy, with the development of the Silk Roads on land and sea, and the establishment of closer trade and diplomatic relations with neighbouring countries. The overland Silk Road was mainly used for trade, while the maritime Silk Road was used for diplomatic relations as well as trade. After the decline of the overland Silk Road, China closed itself off from the outside world. Regardless of its isolation, China has always played an important role in the world economy, accounting for 25–30 per cent of world GDP until the mid-19th century, when the economy began to decline with the unequal contracts of foreigners and the spread of opium. The next time the Silk Road came to the fore again was in 2013, when current Chinese President Xi Jinping spoke about the Silk Road Economic Belt concept during his official visit to Kazakhstan on 7 September. One month later, on 3 October 2013, Chinese President Xi Jinping outlined the Maritime Silk Road concept during his official visit to Indonesia. As a result, on 28 March 2015, the document *Vision and Actions on Jointly Building Silk Road Belt and 21st Century Maritime Silk Road* was released at the Boao Forum International Platform in China, officially launching the global "One Belt, One Road" initiative.

Chinese politics today is still influenced by 5,000 years of Chinese culture, and it seems that China's top state leaders are constantly studying the works of great Chinese philosophers and strategists. Thus, the author of the book devotes a special chapter to the ancient Silk Road, which inspired the Chinese leadership to create the New Silk Road.

The next long chapter provides an in-depth analysis of the development of Chinese geopolitics, from ancient China to present day. Many people question whether or not the "Belt and Road Initiative" is a geopolitical ambition. According to Horváth, in order to understand this, it is necessary to look at it from a geopolitical perspective, but then we often make the mistake of reading about great European and American thinkers, their works and ideas in geopolitical studies, while we have little information about Chinese geopolitical thought, mainly due to the lack of knowledge of the Chinese language. The chapter seeks to answer questions such as how this evolved in China in parallel with the emergence and development of Western geopolitical thought. In China, with its five thousand years of culture, how has political geography and geopolitical thinking been approached? The chapter details China's geopolitical roots through the military strategists and great sages and philosophers of different eras, and then the sprouts of Chinese geopolitics, up

to the modern era, examining geopolitics as a discipline in the country. The author then highlights the differences between Chinese and Western geopolitics, and finally helps interpret the "Belt and Road Initiative" from a geopolitical perspective.

Building on the previous chapters, the following section presents the "Belt and Road Initiative" from an economic, structural and financial perspective. After an overview of the immediate economic background of the initiative, the author highlights the problem of examining the name from a Western perspective, and through this the scope of the project is presented. Following the launch of the "One Belt, One Road" initiative, Western researchers tried to explain the potential of the Chinese initiative by using different maps and one land and one sea route to show that the Chinese initiative would follow the route they had indicated. There were some who, in addition to explaining the route, also drew conclusions – wrongly – that some countries were being left out of Chinese cooperation because the roads did not touch them. The differences between Eastern and Western cultures then come to the surface again, as the West tries to understand Chinese strategies, concepts and initiatives with its own thinking, but this is mostly incorrect. The author points out that, this time too, the Chinese side has adapted, understanding that the use of the word "one" is problematic in Western thinking, and so the English name *One Belt, One Road* was shortened to *Belt and Road* hoping that this would make it clearer to the world, and especially to the West, that it is a whole network system, not a specific route. To support this, the author presents the six main directions of the "Belt and Road Initiative", the types of silk roads and the economic corridors starting from China.

A prerequisite for increasing trade between countries is that they have adequate infrastructure, but to build an infrastructure network, developing countries need huge amounts of money, which they cannot always provide themselves. For this reason, the author considers it important to discuss the financial background of the "Belt and Road Initiative". The financial infrastructure supporting the initiative is constantly evolving. In order to promote the development and infrastructure development of the countries along the "Belt and Road Initiative" across Eurasia, China has initiated the establishment of several investment funds and financial institutions to finance projects in the region, such as the Asian Infrastructure Investment Bank (AIIB) and the Silk Road Fund.

The "Belt and Road Initiative" has become the determinant strategy of China's foreign policy and foreign economy, which is based on China's multilateral and bilateral cooperations. The final chapter provides an overview of China's international relations in the context of the "Belt and Road Initiative", which the author guides the reader through via a case study, using the example of the China–CEE cooperation. China's mutual relations with the United States, Russia, India, Japan, the European Union and Hungary are then discussed in the context

of international reactions to the "Belt and Road Initiative". Finally, the results of the past seven years of the "Belt and Road Initiative" are presented to give an up-to-date picture of the state of play of the Chinese initiative.

With regard to the above, *"Chinese geopolitical thought"* by *Levente Horváth* is a topical and gap-filling work in the Hungarian literature, not only in the context of the "Belt and Road Initiative", but also in terms of a better knowledge and understanding of the Chinese geopolitical thinking. The book is easy to understand for everyone, making it a useful reading not only for researchers, professionals and policymakers interested in Asia and China, but also for those who wish to broaden their horizons and become familiar with the Eastern/Chinese perspective in addition to the Western one.

Poland's Economy in the 20th Century – Turning Points and Challenges*

Bence Varga

In May 2022, the Central Bank of Hungary (Magyar Nemzeti Bank) published a comprehensive programme proposal entitled Sustainable Balance and Convergence in 144 Points[1], which details a two-year economic stabilisation programme. One of the points made in the discussion paper is that the Hungarian economy has unfortunately deviated from the Polish path of development, as shown by the imbalance. Although the comparison in the discussion paper refers to the recent past, we think that it may be worth briefly reviewing the development of the Polish economy in the 20th century, based on the book by the two distinguished Polish academics *Landau* and *Tomaszewski*, in order to see what path the Polish economy followed in this period and what lessons can be drawn from it for today.

After more than 100 years of fragmentation, the Second Polish Republic, which was created after the Polish state became independent (1918), had quite large differences in development between the various parts of the country as well as different legal systems, which meant that they had to be brought into the public finances by completely different means. One of the most important challenges for the Polish government was the revitalisation of industry, for which the government provided loans and orders to entrepreneurs, but the orders could not always be considered necessary for the country's economy and the loans were often insufficient (e.g. the textile industry in Łódź could only develop substantially with loans from the Entente countries). In addition, there were considerable shortages of several raw materials (e.g. coal; in 1919, for example, only 35 per cent of the coal demand was available from within the country's borders). The war economy

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momentarily boosted industry – later, however, this proved to be a temporary effect – but industrial output did not reach the level of 1913, despite the increase. Despite the shortage of raw materials and labour, private enterprises benefited from this period mainly in the form of investment financing, the establishment of private factories and new industrial plants (e.g. electrical industry, precision and optical industry).This was also largely due to accelerating inflation, which allowed production costs to fall in real terms (i.e. the cost of credit was not valorised until 1923), and the cost of transporting goods to decrease (though they increased in nominal terms, but much less than inflation). From 1918 onwards, joint-stock companies developed rapidly, with some 1,455 such companies (e.g. related to sugar refining and textile industry) set up in the first five years after Poland's becoming independent. There was also a need to stabilise the banking system, as a very large number of banks were established (their number increased from 16 to 111 between 1913 and 1923), and the saying of the time was *"if you are in financial difficulties, start a bank"*. Most of these banks were involved in dubious deals and were mostly considered unviable. However, as inflation later accelerated, these unviable banks failed, while most of the systemically important banks (e.g. Bank Handlowy w Warszawie) were saved by state capital injections.

