2 FINANCIAL AND ECONOMIC REVIEW

June 2021
Vol. 20 Issue 2

Financial and Economic Review

Scientific journal of the Magyar Nemzeti Bank

Publisher: Magyar Nemzeti Bank
Publisher in Charge: ESZTER HERGÁR
H-1054 Budapest, Szabadság tér 9.
http://english.hitelintezetiszemle.hu/
ISSN 2415–9271 (Print)
ISSN 2415–928X (Online)

Cover design: MARIANNA IZSÓNÉ BIGAI

2 FINANCIAL AND ECONOMIC REVIEW

June 2021
Vol. 20 Issue 2

FINANCIAL AND ECONOMIC REVIEW

The address of the Editorial Office: H-1054 Budapest, Szabadság tér 9.

Phone: +36-1-428-2600

Fax: +36-1-429-8000

Homepage: https://en-hitelintezetiszemle.mnb.hu/

Editorial Staff:

Dániel Palotai Editor-in-Chief: szemle@hitelintezetiszemle.hu

Endre Morvay Editor-in-Charge: morvaye@mnb.hu

Published regularly every three months.
HU ISSN 2415–9271 (Print)
HU ISSN 2415–928X (Online)

Page setting and printing:
Prospektus Kft.
H-8200 Veszprém, Tartu u. 6.

Contents

Vol. 20 Issue 2, June 2021

STUDIES

ESSAY

BOOK REVIEWS

CONFERENCE REPORT

Expected Impact of the Introduction of the Leverage Ratio at the Hungarian and EU Level*

Beáta Kocsis – László Seregdi

From June 2021, a new set of mandatory requirements will enter into force in the European Union for all credit institutions registered in the EU, specifying in detail the method of calculating the leverage ratio and its minimum level. In this paper, we summarise the main criteria of leverage ratio regulation, the reasons for its introduction and the criticisms that have been expressed. We examine the likely impact of the new requirements as well as the types of credit institutions that may be most affected, and how the leverage ratio relates to different elements of the prudential regulations already in place. Through theoretical and practical examples, we seek to answer the question of when the leverage ratio can become an effective constraint on capital adequacy requirements and for which institutional characteristics it can function as their ideal complement. For this study, we have drawn on the international academic literature on the leverage ratio, analyses by the European Banking Authority and data available from supervisory reporting. We conclude that the leverage ratio in its current form does not have a significant impact on the majority of credit institutions in Hungary, and even at the international level it will primarily only represent an actual constraint for credit institutions which operate with a specific business model and low average risk weights.

Journal of Economic Literature (JEL) codes: E44, E58, G21

Keywords: leverage ratio, banking system, prudential regulation

1. Introduction

The idea of introducing a leverage ratio as a minimum requirement emerged after the 2008 global financial crisis. Although similar regulations existed in the past, for example, in Canada and in the USA in the 1990s (*Brei – Gambacorta 2014*), comprehensive, global standards have not yet been introduced. This is surprising because one of the main reasons for the stricter regulation of banks compared to normal businesses is that, relative to other types of businesses, banks operate with

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

Beáta Kocsis is a financial modeller at the Magyar Nemzeti Bank. Email: kocsisb@mnb.hu
László Seregdi is a supervisory adviser at the Magyar Nemzeti Bank. Email: seregdil@mnb.hu

The Hungarian manuscript was received on 16 March 2021.

DOI: http://doi.org/10.33893/FER.20.2.532

a significantly higher proportion of liabilities, mainly in the form of deposits, i.e. due to the nature of their activities, they operate with high leverage, which also entails higher risk. However, due to the applicable risk weights, so far restriction of the leverage degree has only been partially achieved via the minimum capital adequacy ratio requirements determined as a ratio of own funds to risk-weighted total assets.

Although the capital adequacy ratio regime uses increasingly sophisticated and risk-sensitive methods to measure whether banks have sufficient own funds to cover their risks, the experience of the global financial crisis demonstrated that some banks were able to build up high leverage even while complying with the capital adequacy ratio. While at the end of the 1990s the average leverage ratio of the 20 largest EU banks was around 6 per cent, by 2008 it had fallen to 3 per cent, i.e. dropped about by half, which in practice meant that the balance sheet total was 32 times the capital. During this period, however, the Tier 1 capital ratio of these same banks remained stable at around 8 per cent, meaning that they were able to achieve this increase in leverage without affecting their risk-weighted capital adequacy level (*ESRB 2014*). Such an increase in leverage was partly driven by the reduction in capital requirements achieved through the use of internal models, and partly by the issuance of lower quality, Additional Tier 1 instruments. However, during the global financial crisis, it was precisely such highly-leveraged banks that faced financial difficulties. Excessive leverage was also identified as a major factor in the crisis in the Basel Committee on Banking Supervision's report to the G20 (*BCBS 2010*), and in the De Larosière Report (*De Larosière 2009*), which specifically examines the need for changes to the EU regime. The latter particularly stressed that in the case of some institutions, leverage could have been up to 60 times, which made these institutions especially sensitive to changes in the value of assets. If two banks have the same amount of own funds, any change in the value of their assets (e.g. due to provisions or a decrease in the market value of securities) will have a stronger negative impact on the bank operating with higher leverage. Therefore, after lengthy preliminary consultations, in 2014, the Basel Committee proposed the introduction of a leverage ratio, in the calculation of which, risk weights could be applied to assets and off-balance sheet items only in very few cases. Thus, the leverage ratio is less risk-sensitive than the capital adequacy ratio, but when used as an additional, ultimate limit, it can prevent a bank from operating with excessively high leverage.

The Basel Committee's proposal was initially the object of considerable criticism, as – compared to the capital adequacy ratio – the leverage ratio regulation uses a much more primitive calculation methodology and ignores the risk management improvements that banks have achieved over past decades. According to the analogy used by *Jeremy Newell* (*2016*), General Counsel of The Clearing House

Association in the USA, it is like setting the same speed limit for every road in a country, whether it is a highway or a school zone.

Other critics argued that introduction of the leverage ratio will not result in an increase in banks' own funds; moreover, there is a risk that low-risk items (especially retail mortgages) will become much more expensive, or be financed from outside the banking system through securitisation or by other actors, and such a process will result in higher average risk level for exposures remaining with the banking system (*Marquardt – Blåvarg 2010*), which will weaken financial stability.

If the leverage ratio were used as a stand-alone instrument, these criticisms could be considered valid, but with the introduction of the leverage ratio regime, the Basel Committee does not intend to replace capital adequacy requirements, but rather to complement them (backstop measure). Analysing data from EU banks, ECB staff examined the extent to which criticisms of the leverage ratio are valid in practice, and concluded that introduction of the leverage ratio itself does indeed encourage banks to take higher risks, but the increased capital available from the introduction of the leverage ratio requirement adequately outweighs this negative effect (*Smith et al. 2017*).

As raising new capital involves costs for banks, it is a logical step for them to invest in higher-yielding but riskier assets. However, they cannot do so indefinitely, as risk-weighted capital adequacy requirements will, sooner or later, prevent further risk-taking. At the same time, banks that are already highly-leveraged will need to raise additional capital to meet the requirement. Overall, therefore, introduction of the leverage ratio promotes a safer banking system.

In another work, Smith also argues in favour of the introduction of the leverage ratio on the grounds, that risk-weighted capital adequacy requirements will always have the shortcoming of basing the degree of risk weights on past experience. These may be wrong for the future (*Smith 2020*). Risk weights calculated from the models, and even those used in the standardised method, may reveal that actual risks have been underestimated on the basis of past events; but these errors can be adequately offset by the leverage ratio. So far, the main instrument to offset these errors in risk weighting has been the supervisory capital add-on that can be imposed under Pillar 2, but the introduction of the output floor will also serve this purpose in the future (for details, see *Section 5.3.3.*).