In 1922, the annexation of the eastern part of Upper Silesia to Poland brought several positive benefits (e.g. the supply of raw materials or the conclusion of trade agreements providing for duty-free access), and although there were initial concerns about the Polish market's ability to absorb supply from Upper Silesia, these were later proved unfounded because of the rising inflation and increased demand, due to the French occupation of the Ruhr area. Initially, the creeping inflation had a positive effect (e.g. tax revenues increased), but later, when inflation started to run out of control (from 1923), only the negative phenomena remained: wage inflation reduced domestic demand, production fell, unemployment increased, and the growing public deficit meant that the state did not create additional demand, and the possibilities of borrowing abroad were reduced. However, unlike the 1929–1933 crisis, this was mainly due to internal causes (e.g. rising inflation due to budget deficits).

The period between 1924 and 1929 can be divided into two parts, the inflationary crisis of 1924 to 1926 and the period of economic growth of 1927 to 1929. The first period was characterised by social impoverishment, unemployment as well as falling consumption and investment. In the second period, there were already positive trends, with the application of farming techniques that could be considered modern and the introduction of a land reform, which were clearly positive changes. Industrial production in 1929 was 21 per cent higher than in 1923 (but still only 91 per cent of the 1913 level), helped also by the 1926 British miners' strike through increased coal exports. This period also saw a change in the structure of industry,

with the mining and textile industries dominating the sector, but by 1929 food processing and construction also took on a greater role. There was also some degree of modernisation in industry, with some of the basic steam engines being replaced by electric or internal combustion engines. Numerous attempts were also made to reduce the budget deficit, including by cutting government expenditures and introducing various forms of taxation (direct and indirect taxes, e.g. property tax, land tax, increased income tax), so that by 1927 the budget was already as planned. Monetary reform was completed in 1924, when the Polish zloty replaced the earlier Polish mark. However, the stabilisation was accompanied by substantial foreign borrowing, which in many cases was excessive and quite expensive, and by the granting of various privileges that could not be justified (e.g. Italian businessmen also secured raw tobacco products for a loan of 400 million lire, on terms that could not be considered very favourable). Stabilisation of the Polish currency contributed to the consolidation of the capital position of the banks, and public confidence in the state banks increased in contrast to the private banks, which in many cases performed speculative activities as well (some of which even went bankrupt), which led to a reduction in the number of banks from 111 in 1923 to 51 in 1929.

The years between 1930 and 1935 were the years of the Great Depression in Poland as well, with the crisis hitting bottom in 1932. The following few years were more of a period of stagnation. Poland was hit harder by the crisis than other European countries. For example, while industrial production in Germany decreased by 53 per cent, it fell by 58 per cent in Poland. The recovery after the crisis was also slower than in other countries, so while Polish production in 1935 was 76 per cent of that in 1928, in Hungary, for example, it was 113 per cent. The reason for this in a large part was that the crisis caught the Polish economic policy completely off guard; even in the year before the crisis began, a large number of Polish economists predicted an economic recovery and even when the crisis hit, only a temporary, short downturn was forecast, so that no major assistance to industry, agriculture (where the downturn was one of the most significant in the developed countries) or the banking sector was envisaged. Unfortunately, monetary policy was also characterised by a belated reaction, with no desire to impose exchange rate or payment restrictions, leading to an outflow of foreign capital and depletion of the gold and currency reserves of the Polish central bank, *Bank Polski*. The aim was to reduce the budget deficit by reducing expenditures (e.g. education, agriculture and pensions) and increasing revenues (mainly through tax revenues, selective tax policies and by introducing income tax). However, even in the short term, these measures proved insufficient, and the longer-term effects (e.g. on education) had even more serious consequences. In 1931, within a few months of the news of the collapse of the Vienna Creditanstalt, almost half of the total deposits were withdrawn from the banking sector, but the state banks were more trusted by both the domestic and foreign investors and even saw their deposits rise. The crisis was

exacerbated by the fact that Bank Polski kept its base rate high (one of the highest in Europe), further restricting the already tight lending.

The years 1936–1939 also saw an improvement in the situation of Polish agriculture and industry through an improvement in the general economic climate. The Polish government's aim was to make the economy independent of foreign countries, and in 1936 it drew up a four-year investment plan, but it was rather under-coordinated and difficult to implement. However, instead of a projected 1,800 million Polish zloty, 2,400 million Polish zloty was spent on investment (mainly on modernising industry and developing economically backward regions), which also contributed positively to job creation. The 4-year investment plan was followed by a longer, 15-year investment plan (1939–1954), which was only partially implemented due to the later outbreak of the World War. During the period of the German occupation (1939–1944), industrialisation gained new momentum, but unfortunately it was less organised (especially in the early years of the occupation) and mainly focused on the German Reich's interests (i.e. war aims). Accordingly, the weight of light industry was significantly reduced (small private enterprises were liquidated or merged), many factories were closed without compensation, and a number of enterprises were assigned to a so-called trustee (Treuhander), who essentially exercised the ownership rights. Total industrial output fell most sharply between 1938 and 1941 (by 63 per cent), and although there was some improvement later, in 1942 it was still only 60 per cent of the 1938 level. The only industries that grew during this period were those serving the German army, and agriculture, also in the interests of the German Reich (i.e. providing its food supply). Unfortunately, the increase in agricultural output was not accompanied by the introduction of modern techniques, and in many cases not even by an increase in the area under cultivation, but rather by the more intensive use of existing land. The tax system was characterised by a higher contribution of Polish citizens compared to Germans, as Polish residents had to pay a special tax (the so-called Polish contribution and a social compensation tax, which in some areas amounted to 15 per cent of the salary), while earning 10–30 per cent less than German residents. Through monetary policy, Polish society also suffered a negative turn of events, with a loss of around 75 per cent due to the conversion of the Polish zloty and the German mark, and even a limit on the maximum amount of mark that could be exchanged. Before the German invasion, Bank Polski had all the equipment needed to print money, together with the gold reserves, shipped abroad, so the Germans set up a separate banknote-issuing institution called *Bank Emisyjny w Polsce*. Bank Polski was based in London during the occupation years and was preparing for normal post-war business during this period.

After World War II, the recovery of industry was relatively quick, as the power plants and water networks were not damaged, but it was not an easy task due to the

shortage of skilled labour and raw materials, and was one of the major challenges of the period, along with the restoration of agriculture and the implementation of land reform (by 1946 industrial output was about 70 per cent of its 1938 level). From the Soviet occupation (1944) onwards, Poland followed similar trends to the other occupied countries: the period was characterised by nationalisation (87 per cent of the workforce was employed in state-owned enterprises by 1947, with this figure rising to 89 per cent by 1949), central control, centralisation, forced industrialisation (a 6-year and then a 5-year plan to develop heavy industry) and the creation of cooperatives. Initially, during the years of occupation, there were several types of banknotes of 3 or 4 different denominations in circulation, apart from zloty also from the occupied territories, and the German mark and Soviet rouble were also accepted currencies. *Narodowy Bank Polski* was set up on 15 January 1945, primarily to stabilise finances, centralise the management of company accounts and issue new types of zloty banknotes.

From the second half of the 1950s to the 1970s, the Polish economy gave priority to the search for equilibrium in order to improve the quality of life and prevent the rise of unemployment. The latter was a growing problem due to population growth after the Second World War, as this age group had reached working age (which is why, unlike many other countries, Poland did not have a labour shortage at that time). The need for economic reform became apparent to the Polish leadership, and several initiatives were taken, but unfortunately they did not succeed. One such initiative was the Economic Council, established in 1957, which, although headed by renowned economists, with *Oskar Lange* as its president and *Edward Lipinski* and *Michal Kalecki* as its vice-presidents (the latter was nominated for the Nobel Prize), was nevertheless dissolved in 1962 for its diminishing role and lack of meaningful activity. Although the period from 1957 to 1970 saw an increase in industrial output (by 1970 output had more than tripled compared to 1956), this was not accompanied by any significant modernisation of industry or improvement in product quality. Initiatives were taken in this direction, but a long-term economic strategy was still not developed. Social discontent eventually led to an uprising on 17 December 1970, commemorated by the Gdańsk Fallen Shipyard Workers' Memorial, which has since become a symbol of the Polish port city.

The Agricultural Development Fund, established in 1959, was of great importance for the development of agriculture, and its funds could be used for mechanisation and modernisation, for example. However, use of the Fund's resources was rather limited, so there was no possibility for indirect development (e.g. infrastructure), which would have been particularly needed in the agricultural sector as well. By the second half of the 1960s, agricultural output accounted for 16 per cent of total output, up from around 10 per cent earlier, partly because the government was already encouraging investment in agriculture at this time. Despite this, the

general mood towards agriculture could not be boosted. The fact that health care was not free for agricultural workers (only from 1972), that accident and old-age insurance was not available to them, and that there were no adequate lending sources available, may have contributed to this. The number of people working in agriculture was declining and they were ageing, with a consequent increase in the proportion of land that was not properly managed. There was a proposal by the Polish government to take over land from ageing agricultural workers in exchange for an old-age pension, but, on the one hand, this was not popular with the population and, on the other, because of the problems mentioned above, without a meaningful modernisation of agriculture, the state takeover would also not have substantially helped to increase agricultural output.

The period from 1971 to 1980 was a period of accelerated development in Poland. In 1971, a new 5-year plan was announced, which also aimed to improve the quality of planning and organisation, in the light of previous negative experiences. The plan's priority was to improve living conditions by increasing real wages (by 20 per cent) and national income (by 38 per cent). In addition, a substantial increase in industrial and agricultural output was also included in the targets through an increase in investment (with the allocation of 1,900 billion Polish zloty). Among other things, this led to the establishment of a new coal mine in Lublin, the development of infrastructure (both roads and railways), the development of the northern port of Gdańsk and the establishment of a steelworks in Katowice as well as the launch of car production in Bielsko-Biała (under licence from Fiat). However, there were also a number of negatives, such as the inadequate development of the railway network, and the choice of location for the Katowice steelworks was not the most expedient based on subsequent experience. Also, the factories took too long to set up, resulting in an unduly long commitment of capital. The level of development that occurred exceeded the country's capacities (e.g. in terms of raw materials and labour), necessitating the complete halt or postponement of several investments, and, as in previous years, in many cases quantitative aspects took precedence over qualitative ones, while imports for the investments contributed significantly to increasing external indebtedness and thus vulnerability. The world economic recession of the late 1970s, the resulting shortage of raw materials, mounting inflationary pressures, inadequate levels of investment in agriculture (in the first half of the 1970s investment even decreased compared to the previous years) put the Polish economy in an extremely unfavourable situation, which could not be changed even by the 1976 turnaround, called the economic policy "manoeuvre". By 1980, the budget deficit had reached a level not seen in the country since the Second World War. The Polish economic crisis had a specific character because, unlike the Great Depression of 1929–1933, the Polish crisis of the 1980s was not an imported crisis, but the result of the country's own flawed domestic economic policies.

A review of Poland's economy in the 20th century can provide a number of lessons: public funding (whether direct or indirect) is very difficult to sustain in the long term, at great social cost, and the emphasis should be on promoting self-financing. In this context, there may also be a moral hazard, whereby economic operators anticipate public resources, deliberately placing insufficient emphasis on increasing their self-financing capacity. The lack of strategic planning and coordination in Polish economic policy was exposed on several occasions in the 20th century, and the Polish government responded by introducing unprecedented tax measures, cutting pensions and education spending as well as other cuts, with a focus on short-term goals. The latter was also reinforced by delay of a meaningful modernisation of industry and agriculture. It is striking how unexpected the 1929–1933 global economic crisis was for the Polish economic policy, and why the government's actions in the early period of the crisis were characterised by "denial". But we should also be self-critical about observing the development of the Polish economy in the 20th century, because – to return to the initial thoughts – Poland remained only temporarily on this unfavourable economic path, though it took many years, and looking at the current equilibrium processes, we must say that Poland, albeit painfully, has learned its lesson.