The EU adopted the Basel recommendation on the leverage ratio with the amendment of CRR,[1] and accordingly, compliance with the minimum requirement will be mandatory in the EU from 28 June 2021. Thus, the minimum level of the leverage ratio is defined in the EU regulation directly applicable in the member states, i.e. the requirement itself is not specifically defined in the Hungarian legislation. However, since December 2020, the Credit Institutions Act (Hpt.)[2] has been complemented by a number of regimes related to the leverage ratio, particularly the rules for determining the supervisory capital add-on and the capital guidance that may be imposed because of the risk of excessive leverage, and the measures to be taken in the event of non-compliance with the leverage ratio buffer requirement.

2. Calculation of the leverage ratio and the related minimum requirement

As with the capital adequacy ratio, the method for calculating the leverage ratio is set out in the CRR. The two types of capital requirement standards are similar in many cases, using similar concepts and calculation procedures (e.g. the leverage ratio also uses the value of T1 capital that is applied to calculate the capital adequacy ratio). However, there are also many important differences between them (see *Table 1*).

[1] Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012
[2] Act on Credit Institutions and Financial Enterprises: https://net.jogtar.hu/jogszabaly?docid=a1300237.tv

Table 1
Differences between the capital adequacy ratio and the leverage ratio regimes

	Capital adequacy ratio	Leverage ratio
Capital category used	Three-level: Core Tier 1 capital, Tier 1 capital, total own funds	Sets minimum requirement for Tier 1 capital only
Exposure measurement	Detailed methodology for determining risk weights, with several methods for calculating risk weight (e.g. standardised method, internal models)	Few risk weights can be applied, uniform calculation methodology
Aggregate exposures	Total Risk Exposure Amount	Total Exposure Amount
Risks considered	Credit risk, market risk, operational risk, settlement risk, CVA	No specific risk categories are defined, the minimum requirement is relative to the amount and type of exposures
SREP capital requirement	Under Pillar 2, the micro-prudential supervisory authority may set an additional own funds requirement for any relevant risk	A capital add-on can only be imposed because of the risk of excessive leverage[3]
Capital buffers	Combined macroprudential buffer requirement (capital conservation, countercyclical, G-SII, O-SII, systemic risk)	For the time being, the minimum leverage ratio requirement will only increase for G-SIIs (but later this may also apply to O-SIIs)

Credit institutions are already required to report to the supervisory authority on a quarterly basis the current value of their leverage ratio, calculated in accordance with the current text of the CRR. The new rules on the leverage ratio in CRR2[4] will take effect from June 2021 and, in several respects, clarify the rules used so far to calculate total exposure. The changes typically clarify the range of exposures to be taken into account in the calculation, the way they are calculated and introduce new exemption rules. These changes, therefore, mostly only alleviate the requirements, as they allow for the reduction of the total exposure amount for more assets or off-balance sheet items. Most of the changes made in CRR2 are aimed at alignment with the Basel III recommendation.

Based on the nature of the changes, for Hungarian institutions it can be stated that the current leverage ratio values calculated and reported under the pre-CRR2 rules will not be materially affected by the new regulations.

The Basel guidelines and the CRR2 set the minimum leverage ratio at 3 per cent of the Tier 1 capital. In order to make the leverage ratio and the capital adequacy

[3] The risk of excessive leverage, as defined in Article 4(1)(94) of the CRR, means 'the risk resulting from an institution's vulnerability due to leverage or contingent leverage that may require unintended corrective measures to its business plan, including distressed selling of assets which might result in losses or in valuation adjustments to its remaining assets'.
[4] Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 amending Regulation (EU) No 575/2013

ratio comparable, this minimum level was defined in a similar way to the capital adequacy ratio, i.e. as the ratio between the Tier 1 capital and the total exposure amount. In practice, this can still lead to interpretation difficulties, as traditional approaches have generally interpreted the leverage ratio as the liabilities/capital ratio. In this approach, the higher the value, the higher the leverage, i.e. the riskier the operation of the institution. However, due to the peculiarities of the Basel and CRR calculation method, this is reversed; thus, similarly to the capital adequacy ratio, the higher the value of the leverage ratio, the more capitalised the institution, i.e. the lower the degree of leverage.

The total exposure amount determined as the denominator of the leverage ratio is significantly different from the total risk exposure amount used in the calculation of the capital adequacy ratio. In calculating the total exposure amount, all assets and off-balance sheet items are to be taken into account at 100 per cent value, except those included in *Table 2*.

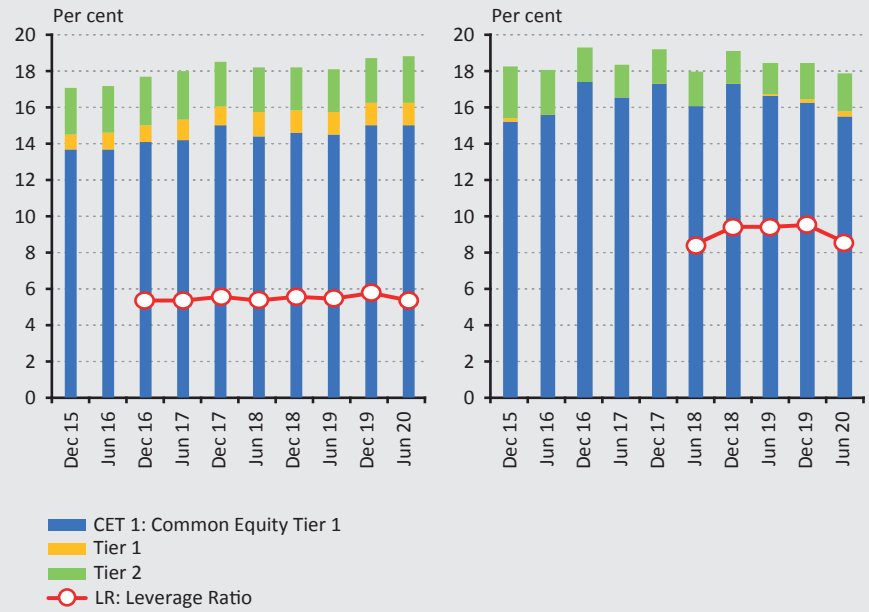
Table 2
What should and should not be taken into account in total exposure

Assets	
• Assets that have been deducted in the calculation of Tier 1 capital (e.g. intangible assets, investments) may be disregarded • Assets should be taken into account at their value less impairment and prudent valuation • Credit risk mitigation factors (collaterals, guarantees) should not be taken into account in determining the value of assets, except for certain pre-financing or bridging loans (e.g. loan secured by building-society savings) • Exposures to a parent company, a subsidiary, a sister company may be exempted upon the approval of the supervisory authority • Article 429a of the CRR2 also lists other exposures that may be exempted, e.g. guaranteed parts of export credits, the trade exposures of the institution to a qualifying central counterparty, fiduciary assets, certain exposures to central banks	
Off-balance sheet items	
Off-balance sheet items in Annex I to CRR	The exposure amount should be calculated according to Article 111(1) of the CRR, in a manner similar to the calculation of the capital adequacy ratio, except that a credit conversion factor of 10 per cent rather than zero should be applied to low-risk off-balance sheet items
Derivative transactions	For derivative transactions, the exposure amount under CRR2 should now be calculated with the newly introduced Standardised Approach for Counterparty Credit Risk
Securities financing transactions	In the case of securities financing transactions (repo, securities lending), the additional risk due to counterparty credit risk must be taken into account
Credit derivatives sold	For sold credit derivatives, in addition to the counterparty credit risk of the transaction, there is an additional credit risk due to a possible change in the credit quality of the underlying asset, and this risk must also be added to the total exposure amount

3. Leverage ratio data at EU and Hungarian level

In its annual Risk Assessment Report, the European Banking Authority (EBA) has also performed a detailed analysis of data from 162 banks covering 80 per cent of the EU banking system. Data on the capital adequacy ratios and leverage ratios of these banks and similar data for credit institutions operating in Hungary are presented in *Figure 1*.