Financial Stability Conference: New Challenges and Focuses*

Gábor Fukker – Gabriella Grosz – Evelyn Herbert – Márton Zsigó

Organised by the Central Bank of Hungary (Magyar Nemzeti Bank, MNB) and the Official Monetary Financial Institutions Forum (OMFIF), the conference entitled '*Financial Stability Conference: New Challenges and Focuses*' was held on 26–27 May 2022, with well-known international experts presenting their opinions on the short-term challenges and longer-term future of financial stability. In 7 main sections, partly in person and partly online, 29 speakers from 4 continents discussed current issues concerning financial stability and recent challenges affecting the financial system, such as the coronavirus crisis and the war between Russia and Ukraine, and they also reviewed questions regarding the future of the financial system, including the management of climate risks and digitalisation, which affects financial intermediation as a whole.

The conference was opened by *Barnabás Virág*, Deputy Governor of the MNB, and *David Marsh*, Chairman of OMFIF. In his opening remarks, Virág emphasised the importance of knowledge-sharing events like this one, which is made even more relevant by the recent shocks to the financial system and the further turbulences expected in the 2020s. Following the 2008 crisis, central banks and supervisory authorities have collected a lot of experience in a short time, and the Deputy Governor of the MNB viewed this conference as a great opportunity to share it, as this also allows us to be more prepared to face the challenges of the future. He noted that the changes brought into our lives by the 2020s, such as the coronavirus pandemic and the war between Russia and Ukraine, were previously inconceivable. In a situation like this, it is essential to ensure financial stability, and central banks play a prominent role in maintaining such stability. Central banks, market participants, FinTech and BigTech companies as well as governments must cooperate in strategic partnership for a sustainable future. Finally, he expressed his hope that this event would be the first step in a series of conferences where experts

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Conference report

could regularly discuss current issues concerning financial stability, thus contributing to building a stable financial system, which is able to react to challenges.

In his opening remarks, Marsh pointed out that in light of the financial and geopolitical challenges facing the global economy we are all 'unconventional' today. In line with the broad theme of the conference, he emphasised that one of the most important tasks of central bank experts today is to recognise the constraints of their knowledge and to learn, in order to be able to perform their expanding responsibilities. Central banks deal with a much wider range of tasks than in the past, and thus their work has become better known for the public as well. In addition, a review of central bank operating models is taking place. Within that, the rethinking of expectations is continuous; cooperation with the private sector is also needed, along with learning from the mistakes of the past and recognising new avenues leading to the future. The Chairman of OMFIF closed his remarks by saying that the conference allows us to start the work to manage the above risks and learn from one another.

In his keynote speech, *Tobias Adrian* (IMF) presented an approach to the calibration of the countercyclical capital buffer (CCyB) in a stress testing framework, which – using up-to-date and parsimonious methods – would take into account the consequential effects of the losses of the banking sector on the real economy and further second-round interactions as well. Recognising the close correlation between real economy performance on the one hand and financial conditions and stress on the other, the speaker outlined a novel approach to financial cycles, which allows regulatory authorities to respond faster to financial turbulences and gain a better picture of the sometimes rapidly mounting risks to the financial system. The proposed method would allow the separation of potential bank losses caused by the direct real economic and financial stress from the losses caused by second-round interactions. Moreover, using such approach the regulator could make a choice according to its risk aversion preferences about the level of systemic crisis probability the calibration of the countercyclical capital buffer is based on.

The Russia–Ukraine war and elevated geopolitical risks

In the first panel discussion of the conference, participants discussed the potential effects of the Russia–Ukraine war, focusing on the Central and Eastern European region. It was drawn as a conclusion that although financial stability is not currently in immediate jeopardy, geopolitical risks need to be paid attention to and be given greater importance in the long run in the midst of extraordinary crisis events, and financial stability tasks should also not lose their priority in the face of increasingly pressing economic policy problems.

The keynote speech on the topic was held by *Jon Danielsson* (London School of Economics, Systemic Risk Centre), who called attention to the fact that according to financial market indicators investors are not as pessimistic in the short run as they were at the beginning of the Covid-19 pandemic, although over the longer term of 10 years they already expect a major downturn in the market. In his opinion, in a narrow sense the war will not result in financial stability problems, because the financial system is resilient and stable, and it is not the war itself that represents a significant risk for the financial system, but the state in which it found the economy. According to his assessment, the recession caused by the coronavirus was in fact a V-shaped one, followed by a quick rebound, and thus the liquidity-expanding measures already had a procyclical effect in the ascending phase of the V-shape, resulting in an inflationary spiral. He emphasised as a longer-term effect that we may return to a period when real economy areas are preferred to financial stability, and highlighted that the political dimensions of crises also need to be considered when making financial stability decisions.

The panel discussion that followed the keynote speech was moderated by *Barnabás Virág* (MNB), with *Ajay Rawal* (Ernst & Young) and *Paweł Szałamacha* (Narodowy Bank Polski) joining Danielsson in the panel. According to the participants, regarding the macroeconomic effects of the war, the golden era of economic stability preceding the coronavirus is expected to end, although the direct impacts of the war seem to be limited for the time being. The main problem may be high inflation, which is difficult to manage in view of the already exhausted fiscal and monetary toolkit. In relation to the efficiency of monetary transmission in Poland, it is seen that the transmission of interest rate hikes worked well in the mortgage loan market, but on the deposit side the prime minister's verbal intervention was necessary to make banks slowly increase the rates. Although the Polish government adopted various measures that protect debtors from the rise in interest rates, according to the assessment of the Polish central bank they are not needed for the time being; mortgage loans perform well due to the strong labour market and growing wages.

Although bank share prices declined considerably in the past period, the participants believe that this does not reflect any loss of confidence in banks. Banks continue to have an overly high amount of deposits, and it is a problem for them to place the excess liquidity. Therefore, they increasingly attempt to direct customers' money into asset management products. The participants in the panel proved to be rather pessimistic regarding the further spread of crypto-assets and central bank digital currency. In their opinion, accelerated by the war as well and in view of the increasingly strict regulation (e.g. regulations against money laundering), crypto exchanges are losing their main attraction, i.e. functioning without central control, relying only on technology. In their opinion, the main argument for the introduction of central bank digital currency is to allow the central bank to control payment

systems, but the already well-functioning payment systems and data protection concerns make its use questionable. In connection with the war, the participants in the panel do not expect any major impact concerning the green transition.

Experiences from the coronavirus pandemic in relation to financial stability and macroprudential policy

In the next section of the conference, the experts analysed the effect of the coronavirus on financial stability. In his keynote speech, *Javier Suarez* (CEMFI, ESRB ASC) emphasised that the crisis caused by the coronavirus provided the first opportunity to test the micro- and macroprudential framework set up after the 2008 crisis, and, on the whole, it passed the exam with a good result. The reaction of regulators and other decision-makers was quick and determined, and, overall, the measures can be considered successful, as order in the market was restored, the number of corporate bankruptcies was extremely low, and banks also remained stable. Nevertheless, these measures may have contributed to inflationary tensions, the increase in government debt and to the overvaluation of real estate markets as well, which may pose risks in the future. One of the points to be corrected in the prudential framework may be the regulation concerning non-bank institutions, and money market funds within that, as in this segment significant vulnerability and quick, negative market reaction was observed, which spread over to several markets. Consequently, this vulnerability needs to be treated at the level of the system in the future. Another area to be corrected is that of regulatory capital buffers, which were not high and releasable or usable to the extent hoped by experts. Accordingly, countercyclical macroprudential measures were substituted by supervisory, microprudential interventions, but in order to manage future crises it may be worth reconsidering the framework of capital buffers.

The speech was followed by a panel discussion moderated by Suarez, with *Elena Carletti* (Bocconi University, ESRB ASC), *Stijn Claessens* (BIS) and *Jan Frait* (Česká národní banka) as panellists. Carletti highlighted the positive effects of the state credit guarantees introduced during the coronavirus pandemic. The guarantees introduced were widely used, and played a major role in supporting the real economy, and indirectly the financial system as well, even if they were partly used for the refinancing of previous loans. Nevertheless, they may have also had a negative impact on banks' incentives; due to the guarantees, the financing of non-viable, zombie companies may have continued for longer than necessary. She emphasised that government debt increased during the crisis, and banks' government securities exposure was also up, and thus the nexus between states, banks and companies may pose a risk in the future. According to Claessens' assessment, in connection with the capital buffers, the system-wide limitations on dividend payment proved to be useful, and according to the expectations banks

with smaller management buffers were lending less. In his opinion, cyclicality is an inevitable feature of the system, but it is important that the regulation should be formulated in a way to reduce procyclicality as much as possible. Frait presented the Czech macroprudential measures taken during the coronavirus pandemic. The Czech central bank behaved in a countercyclical manner: it reduced both the base rate and the countercyclical capital buffer (CCyB) rate, which have been raised since then. In 2020, the release of the CCyB was justified by high market pressure. Next time, however, they would prefer to wait for the losses to be realised before the release. They also eased the borrower-based measures, before restoring their pre-crisis state not long ago. In addition, he also emphasised that it is important to take account of fiscal policy as well: sovereign risks may increase, and for the management of sovereign risk the Czech central bank carries out public finance stress tests.

Introduction of central bank digital currencies and its impact on financial intermediation, financial stability and the macroeconomy

The panel section discussing the central bank digital currency (CBDC) highlighted the worldwide interest in the new type of digital currency on the part of central banks, which face new consumer demands and the challenge posed by crypto- and digital currencies.

In the keynote speech, *Kimmo Soramäki* (FNA) first spoke about the main issues concerning central bank digital currency. Experiments with the introduction of CBDC are already underway in a number of countries in the world. The various options of introduction intend to answer different problems: national CBDCs, inter alia, aim at reducing the user cost of money, increasing financial inclusion as well as strengthening financial sovereignty and security, while cross-border, 'wholesale' CBDCs intend to minimise the costs and difficulties of international transactions. According to the speaker, the introduction of domestic retail CBDC will be indispensable for central banks in the future, and the main issues will arise in terms of technology, design and applicability.

The panel discussion that followed the speech was moderated by *David Marsh* (OMFIF), joined by Soramäki as well as *Tanja Heßdröfer* (Giesecke+Devrient) and *Ruth Wandhöfer* (Payment System Regulator Panel). In the discussion, they mentioned that people would like the financial system to offer availability and resilience, and this is what the new financial system should achieve, including through the introduction of CBDC. They also compared the issues of security and the possibilities of fraud as well as crime prevention with respect to digital currencies and cash. Digital currencies carry various risks, the management of which is crucial for successful operation, although they offer a number of solutions to problems

related to cash. Anonymity and monitoring of transactions are easier to handle in the case of digital solutions. According to the uniform position of the participants in the panel discussion, central bank digital currency may primarily appear in a complementary role alongside cash.

System-wide stress tests and stress tests for non-banking sectors

The keynote speech of the stress test section was held by *Christoffer Kok* (ECB), who reviewed the latest developments and macroprudential uses of bank stress tests, emphasising the importance of their extension to actors outside the banking system. Macroprudential stress tests intend to assess risks and vulnerabilities in the financial system at the systemic level. Their results may be used for determining capital shortages in a stress situation as well as for the calibration of macroprudential instruments.

Market players' further endogenous reactions may also induce second-round effects, which may exacerbate the stress situation. Therefore, in stress scenarios it is difficult to draw the line between the triggering exogenous shocks and the endogenous reactions. Deleveraging, capital increase, reduction of credit supply and selling securities at discounted prices may be reactions like that. All of these reactions are affected by solvency and liquidity regulations. In addition to the presence of all of the above, potential direct or indirect contagion between institutions is an important channel to consider. Losses caused by fire sales of illiquid securities portfolios and endogenous price-reducing mechanisms arise in close relationship with these contagion channels, which is an area being actively researched. In addition to banks, the role of other financial sectors, such as investment funds, insurance companies and central clearing houses have also become very important in the financial system. The stress testing of these sectors is also developing; the subsequent speeches provided insight into such research projects.

Antoine Bouveret's (ESMA) presentation examined how money market funds can comply with regulatory criteria in stress situations. Money market funds are important backers of banks, and thus they are significant entities at the systemic level as well. In the event that these funds face high redemptions, they may sell liquid or less liquid assets, but in both cases they may breach regulatory requirements (net asset value and weekly liquid assets). The authors optimise this asset sales strategy and examine the effects of various regulatory reforms. *Matthias Sydow* (ECB) spoke about the development and principles of system-wide stress testing, and then went on to present the findings of a two-sector model (comprising banks and investment funds) using a Covid-19 stress scenario. The model contains most of the channels of contagion listed above. According to the findings, a major portion of the losses that are significant at the system level are caused by fire sales.

Within that, the sales of investment funds may increase banks' losses by as much as one percentage point as a percentage of their risk exposure amount.

Quantifying the effects of climate risks on financial institutions and possible regulatory responses

In the keynote speech of the section organised in the topic of stress tests specialising in the assessment of financial risks caused by climate change, *Irene Monasterolo* (EDHEC BS) concluded that, in spite of initial scepticism, the stress tests processing the risks of climate change have become popular among regulators, academics and market institutions as well, all over the world. One of the most important findings of Monasterolo and her fellow researchers is that well-planned, timely-implemented regulatory responses to the increasingly pressing problems of climate change can significantly reduce the potential losses of the EU's credit institution portfolios compared to late, shock-like climate policy and regulatory corrections. The speaker emphasised that climate change is a current problem; significant progress needs to be achieved in green technological transition in the next five years already, and thus the development of risk analysis methods is not only an issue for the distant future.