Figure 1
Capital adequacy ratios and leverage ratios of EU credit institutions compared to those of domestic banks (31 December 2015–30 June 2020)

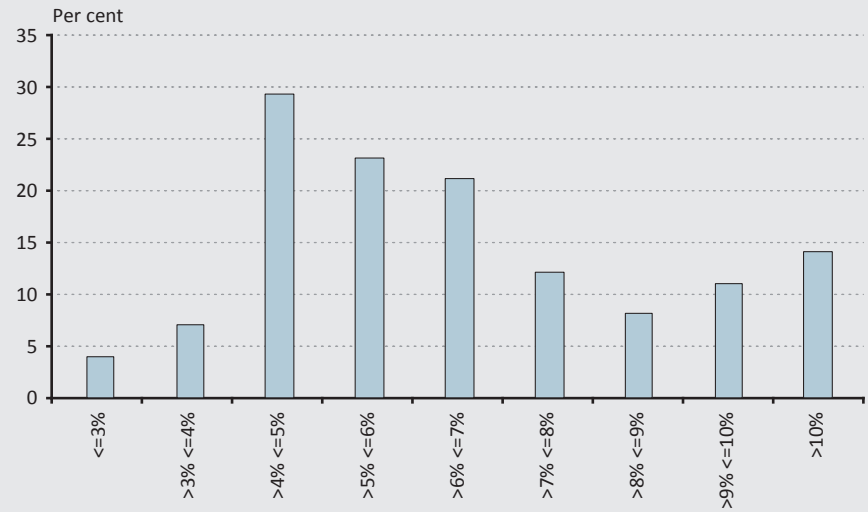


Source: EBA (2020a):57, MNB's credit institution data series

Figure 1 also shows that capital adequacy ratio and leverage ratio do not necessarily move together. While at the EU level, there is a clear increase in the total and Core Tier 1 capital ratios, the leverage ratio is essentially stagnating with small fluctuations. Compared to this, domestic data show a difference in that Hungary has a very low ratio of additional Tier 1 capital relative to the EU average, but some co-movement can already be observed in the capital adequacy ratio and leverage ratio.

A closer look at the EU banks' leverage ratio data also reveals that there is quite a wide variability in the leverage ratios of individual banks (*Figure 2*).

Figure 2
Leverage distribution of EU banks based on end-June 2020 data

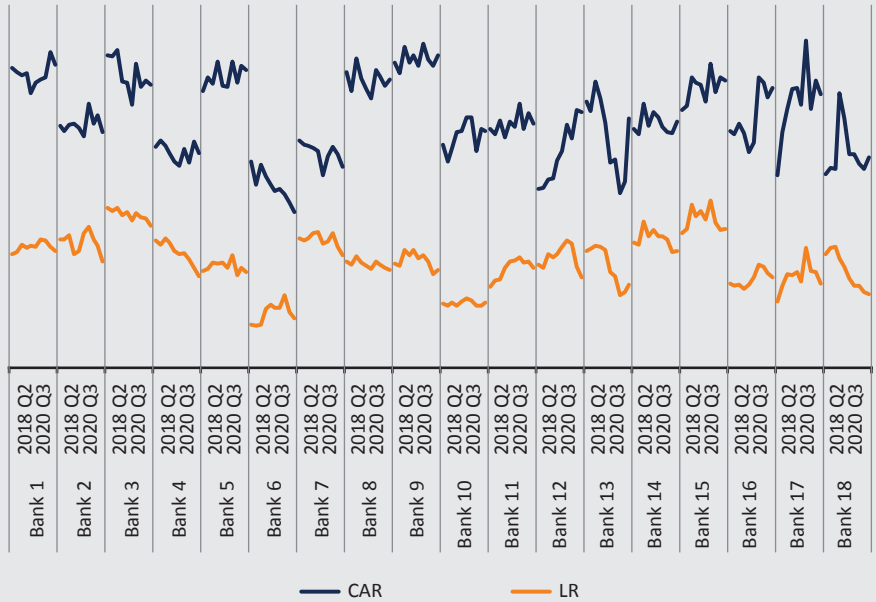


Source: EBA (2020a):58

Looking at the Hungarian data at the aggregate level, the values of the capital adequacy ratio and the leverage ratio are broadly in line, but there are a number of individual banking data where these values move in the opposite direction of each other. In addition to the increase and relative stagnation of the capital adequacy ratio, the leverage ratio is decreasing for banks 2, 4 and 18, while the opposite trend is observed for bank 6 (*Figure 3*).

There can be many reasons for inconsistent movements; without being exhaustive, let us take a few theoretical examples (*Figure 4*). If the institution invests its new funds (e.g. deposits) in low-risk assets (e.g. government securities), the capital adequacy ratio will show a minimal decrease or remain at the same level due to the low risk weight, while the leverage ratio will deteriorate significantly as it considers the total exposure amount. If the share of Tier 2 capital items within the own funds increases significantly at the expense of Tier 1 capital items, this will also cause a deterioration in the leverage ratio, with the capital adequacy ratio remaining unchanged as it takes into account the total capital.

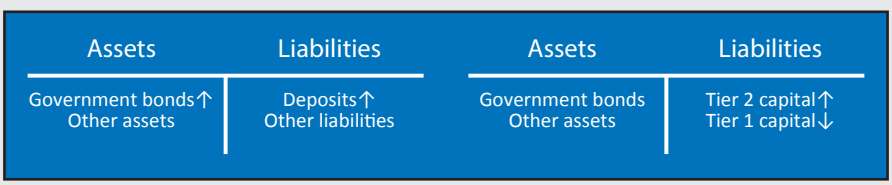
Figure 3
Evolution of capital adequacy and leverage ratios (2018 Q2–2020 Q3)



Note: To avoid identification, banks reporting outlier values are not shown in the figure. The exact values are not provided for data protection reasons, and the numbering of banks is different in the different figures.

Source: MNB, supervisory reporting

Figure 4
Examples of 'co-non-movements' of capital adequacy and leverage ratios



4. Leverage ratio as an effective constraint

Due to its simplified approach which ignores risk weights, the leverage ratio can be an ideal complement to the more complex, risk-sensitive framework of the capital adequacy ratio. Depending on the risk profile of the institutions, one of the two methodologies typically represents a stronger constraint, setting a higher minimum capital requirement. Regarding the capital required, the two sets of requirements are equal for a theoretical threshold, which can be called the critical average risk weight (*Kenaissi – Gimpelewicz 2017*).

The definition of the critical average risk weight can be derived through the example of a theoretical ABC bank. Let us assume that ABC bank has no Pillar 2 capital requirement and is not subject to any macroprudential capital buffer requirement other than the capital conservation buffer (CCB). Now, let us further assume that the exposure amount used to calculate the leverage ratio (LR) and the capital adequacy ratio (CAR) is the same, i.e. it has no exposures that would require or justify an additional requirement, a different valuation methodology or netting in the calculation of the leverage ratio compared to the capital adequacy ratio. In this simplified world, the minimum capital required under the leverage ratio methodology is 3 per cent of the total exposure, while for the capital adequacy, the minimum capital is determined by the total exposure amount multiplied by the average risk weight and by 8.5 per cent[5] (*Kenaissi – Gimpelewicz 2017*).

$$\textit{Leverage capital requirement} = 3\% \cdot \textit{Total exposure} \tag{1}$$

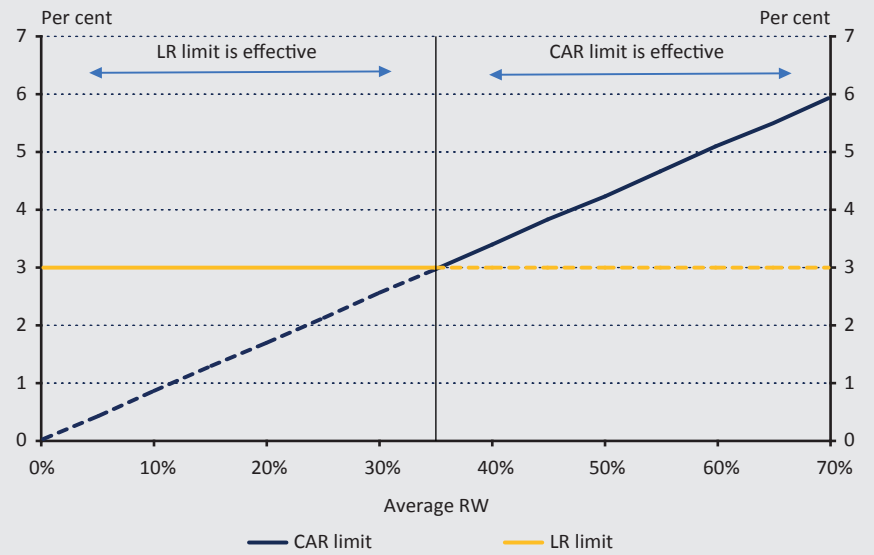
$$\textit{Capital adequacy capital requirement} = 8{,}5\% \cdot \textit{Total exposure} \cdot RW^* \tag{2}$$

$$\textit{Critical } RW^* = 3\%/8{,}5\% = 35{,}3\% \tag{3}$$

The critical average risk weight, which is the boundary between the two frameworks, will then be 35.3 per cent. If the institution's average risk weight remains above 35.3 per cent, the minimum capital required is determined by the fulfilment of capital adequacy requirements, upon fulfilment of which the 3 per cent minimum level of leverage ratio is automatically met. The leverage ratio becomes an effective constraint only below 35.3 per cent, at which point the higher capital requirement arises from meeting the 3 per cent limit (*Figure 5*).

[5] For the sake of comparability with the leverage ratio, only the capital adequacy for Tier 1 capital is considered. Under the CRR, the required minimum capital adequacy is 8 per cent; for T1 capital, 75 per cent of it, i.e. 6 per cent, plus a capital conservation buffer of 2.5 per cent.

Figure 5
Effective boundary of the leverage ratio



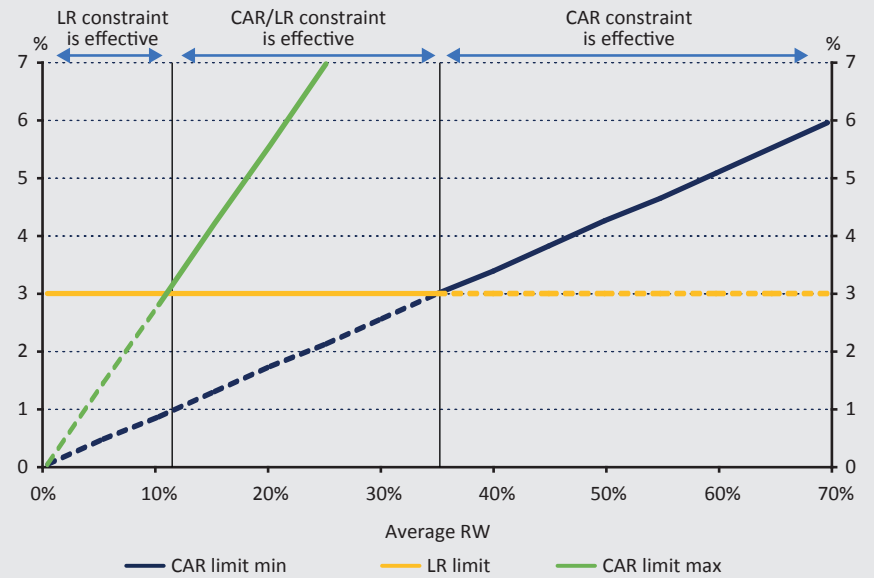
Note: In the figure, lending activity financed from sources other than Tier 1 capital, while maintaining an unchanged asset mix, represents a downward shift.

Source: Compiled on the basis of Kenaissi – Gimpelewicz (2017)

If we assume that the value of non-CCB buffers in the Hungarian banking sector ranges between 0 and 12 per cent,[6] of which O-SII is 0–2 per cent[7] and capital guidance (P2G) (in the absence of publicly available data, hypothetically) is 0–10 per cent, and if we also assume a value between 0 and 10 per cent for Pillar 2 capital requirements (public data are also not available here), then, based on the above, the critical average risk weight will be between 10.7 and 35.3 per cent (*Figure 6*).

[6] CCyB=0%, SyRB=0%
https://www.mnb.hu/en/financial-stability/macroprudential-policy/the-macroprudential-toolkit/instruments-to-contain-the-risks-of-excessive-credit-growth/countercyclical-capital-buffer
[7] https://www.esrb.europa.eu/pub/pdf/other/esrb.notification200827_osii_hu~617159d05f.en.pdf?62f74467cb59547c01409f286788b2aa

Figure 6
Effective boundary of the leverage ratio via a concrete example



Source: Compiled on the basis of Kenaissi – Gimpelewicz (2017)

The calculated average risk weight refers to the total risk-weighted exposure amount, but from this the credit risk weight can also be estimated. In the Hungarian banking sector, the credit risk ratio within the total capital requirement is 86 per cent,[8] and thus the leverage ratio can become effective below a level of approximately 30 per cent for the risk weight of an average credit risk,[9] subject to our assumption that the above exposure amounts are the same. In the Hungarian banking sector, the average credit risk weight calculated according to this method is currently higher than this; in the period 2018–2020, it was above 43 per cent in each quarter. Although there were several values of around 20–30 per cent in the period under review for the group-level banking data, an average credit risk weight representing a lower effective constraint usually applies in these cases, due to additional buffer requirements (P2G, P2R, O-SII) on Tier 1 capital, and thus the minimum required level of leverage ratio, with the capital adequacy ratio, represents a real constraint in few cases.

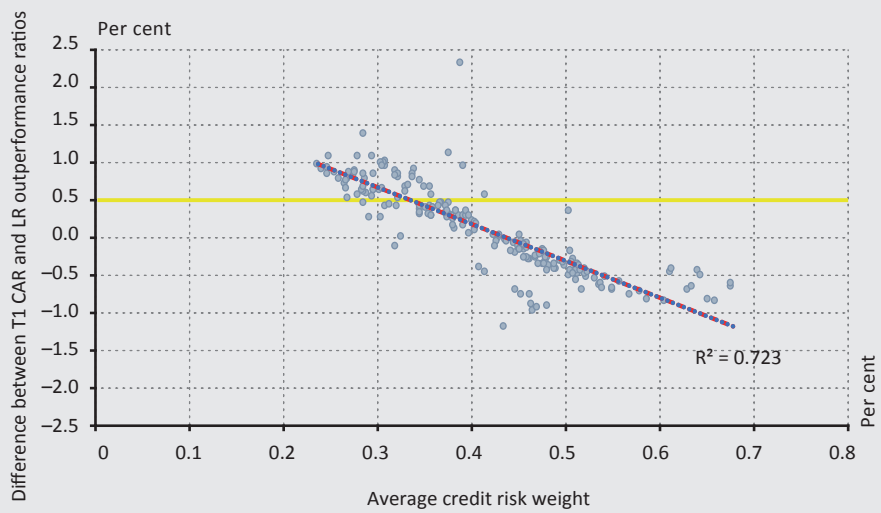
[8] By the end of 2019: https://www.mnb.hu/en/supervision/time-series/i-financial-institutions/credit-institutions

[9] In this case, the calculation of the average credit risk weight: (credit risk RWA)/(exposure amount used in the calculation of the leverage ratio). It should be noted that, due to the assumption of equal exposure amounts, in the denominator, the credit risk exposure in the general sense was not taken into account.