The possibilities and challenges of prudential regulatory responses to the financial risks of climate change were examined in a presentation by *Hugh Miller* (LSE), with a special focus on the identification of large exposures of financial institutions vis-à-vis vulnerable sectors, companies or financial assets. The presenter suggested that authorities should develop the reporting and disclosure obligations on the basis of 'soft' large exposure thresholds with a monitoring objective, expecting additional reporting from the credit institutions that finance exposures in the sectors and companies that are the most vulnerable due to green transition risks in a high concentration. *Remco van der Molen* (DNB) presented his and his colleagues latest findings exploring the risks of real estate exposures. According to their estimate, the value of some 40 per cent of the real estate exposures of Dutch financial institutions may be significantly affected by the impacts of climate change by 2030 already. About one half of Dutch households are unable to find the means to cover the renovation costs on their own in the case of unfavourable climate change scenarios, and many of them would be unable to have access to sufficient financing even through lending. At the same time, it is possible to significantly reduce the aforementioned risks by embarking on an organised, optimal green transition path in a timely manner.

Paul Hiebert (ECB), moderator of the roundtable discussion on the systemic risk and regulatory consequences of climate change, pointed out that without large-scale adaptation implemented in the short run it has to be accepted as a baseline scenario that the 1.5 degrees Celsius climate policy objectives set out in the Paris Agreement

will not be met, and that the global economy will face a combination of physical and transition risks. In his opening remarks, he outlined that the vulnerabilities caused by climate change, which is expected to become increasingly intensive, may amplify systemic financial risks and may thus pose serious tasks to macroprudential policy as well. *David Carlin* (UNEP FI) emphasised that the expansion of transparent and reliable information reaching market investors about the impact of the financed economic activities on the climate and about corporations' strategic and risk management attitude is crucial to enable market investors to make green, environmentally conscious decisions. In his contribution, he called attention to the present state in which even in the European Union too few entities are able to provide too little information to satisfy the needs of policy makers and investors seeking sustainable options. In his comments, *Gábor Gyura* (UNEP FI) noted that Hungarian banks are not yet adequately prepared for the assessment of these risks and that a substantial adjustment of their portfolios has not yet occurred. Moreover, lack of data is also a serious problem. Nevertheless, in order to launch and facilitate the green transition of credit institutions, the MNB has issued a recommendation in connection with the identification, measurement, management, control and public disclosure of environmental risks. In addition, it provides a housing, corporate and local government preferential capital requirement in proportion to the financing of sustainable, green loan purposes and economic activities. *Wang Xin* (PBoC) explained that, in the process of rapid industrialisation and urbanisation, China already counts for around one third of the global GHG emissions and thus the Chinese central bank also handles the potential consequences of climate change as important risks. Accordingly, various programmes aim at reducing these risks; the environmental sustainability of loans, bonds and other relevant exposures of banks has been assessed every quarter for years. The PBoC also started the climate stress testing of larger banks and is continuously developing its stress analysis methods and tools. The supervisory work is complemented by the planned development of banks' green disclosure requirements and monetary policy instruments that support the green transition.

Overly complex financial regulation and advanced data analysis methods

In his keynote speech in the penultimate section of the conference, *David Aikman* (Qatar Centre for Global Banking and Finance) dealt with questions related to the increasing complexity of financial regulation, driven by two processes. Firstly, the idea that complex financial systems require complicated regulation and the fear that non-risk-based regulation may create bad incentives. Secondly, continuous adjustment of the framework in small steps as well as lobbying and the search for compromises may also have played a role in regulation becoming complicated. According to Aikman, this excessive complexity represents a clear problem, as

(1) it results in direct compliance costs on the side of market participants; (2) it hinders competition, because the understanding and application of the rules entail high fixed costs; (3) it is often less efficient; and (4) it makes the assessment of compliance difficult for the regulatory authorities.

Following the presentation, the topic was analysed by the other invited experts, *Andres Alonso* (Banco de España) and *Malcolm Kemp* (Nematrian), within the framework of a panel discussion moderated by Aikman. Alonso presented the risks that may be caused for regulatory and supervisory authorities by the fact that banks use increasingly advanced data analysis methods, such as artificial intelligence and machine learning, for credit risk analysis. These methods have numerous advantages for banks and are coupled with declining capital requirements as well as wider and deeper access to customers. At the same time, various risks arise, starting from the issue of data protection through the increase in model risks to the difficulty of interpreting the results. Kemp pointed out that the regulatory framework is complex indeed, but the financial system itself and the shocks to it are also very wide-ranging. In order to manage them, the *Advisory Scientific Committee* (ASC) has elaborated guiding principles to be followed. Macroprudential regulation is able to increase the security of the functioning of the financial system, inter alia, through the flexible use of capital buffers. In addition, activity-based rules may ease the complexity of regulation. He mentioned digitalisation as the latest challenge, as in addition to classical financial risks new ones originating from it also arise, including, for example, CBDC or BigTech companies, which – depending on the regulatory responses – may already pose a serious risk to institutions already in the market. Audience remarks included that the advanced data analysis methods may put supervisory authorities in a very difficult situation, as the increasingly complex models envisage lower and lower capital requirements, while it will be a challenge for the authorities to assess whether they really took the results closer to the actual capital requirement or simply those models are applied that are the most suitable for justifying the lowest capital requirement. Accordingly, authorities may set higher capital requirements as a precaution, but this may lead to counter-selective portfolio composition and higher pricing on the side of financial institutions as a second-round effect.

Bank business model transformation: non-bank, shadow bank competitors and the technological competition as well as its financing

In the last panel discussion of the conference, moderated by *Sopnendu Mohanty* (MAS), panellists *Leonardo Gambacorta* (BIS), *Jesper Berg* (Finanstilsynet) and *Gergely Gabler* (IBCE) pointed out that in the long run the new digital market players (FinTech and BigTech companies) may widen their market presence in close cooperation with 'traditional' financial institutions, although this may raise

questions in a number of areas, such as competition, credit risk management and data security. The experts agreed that data will play a prominent role in the financial system of the future, and both the financial institutions and the authorities must prepare for the related risks (including cyber risk, data quality and developed data analysis methods).