Looking for empirical evidence of the leverage ratio becoming effective, we examined the relationship between Tier 1 capital adequacy,[10] the leverage ratio and the average risk weight we defined, over the time series already used before (2018 Q2–2020 Q3). We calculated the degree to which individual institutions exceed the absolute minimum of the capital adequacy requirement for Tier 1 capital (6 per cent) and the leverage ratio requirement of 3 per cent, and then compared the difference between the two ratios with the average credit risk weight. If the outperformance ratio with regard to the capital adequacy ratio for a given institution is significantly higher than the excess ratio regarding the leverage ratio, then the leverage ratio is expected to be an effective constraint sooner, and the institution is in the positive quadrant of the vertical axis. Experience has shown that the lower the average credit risk weight of an institution, the more likely this is (*Figure 7)*.

To illustrate this using an example: if, with respect to Tier 1 capital, an institution has a capital adequacy ratio of 9 per cent and a leverage ratio of only 3 per cent, it is constrained by the leverage ratio requirement, and in *Figure 7*, it is on the line y = 0.5 (since 9/6 – 3/3 = 0.5). According to the observed data, the lower the average credit risk weight of an institution, the more likely this is.

Figure 7
Capital adequacy and leverage ratios for Tier 1 capital in relation to average credit risk weight in the Hungarian banking sector (2018 Q2–2020 Q3)



Note: The authors have taken care to preserve anonymity in the presentation. T1 CAR: capital adequacy for Tier 1 capital, calculation of y values (T1 CAR/6%) – (LR/3%)

Source: MNB, supervisory reporting, quarterly data for credit institutions registered in Hungary

[10] As before, the reason for choosing adequacy for Tier 1 capital is that only Tier 1 capital can be taken into account in the leverage ratio.

If the total capital adequacy ratio was used instead of the Tier 1 capital requirement, the correlation would be affected by the Tier 2 capital proportion, which can only be taken into account in the case of total capital adequacy. For banks with the same parameters (own funds, RWA, leverage ratio exposure, average credit risk weight), the higher the Tier 2 capital proportion within the own funds, the lower the leverage ratio will be, making it even more likely that the leverage ratio will be breached sooner relative to the capital adequacy ratio. However, *Figure 7* would be distorted by the heterogeneity of the Tier 2 capital ratio across banks and the different capital concept of leverage and total capital adequacy ratio, so the correlation would be less clear.

The leverage ratio can become an effective constraint primarily if the bank's internal model used in the calculation of Pillar 1 capital requirement assigns extremely low credit risk weights to exposures, and the bank has significant amounts of government securities or principally low-risk assets based on its business model. In many cases, mortgage banks, building societies and other individual institutions with a special business model fall far below the average credit risk weight of 30 per cent mentioned above, and thus in their case the leverage ratio is most likely to become effective. The role of the business model is discussed in detail in *Section 5.5*.

In light of the above, the minimum leverage ratio requirement is currently set at such a low level that it only creates an actual constraint in special cases for banks that are engaged in services considered low risk by the capital adequacy rules. During the EU Parliament's debate on CRR2, which introduced a minimum of 3 per cent, there were many proposals for amendments, which would have set the floor significantly higher (the highest proposal was for a 10 per cent minimum).

Although the Basel Committee voted in favour of the 3 per cent minimum in its proposal, and this has been adopted by the EU, there are quite different views on determining the optimal value for the minimum requirement. Studies on this issue take the view that an equilibrium value must be found, at which the benefits of a higher leverage ratio are equal to the resulting higher costs.

The benefits of a higher leverage ratio primarily include a reduction in the likelihood of a banking crisis, the quantification of which depends on factors such as the impact of the banking crisis on reducing a country's GDP or the persistence of the impact. As for the costs of a higher leverage ratio, the point here is that, as a result, banks have to have more capital, which makes their funding costs more expensive, and this is reflected in the pricing of the services they offer. Such studies determine the optimal leverage ratio at levels well above 3 per cent, falling in the range of 8–21 per cent, depending on the variables included in the calculations (*Barth – Miller 2018*).

In light of these studies, it may seem surprising to set the minimum requirement at 3 per cent, but the main reason for this is that the Basel Committee intends to use the leverage ratio only as an additional instrument for the capital adequacy ratio. If we look at the regulation of the capital adequacy ratio, it is clear that, since its introduction in 1988, the regulation has undergone a number of tightening measures, including, in particular, additions regarding market and operational risk, the Pillar 2 capital requirement, capital buffers, tightening of the conditions for instruments that can be taken into account in own funds or the increase in the share of CET1 capital within own funds. Therefore, over the longer term, it is quite possible that leverage rules will also be tightened if the leverage ratio is shown to be an effective instrument in preventing banking crises. How the higher leverage ratio requirement imposed by supervisory authorities due to the risk of excessive leverage will work and the extent to which it can be standardised will be crucial in this respect. The future evolution of the leverage ratio regulation may also be affected by how banks react when it becomes an effective constraint, because – from a financial stability point of view – it makes a difference whether banks reduce their risks on the assets side, e.g. by selling securities or loans (deleveraging), or raise new capital in order to achieve compliance.

5. Other important issues related to the leverage ratio

5.1. Basel III finalisation, introduction of the G-SII capital buffer, exposures to central banks

At the end of 2017, the Basel Committee amended the Basel III recommendation in relation to a number of points, including changes to the rules for calculating the leverage ratio (*BCBS 2017*). Most of the changes have no significant impact and are mainly of a technical nature, including the manner in which derivatives are included in the total exposure amount and alignment of the exposure amount calculation of off-balance sheet items with the risk weights used in the calculation of the capital adequacy ratio. However, there were also some changes with a more significant impact, in particular the imposition of the G-SII[11] leverage capital buffer and the possibility to exempt exposures to central banks.

The leverage ratio buffer requirement is half the size of the G-SII systemically important capital buffer. In practice, this means that if, for example, a G-SII has a G-SII capital buffer requirement of 1 per cent, the minimum leverage ratio will be 3.5 per cent instead of 3 per cent. In the event of non-compliance with the leverage ratio buffer, the G-SII shall restrict payments (dividends, variable remuneration) in the same way as in the case of non-compliance with the combined buffer requirement. The impact of the G-SII leverage ratio buffer requirement is illustrated

[11] G-SII: Global Systemically Important Institutions

in the figure below for a G-SII with a G-SII capital buffer requirement of 1 per cent. For such a bank, the minimum CET1 capital adequacy ratio requirement consists of the Pillar 1 minimum capital requirement (4.5 per cent), the capital conservation buffer requirement (2.5 per cent) and the G-SII capital buffer requirement (1 per cent), i.e. a total of 8 per cent. The minimum leverage ratio requirement will increase by half of the 1 per cent G-SII capital buffer requirement, so it will be [3+(1×50%) =] 3.5 per cent.

Table 3
Capital conservation ratios applicable in the event of non-compliance with CET1 capital adequacy ratio and leverage ratio

CET1 Capital adequacy ratio	Leverage ratio	Minimum capital conservation ratios (as a percentage of earnings)
4.5–5.375%	3–3.125%	100%
> 5.375–6.25%	> 3.125–3.25%	80%
> 6.25–7.125%	> 3.25–3.375%	60%
> 7.125–8%	> 3.375–3.50%	40%
> 8.0%	>3.50%	0%

Source: BCBS (2017)

Table 3 shows that if the bank in the example has a leverage ratio of 3.3 per cent, it shall restrict its dividend-like or variable-remuneration-like payments. The detailed rules on the restriction of payments are set out in the CRD[12] and, on the basis of this, in Section 96/A of the Hpt. In essence, the bank must retain 60 per cent of its year-end profits, and only 40 per cent of it can be used to pay dividends or variable remuneration. Payment restrictions should be maintained until the bank is able to meet these minimum requirements.

In line with the Basel recommendation, CRR2 also introduces the leverage ratio buffer requirement to be met by relevant G-SIIs from 1 January 2023 (CRR2 was originally to introduce this requirement from January 2022, but due to the coronavirus pandemic, both the Basel Committee and the EU extended the implementation deadline by one year). There are no G-SIIs in Hungary, but under the CRD, in the EU the Commission will have until June 2022 to examine whether the leverage ratio buffer requirement should be extended to O-SIIs (Other Systemically Important Institutions). If the Commission proposes an extension, the EU Parliament and the Council may decide that the leverage ratio buffer requirement must also be met by O-SIIs. This would currently mean a higher leverage ratio requirement for eight institutions in Hungary.

[12] Directive 2013/36/EU of the European Parliament and of the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms

Under the CRR2 leverage ratio regulation, national supervisory authorities may, in special circumstances, allow institutions not to include certain exposures to the central bank in the total exposure amount for a maximum period of one year. The consequence of this exemption, however, is that if a bank elects for the exemption for central bank exposures, the leverage ratio requirement will increase, i.e. the bank will have to meet a higher level than 3 per cent, and the degree of the higher requirement will depend on the amount of the exempted exposure.

The 2020 CRR 'quick fix' amendments to mitigate the economic impact of the coronavirus pandemic allowed national authorities to make use of this option even before the entry into force in June 2021. In fact, the ECB published its decision on this matter in September 2020.[13] Given that the minimum leverage ratio requirement is not yet in force until June 2021, this has mainly helped ECB-supervised institutions to disclose more favourable leverage ratio data.

5.2. Supervisory capital add-on requirement

From December 2020, a new supervisory instrument in the CRD V[14] (and in the Hpt. implementing it) is that the Magyar Nemzeti Bank (the Central Bank of Hungary, MNB) can formulate an additional own funds requirement and capital guidance for institutions in the event of excessive leverage risk. This capital requirement and capital guidance can be applied in addition to the capital requirement previously imposed under the SREP, and in practice means that the MNB sets a minimum for the institution, higher than the 3 per cent leverage ratio.

However, the capital add-on requirement imposed due to excessive leverage risk cannot be reflected in the supervisory capital add-on requirement on the 8 per cent risk-weighted asset value under the SREP, as due to the excessive leverage risk, only an imposition of an add-on on the leverage ratio can be formulated. Thus, in the case of the leverage ratio and the capital adequacy ratio, similar regulatory and supervisory instruments operate (Pillar 1 minimum requirement, capital buffer, supervisory capital add-on requirement, capital guidance), but these two sets of requirements operate in parallel, and there is no overlap between them. This new instrument may be particularly effective in countries with banks where the leverage ratio is an effective constraint.

5.3. Relationship with other prudential regulatory instruments

The current instruments for the prudential regulation of banks have evolved in a long process. Today, they can be said to form a coherent system that covers a wide range of banking activities and associated risks. At the same time, the business model, the market environment and the relevant risks associated with the activities

[13] https://www.bankingsupervision.europa.eu/press/pr/date/2020/html/ssm.pr200917~eaa01392ca.en.html
[14] Directive (EU) 2019/878 of the European Parliament and of the Council of 20 May 2019 amending Directive 2013/36/EU

will affect which regulatory instrument is a bottleneck for a given bank. Most recently, the Basel Committee used year-end 2017 data to examine which prudential regulatory instrument was the most difficult for the 128 banks in the sample to meet *(BCBS 2019)*. The survey found that the Tier 1 capital ratio was the strongest regulatory constraint for 35 per cent of banks, the NSFR (Net Stable Funding Ratio) for 15 per cent, the TLAC (Total Loss Absorbing Capacity, under the CRR: MREL[15]) for 12 per cent, the leverage ratio for 11 per cent and the LCR (Liquidity Coverage Ratio) for 6 per cent. As can be seen, while the leverage ratio is not the strongest regulatory instrument, it was still the strongest regulatory constraint for 11 per cent of banks. The leverage ratio regime is closely linked (in addition to capital adequacy) to other regulatory instruments, including, among others, the LCR rules, a possible future limitation of sovereign risks, the output floor and the MREL requirements, which also affect the effectiveness of the leverage ratio regime.

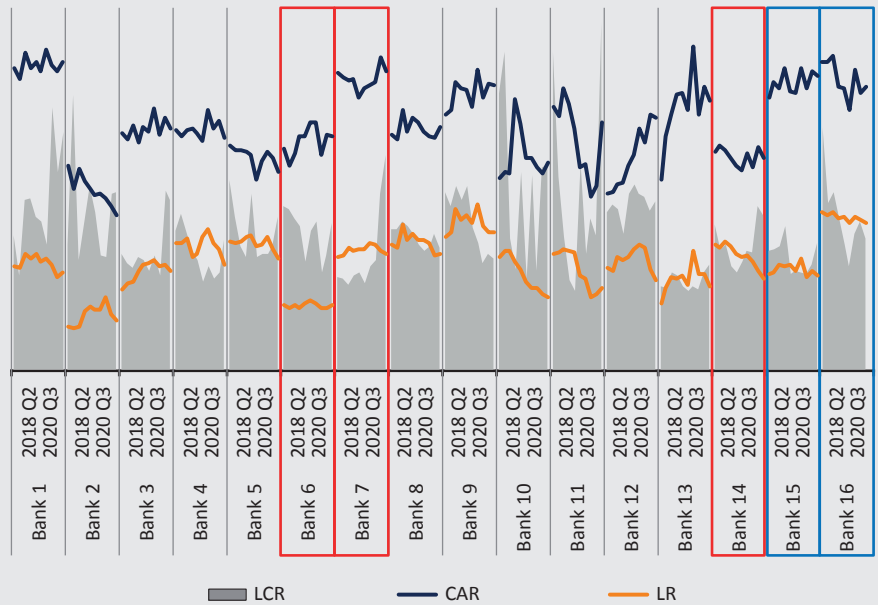
5.3.1. LCR

The Liquidity Coverage Ratio can be used to measure whether the bank holds a sufficient quantity and quality of liquid assets for the eventuality of a short-term (30-day) liquidity stress.[16] The denominator of the ratio is the weighted amount of expected outflows within 30 days in the event of stress, and its numerator is the weighted amount of available liquid assets.[17] Changes in the LCR may in some cases explain different movements in the capital adequacy ratio and the leverage ratio. If a bank invests its funds in government securities or other low-risk liquid assets to increase its liquidity, this may cause the LCR numerator to rise, while in capital adequacy, exposure with a 0 per cent or low risk weight causes no, or (in the case of a low positive weight) only a small, change. However, in the calculation of the leverage ratio, the same exposure is taken into account at full value, and it reduces its value. Of course, in this theoretical example, the movement of the LCR is considered in a very simplified way; only one component of it is considered. In addition to changes in liquid assets, the development of net outflows also plays a role in the evolution of the ratio, both via changes in the bank's liability structure (due to different outflow weights of liabilities) and via the development of inflows.

[15] MREL – Minimum Requirement for Own Funds and Eligible Liabilities
[16] https://www.mnb.hu/en/financial-stability/macroprudential-policy/the-macroprudential-toolkit/instruments-addressing-liquidity-and-financing-risks
[17] The weights used for the calculation of the LCR are set out in Commission Delegated Regulation (EU) 2015/61, a text with EEA relevance supplementing Regulation (EU) No 575/2013 of the European Parliament and the Council with regard to liquidity coverage requirement for credit institutions.