There was consensus in the discussion that without digitalisation neither the traditional nor the new market participants will survive – not even in the medium term. Among the financial stability aspects of the appearance of new technologies, it was mentioned as a significant risk that regulators are unable to react to a new technology as fast as it appears in the market. Neobanks and FinTechs quickly find the less regulated pathways, thus creating regulatory arbitrage. According to the participants, however, new entrants will sooner or later be subject to bank regulation in line with their respective activities.

One of the key areas of technological innovations is the provision of cloud services, which jeopardises financial stability directly and indirectly. Cyber risk, for the avoidance of which steps were already taken through the development of the national infrastructure, was identified as direct risk, whereas the concentration of services at BigTech companies was identified as an indirect risk. The experts considered the role of data in the financial system a key issue. Although the data-based provision of services by BigTech companies is not yet clear-cut, it can clearly be stated that they have the greatest knowledge and technological advantage, followed by FinTech firms, whereas banks' data processing technology may be considered obsolete. In the discussion, the experts touched upon the cooperation of banks and FinTech firms, highlighted BigTechs' practice aiming at the acquisition of small banks as a new business model, by way of which the new entrants may obtain bank licences. These developments may also result in the distortion of market competition, the evolution of monopolistic positions of new entrants, bringing a risk into the financial system. With regard to the next five years, they mentioned that the technological achievements of decentralised finances may appear in practice as well. An example for this could be the case of smart contracts, while they do not forecast any bright future for crypto-assets. In the case of digital currencies, they think the appearance of central bank digital currency is more conceivable in view of the trust in central banks. Moreover, they believe that it is possible to build a well-functioning, successful digital structure on central foundations as well.

Further information on the conference is available on the event website (https://www.mnb.hu/web/en/financial-stability/financial-stability-conference-2022); the presentations and panel discussions are available on the MNB's official YouTube channel (https://www.youtube.com/user/MagyarNemzetiBank).[1]

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[1] https://www.youtube.com/watch?v=vhYBWBLtpJs, https://www.youtube.com/watch?v=IQxLKoWPh8I

International Congress on Digital Transformation and Sustainability in Global Financial Economics*

Tim A. Herberger – Leon Birawsky

In the financial sector, digital transformation and sustainability must be viewed in an integrative manner. But how can this requirement be put into concrete terms and what key challenges will we face in the financially-oriented corporate world in the future as a result of the combination of digital transformation, sustainability and financial markets? The international congress "Digital Transformation and Sustainability in Global Financial Economics" held at Andrassy University Budapest (AUB) on 27 September 2021 addressed these challenges and provided interesting insights into current international research projects on the topics of digitalisation, digital transformation, sustainability, financial markets, blockchain, environment, social, governance (ESG) and green technologies.

1. Initial Situation

Are digital transformation and sustainability in global financial economics in lockstep? In a nutshell, the idea is to address the two issues and the related efforts by different stakeholders in the global international financial markets and to think together in finding solutions. However, the difficulty that arises at the very beginning of this "thinking together" is that there is usually a lack of universally used definitions.

Sustainability is always about values, organisations and institutions (*Dedeurwaerdere 2014: 1*), but it is also about awareness (*Hildebrandt 2020*). In the well-known "Three Bottom Line" framework, sustainability means a harmony of economic, environmental and social objectives and that harmony leads to a win-win-win development for companies (*Elkington 1994, 1998*). However, harmony between the three areas is a challenge in practical implementation, because it also involves harmonising the different motivations and interests of various stakeholder groups (see e.g. *Wissenschaftliche Dienste des Bundestages 2004*; *Herberger – Dötsch 2021*). Sustainable efforts mean to identify "*the needs of the present without*

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compromising the ability of future generations to meet their own needs".[1] However, for example, a high-tech start-up will not be able to include all future generations in its daily struggle for survival, and a conglomerate constituted as a publicly listed company will not always want to. The question arises: *Can digitalisation and digital transformation be helpful in a symbiosis to promote this harmony?*

If we want to find a meaningful approach, however, we first need to be clear about what digitalisation means (*Herberger – Dötsch 2021*). Even though the common use of "digitalisation" and "digital transformation" documents an awareness of the problem in the public, the terms remain vague and there is a lack of an appropriate definition that would enable understanding across disciplines. The relationships between the terms remain unclear. While digitalisation can be interpreted as the introduction of new solutions based on digital technologies, digital transformation addresses the implementation induced by digitalisation and the associated changes as well as risks resulting from digitalisation compared to the initial situation, which ultimately determines the consequences for all stakeholders, also reaching beyond the implementation issue (*Herberger – Dötsch, 2021*; *Herberger – Zoll 2020*; *Hess 2019*). Consequently, digitalisation and digital transformation as terms can be located in a sequence. Against the background of a (business) process, digitalisation can be interpreted as the first step of a change of a current state. Digitalisation is followed by the digital transformation in the form of a transformation process that ultimately leads to fundamental changes in a business model and in extreme cases can even lead to the obsolescence of the business model (e.g. *Helm et al. 2022*). This, of course, inevitably leads to spill-over effects on societal systems and corresponding stakeholders (*Herberger – Dötsch 2021*; *Herberger – Zoll 2020*).

The Corona pandemic, with a dual transformation booster of innovation and technology, shows us that sustainability and digitalisation are certainly not contradictory, but rather could support each other up to the point of merging. Finally, the AUB was very delighted to discuss those kinds of potential synergies at the finance-focused conference. A special euphoria was noticeable among all participants groups (AUB students, international researchers and the public interested in sustainability as well as digital transformation in the finance sector), because after more than a year it was possible to hold a larger, in-person conference at the university.

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[1] International Institute for Sustainable Development. https://www.iisd.org/about-iisd/sustainable-development. Downloaded: 7 March 2022.

The AUB opened its doors to the public on Tuesday, 23 September 2021 to discuss the newest developments in the digital and sustainable future in the business administration sector with a special focus on financial issues. *Tim Alexander Herberger*, host of conference and head of the Chair of Business Administration, specifically Entrepreneurship, Finance and Digitalisation, was highly enthusiastic about the opportunities provided by the face-to-face dialogue at an international level and the combination of experienced as well as young researchers as well as prospective researchers/students and the interested public. He also emphasised the important financial commitment of the Hans Seidel Foundation, without whose efforts such a large conference would not have been possible without charging conference fees. *Zoltán Tibor Pállinger*, the rector of AUB, underlined the importance of the event and gave the starting signal for an exciting combination of scientific presentations with discussions and keynotes by *Anikó Szombati*, Chief Digital Officer at the Central Bank of Hungary (Magyar Nemzeti Bank, MNB), and *Marcel Tyrell*, Chair of Banking and Finance at Witten/Herdecke University.