Movements in a direction similar to the above example (the LCR is rising, and the capital adequacy ratio and the leverage ratio are moving apart) are observed in the periods marked for banks 6, 7 and 14, while for banks 15 and 16, we can see that with the LCR decline, the capital adequacy ratio and the leverage ratio are moving closer together (Figure 8).

Figure 8
Evolution of LCR, capital adequacy and leverage ratios (2018 Q2–2020 Q3)



Note: To avoid identification, banks reporting outlier values are not shown in the figure. The exact values are not provided for data protection reasons, and the numbering of banks is different in the different figures.

Source: MNB, supervisory reporting

Although the primary purpose of introducing the leverage ratio is to ensure that banks have an adequate capital position, its impact on maintaining solvency cannot be entirely neglected either. As the leverage ratio requirement sets a threshold with regard to the Tier 1 capital minimum, it increases the proportion of funds that cannot be withdrawn in the event of a crisis and are available safely and permanently even in the case of a bank run.

5.3.2. Sovereign risks

As the global financial crisis highlighted the dangers of too close a relationship between commercial banks and states, regulatory authorities — in particular the Basel Committee — have already made several attempts to restrict banks' sovereign exposures, i.e. risk-takings, mainly in the form of government securities or other forms of financing, towards individual states. The Basel Committee also published a separate discussion paper on this subject *(BCBS 2018)*. In it, among other things, it suggested increasing the risk weight of sovereign exposures, imposing a capital add-on in the case of excessive concentration of sovereign risk exposures or possibly revising the exemption from large-exposure limit. In the end, however, no specific proposal was made for limiting sovereign risk exposures; nevertheless, it can be stated that the introduction of the leverage ratio is also partly suitable for limiting sovereign risk exposures. Namely, while these exposures are assigned a 0 or very low risk weight in the calculation of the capital adequacy ratio, in the leverage ratio, they have a 100 per cent weight in the calculation of the total exposure amount. Accordingly, a bank with a large proportion of government securities on its balance sheet is more likely to run into the 3 per cent leverage ratio limit than the minimum capital adequacy ratio requirement of 8 per cent.

5.3.3. Output floor

In December 2017, the Basel Committee further refined its recommendations on the prudential regime for banks, and in this context, it reintroduced a previously used instrument, the output floor. The output floor is designed to limit the capital requirement reduction — available through internal models — in the case of banks using internal models, in proportion to the capital requirement calculated under the standardised method.

In practice, this means that banks using internal models (basic or advanced internal rating-based approach) to calculate the credit risk capital requirement must also continue to calculate their capital requirement under the credit risk standardised method, and their final credit risk capital requirement should not be less than 72.5 per cent of the capital requirement calculated under the standardised method, even if internal model calculations resulted in a lower capital requirement. One of the main reasons for the introduction of the output floor was that the capital requirement calculations of banks using internal models showed significant differences in practice, and the capital requirement differences could not always be justified by empirical facts (e.g. portfolio PD differences, different business models).

Since the output floor limits the capital requirement reduction available to banks using internal models, and thus the average credit risk weight of the portfolio as a whole as well, it reduces the actual restrictive role of the leverage ratio. The leverage ratio is an actual constraint mainly for banks operating with low credit risk

weights, while the output floor limits the extent to which the average risk weight can be reduced for banks using internal models.

This link has been identified and confirmed by the EBA Basel III monitoring reports *(EBA 2020b)*. Analyses by the EBA showed that, without the application of the output floor, the capital adequacy requirements calculated by risk weights were the more stringent constraint for 71.7 per cent of the banks surveyed, while the leverage ratio was the more stringent regulatory instrument for 28.3 per cent of the banks.[18] When the output floor is implemented, these ratios change as follows: the share of banks for which the capital adequacy ratio is the more stringent constraint remains at 71.7 per cent, the share of banks for which the leverage ratio is the constraint decreases to 12.3 per cent, and the share of banks for which the output floor will be the more stringent constraint is 16 per cent. The gradual introduction of the output floor from 2023 will therefore reduce the proportion of banks for which the leverage ratio is the actual constraint.

5.3.4. MREL requirement standard

The close relationship between the leverage ratio and the MREL is illustrated by the fact that the CRR set the minimum requirements for own funds and eligible liabilities for global systemically important institutions at 18 per cent of the risk-based calculated total risk exposure amount used to calculate the capital adequacy ratio, on the one hand, but at 6.75 per cent of the non-risk-based calculated total exposure amount used in the calculation of the leverage ratio on the other hand. As a consequence of this dual set of requirements, there may be banks for which the actual MREL requirement will not be the total risk exposure amount, but rather the value calculated on the basis of the non-risk-based total exposure amount. The level of the MREL requirement is thus also affected by the amount of leverage a bank is operating with.

Although there are no global systemically important institutions in Hungary, and the minimum MREL level for credit institutions is set by the resolution authority, the total exposure amount also has an impact on MREL compliance for these credit institutions. This is because, pursuant to the Resolution Directive[19] and the Resolution Act[20] implementing it in Hungary, the resolution authority sets the minimum requirement for own funds and eligible liabilities not only in proportion to the total risk exposure but also to the total exposure. Consequently, an increase in the total exposure amount may result in an increase in the minimum MREL level.

[18] The EBA's analysis also notes that the role of leverage ratio in this example is overestimated, as only the Pillar 1 requirements have been taken into account for capital adequacy requirements, which, in practice, are complemented by the Pillar 2 capital requirement and the capital buffer requirements.
[19] Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014 establishing a framework for the recovery and resolution of credit institutions and investment firms
[20] Act XXXVII of 2014 on the Development of the Institutional Framework Intended to Enhance the Security of Members of the Financial Intermediary System

5.4. Further decline in the role of Tier 2 capital

Following the global financial crisis, there has been a clear regulatory trend towards reducing the role of Tier 2 capital that banks can take into account in own funds. One important lesson of the global financial crisis was that in the settlement of losses, Tier 2 capital items have only a limited capacity to absorb losses. This is partly because Tier 2 capital, unlike other own funds, may have maturity, and partly because it can actually be used to settle losses only in the event of liquidation of the bank.

Instruments that can be considered Tier 2 capital are usually subordinated loans with an original maturity of more than five years, where the lender agrees to be ranked last in the order of priority, senior to shareholders, in the event of liquidation of the bank. Although this provision poses a significant risk for the lender, as its claim is subordinated to that of other creditors, it also means that the bank can only use such an instrument in a liquidation procedure to settle losses.

This set of requirements was developed back at a time when banking crisis management procedures were quite underdeveloped and the main purpose of the regulation was to repay depositors their money even in the event of liquidation of the bank. However, the current banking regulation has recognised that winding up a bank is a long, costly process, which usually causes more losses than rescuing the bank as part of a comprehensive resolution process.

Regulatory changes over the past decade have therefore been geared towards improving the resolvability of banks (resolution authority and fund, setting minimum requirement for MREL liabilities). In such an approach, it is evident that the role of Tier 2 capital items in regulation should decline and that of higher-quality capital items should increase. This transformation is reflected in several regulatory items: its clearest item is the setting of minimum requirements for Core Tier 1 capital (4.5 per cent) and Tier 1 capital (6 per cent) within the capital adequacy ratio, as a result of which only one quarter of the total minimum requirement of 8 per cent can be covered with Tier 2 capital.

This decline in the role of Tier 2 capital is also reflected in the fact that the minimum leverage ratio requirement of 3 per cent — similarly to the basis of the large-exposure limit — has been set in proportion to the Tier 1 capital. The new prudential requirements for leverage ratio and large exposures to be met from June 2021 will therefore further reduce the role of Tier 2 capital, thereby encouraging banks to seek to include in their operation new capital instruments that can also be used to write off losses on a going concern basis.