2. Summary of the Speakers' Research Findings

Jona Stinner and *Marcel Tyrell* from the University of Witten/Herdecke (Germany) presented their current research work focusing on empirical research in the context of an earlier "mining shock" in crypto currencies. This shock occurred when major mining farms in China were shut down for 6–7 weeks due to strict lockdown regulations to control the pandemic. This special event made it possible to examine the industrial-economic market structure and efficiency characteristics of the mining market as part of Bitcoin technology. It was clear that stability is linearly dependent on the transaction security of the system. The speakers emphasised the immense power of blockchain technology as a central response in the discussion of sustainability and future aspirations. Wherever we see complex supply chains, the use of blockchains combined with smart contracts offers great potential for increasing efficiency and reducing the number of intermediaries causing transaction costs. By reducing the number of intermediaries, the surplus rent can be passed on to both producers and consumers, maximising the overall welfare. Nevertheless, the high energy costs of the mining process will continue to be a challenge, according to the speakers.

While the opening section clearly presented the overwhelming possibilities of digital transformation, *Julia Brunhuber* and *Martina Sageder* from Salzburg University of Applied Sciences illustrated the apparently unchanged reality at German-speaking SMEs according to digital transformation. Based on their analysis, using content analyses of interviewed experts, they investigated how progress in the acceptance of digital financial services among small and mid-sized enterprises (SMEs) looks

like. They showed that for reasons of consumer confidence traditional house banks are still the first choice of contact, especially when dealing with financing issues. When analysing the digitalisation progress of German and Austrian companies, processes are often implemented digitally using "stand-alone solutions". The reason why companies decide against implementing entirely integrated systems is often not a question of budget; it is more about considering which specific parts of the system is needed to be implemented and whether there are sufficient HR-based resources to educate staff in using those new systems.

Michael Kuttner, professor at Salzburg University of Applied Sciences, continued with his presentation of a structured literature review-based paper. He discussed the research issues of which factors support or impede the circular economy of SMEs and how the "R's" (Reduce, Reuse and Recycle) of sustainability can be linked to the circular economy. In the discussion following the presentation, it was suggested that the R-factors be pulled to a holistic ESG level. In addition, some of the discussion contributions saw a particular challenge in a more efficient measurement or quantification of sustainability.

In the third part of the scientific sessions, the topic "Reporting of ESG efforts" was taken up. *Martina Sageder*, professor at Salzburg University of Applied Sciences, presented results from a research project where the sustainability reporting of manufacturers in the automotive sector was compared from an ecological point of view. The content-analytical comparison between different sustainability reports (2014 and 2018) clearly indicates that specific formulations, such as the definition of objectives, became significantly "flatter" during the last few years. Therefore, a green-washing learning effect can be deduced, whereby corporations assume that negative image effects will occur when formulated goals are not achieved. In this context, she communicated a strong connection in the recent "Diesel Scandal" by Volkswagen as a groundbreaking "shock moment" within the automotive sector.

Alain Fuchs and *Manuela Ender* from Salzburg University of Applied Sciences also took another media "shock event" as a starting point to analyse sustainability reports. After the "Ibiza Affair" in Austrian politics, the Corruption Perception Index (CPI) in Austria decreased significantly. An analysis of sustainability reports of companies listed on the prime market of the Vienna Stock exchange indicates that there is certainly potential for improvement in reporting corruption-related content. At the end of the scientific presentations, *Eduard Bossauer* from AUB presented his research project, which includes the implementation of a primary data collection for the European market, in order to determine capital costs and return expectations for several investor groups and types of use with a strong focus on private equity. He showed that private capital markets are still suffering a transparency deficit in terms of data collection that leads to problems in calculating the discount rates.

In a nutshell, the presented research underlines the need for standardised reporting and reliable data exchange in relation to ESG. The speakers noted considerable differences in quality, especially in sustainability reports. Since, according to EU regulations, stand-alone sustainability reports are to be integrated into company reports in the future, uniform standards and auditing obligations are needed. In this way, sustainability efforts could be quantified and made more comparable. From the perspective of the financial markets, stricter rules are to be welcomed due to the unchanged high interest in sustainable investments.

3. Summary of the Keynote Speakers' Statements

During the closing keynotes, *Anikó Szombati* took the audience through the digital strategy for Hungarian banks. Underlining the main fields of activities within the digital transformation strategy, Szombati emphasised the importance of "human beings" as a social factor within the ESG-driven digitalisation topic:

"Actually, we want to establish a digital culture".

Progress in digitalisation can only be achieved in cooperation with people, where people are an active part of digital transformation. According to Szombati, providing training for employees is one of the central tasks of the MNB.

Whereas the scientific lectures mainly discussed entrepreneurial action based on ESG principles, *Marcel Tyrell*, professor at Witten/Herdecke University, raised a controversial question to this topic. He questioned whether we might be in a green bubble in the financial market: Is it meaningful just to follow the trend of investing exclusively in green technology? He based his arguments on a counterfactual approach contained in the work of *Oehmke – Opp* (*2020*). He argued that it might be useful to invest in "brown" technologies, as some companies will then have a greater opportunity to pursue a greener strategy in the future. This approach was discussed critically in the auditorium. During discussion, there was wide consensus on Tyrell's demand that in the future a specific ESG factor is needed to quantify and value sustainable investments.

4. Concluding Remarks

In his closing statement, host *Tim Alexander Herberger* emphasised that digitalisation and sustainability can no longer be separated from each other. Both always have to be considered together, just like a DNA strand. Technological developments through blockchains and smart contracts can be a decisive factor in achieving the common global objective of climate neutrality.

Finally, the speakers as well as the audience revealed the great potential of using digitalisation to answer questions about how sustainability looks like in numbers. Therefore, finding suitable monitoring parameters and comparable standards is one of the most important challenges in the future. Moreover, it can be assumed that emerging "shocks" in the global economy and on the financial market will continue to cause dynamic changes in the future.[2]

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[2] Some research papers which were presented on the conference is published in an anthology about the conference and the corresponding topics in German: *Herberger, T. (ed.) (2022): Digitale Transformation und Nachhaltigkeit in der globalen Finanzwirtschaft (1st ed.).* Nomos Publishing. Furthermore, the AUB plans a further conference on sustainability and digital transformation topics in financial economics in the upcoming winter. For further information, please visit the AUB website (https://www.andrassyuni.eu/nachrichten/call-for-papers-zur-2-tagung-digitale-transformation-und-nachhaltigkeit-in-der-globalen-finanzwirtschaft.html).

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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.

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