5.5. The role of the business model

Prior to the EU implementation of the Basel leverage ratio in the CRR, the EBA assessed the expected impact of its introduction and published a detailed report on the subject *(EBA 2016)*. In that report, the EBA also discussed the business models for which it may be worth considering setting specific rules for banks in respect of calculating the leverage ratio. One such special business model is that of mortgage banks, which operate with a much lower average risk weight than commercial banks, as the loans they provide are mortgage-backed and thus have a low risk weight. Of the 12 mortgage banks in the sample at the time, in 2016, five still had leverage ratios below 3 per cent and another five had leverage ratios below 5 per cent.

As preliminary impact assessments showed that introducing the leverage ratio could be the most restrictive for the activities of mortgage banks, it was also suggested that a leverage ratio requirement of less than 3 per cent be set for mortgage banks, but this proposal was ultimately rejected.

The same EBA report also revealed that there is another business model that is more burdened than average by the leverage ratio requirement. Public development banks also operate with a low average risk weight, partly due to their client base and partly because of the public guarantee schemes related to their activities. Under the CRR2, such institutions are also not exempted from the leverage ratio regulation and not subject to a lower minimum requirement, but are nevertheless granted a significant relief: in calculating the total exposure amount, a public development credit institution[21] does not need to take into account its claims on central governments, regional governments, local authorities or public sector entities in relation to public sector investments and promotional loans. Thus, regulating the leverage ratio cannot be a barrier to public sector development.

The 2016 EBA report on the leverage ratio contained a proposal for exempting central counterparties and central securities depositories operating as credit institutions from the leverage ratio regulation, but in the end the CRR only included the special feature that the initial margin on centrally-cleared derivative transactions received by institutions from their clients which they pass on to central counterparties should be excluded from the total exposure amount.

[21] This type of institution is defined in detail in Article 429a(2) of the CRR.

5.6. Disclosure

Ever since the Basel II recommendation introduced disclosure requirements as the third pillar of the regulation in 2004, it has become common for the introduction of a new prudential rule to be accompanied by an extension of disclosure rules. Under the CRR, banks were already required to disclose data on the leverage ratio prior to the introduction of the 3 per cent minimum. Under the CRR2, credit institutions are required to disclose their leverage ratio and the total exposure amount on a semi-annual basis, and large institutions are also required to disclose the details of the calculation of the ratio.

5.7. The leverage ratio as an alternative regulatory approach

While the leverage ratio is a backstop-type instrument under the Basel Committee guidelines and the EU regulation, in the USA, the leverage ratio is also used as an alternative regulatory instrument. Since 1 January 2020, community banks supervised by the Office of the Comptroller of the Currency, the Federal Reserve, and the Federal Deposit Insurance Corporation have been allowed by law to comply only with the leverage ratio requirement, instead of the complex capital adequacy requirements calculated on the basis of risk weights. This option is available to banks where:

- the consolidated balance sheet total is below USD 10 billion;
- the ratio of off-balance sheet items to total assets is below 25 per cent; and
- the leverage ratio is above 9 per cent (temporarily reduced to 8 per cent due to the pandemic, with a minimum requirement of 9 per cent only from 2022).

This procedure is beneficial for banks because it makes it much cheaper for these institutions to comply with the legislation; they do not have to calculate their capital adequacy ratio using detailed rules and report it to the supervisory authority. In the event that a bank's leverage ratio falls below 9 per cent, the bank will be subject to a two-quarter transition period until it either brings its leverage ratio back to the required level or returns to the regulatory framework for the capital adequacy ratio.

This US measure is not contrary to the recommendations of the Basel Committee, as it only applies to large, internationally significant banks anyway. This option is available to a very high number of banks; based on the 2019 Q2 data, 4,581, i.e. 85 per cent of the 5,382 banks operating in the USA may have been able to meet the set of simplified compliance requirements (*Loudis et al. 2020*). Moreover, the financial developments in recent years have resulted in a trend of steady increase in the leverage ratio of US banks and overall, for 97 per cent of the banks eligible

to join, the higher leverage ratio requirement of 9 per cent has resulted in a higher capital requirement than the capital adequacy requirements calculated on the basis of risk weights, so the transition also does not lead to a weakening of financial stability.

While this new system seems to be favourable for US banks, according to the data from September 2020, only less than a third of banks eligible to join had so far made use of the simplified compliance option. The main reason for this was that they found the resulting cost savings insufficient and the large inflow of deposits had reduced their leverage ratio and made their ability to meet the minimum requirement on a sustained basis uncertain (*Duren – Clark 2020*).

By using the new direction and its experience, in the longer term, even EU policy-makers may consider the possibility of moving to a simplified capital requirement regulation, as in the EU there are also a great many small institutions for which a simpler calculation method could lead to cost savings. For example, only six[22] of the banking groups operating in Hungary have a balance sheet total of more than HUF 3,000 billion (USD 10 billion), i.e. such a measure could mean simpler requirements for many banks in Hungary as well; furthermore, in a number of other EU countries (especially in those with smaller cooperative banks), this may mean an even higher ratio to the number of banks.

6. Summary

The introduction of the leverage ratio is one of the several regulatory responses to the global financial crisis. From June 2021, the set of EU requirements based on the recommendations of the Basel Committee will be a mandatory minimum requirement in Hungary as well, under the directly applicable EU regulation. The leverage ratio requirement in its current form only complements the capital adequacy requirements calculated on the basis of risk weights, but it seems to be an effective instrument to prevent banks from becoming overleveraged, thereby improving the resilience of the banking system and strengthening financial stability. The leverage ratio is also closely linked to other instruments of prudential regulation, in particular liquidity requirements, MREL requirements and the output floor, and can effectively contribute to appropriately correcting for possible underestimation of risks in the calculation of the capital adequacy ratio. However, regulators should also bear in mind that while an excessively high leverage ratio requirement may be effective in raising the level of own funds in the banking system, it may contribute to financial services becoming more expensive or to their moving outside the banking

[22] Based on the data from 31 December 2020

system, and thus the minimum level of leverage ratio should only be changed on the basis of thorough impact studies.

The business model of banks has a significant impact on how they are affected by the introduction of the new requirement. The leverage ratio is expected to be an actual constraint for banks operating with a low average risk weight and a significant proportion of Tier 2 capital. These banks can achieve compliance with the new requirement primarily by raising a new Tier 1 capital or by changing their business model. Other measures related to the leverage ratio, in particular the methods for supervisory imposition of capital add-on and capital guidance due to the risk of excessive leverage, are still under development; thus, the actual impact of the leverage ratio can be effectively estimated once these supervisory procedures are in place and integrated into the supervisory processes. It is quite possible that through the use of practical experience even the leverage ratio regime will change in the future so that this new requirement can act as an effective constraint for a wider range of banks to curb excessive risk-taking. The changes may not only concern the minimum level of leverage ratio, as – in their own right – the changes to certain detailed rules for the calculation method (e.g. exemptions from inclusion in total exposure amount) may also be such as to allow regulatory authorities to influence the way banks operate.

References

Barth, J.R. – Miller, S.M. (2018): *Benefits and costs of a higher bank "leverage ratio"*. Journal of Financial Stability, 38(October): 37–52. https://doi.org/10.1016/j.jfs.2018.07.001

BCBS (2010): *The Basel Committee's response to the financial crisis: report to the G20*. Basel Committee on Banking Supervision, October. https://www.bis.org/publ/bcbs179.pdf

BCBS (2017): *Basel III: High-level summary of Basel III reforms*. Basel Committee on Banking Supervision, December. https://www.bis.org/bcbs/publ/d424_hlsummary.pdf

BCBS (2018): *The regulatory treatment of sovereign exposures.* Discussion paper, Basel Committee on Banking Supervision, 9 March. https://www.bis.org/bcbs/publ/d425.pdf

BCBS (2019): *Survey on the interaction of regulatory instruments: results and analysis*, Working Paper 35, Basel Committee on Banking Supervision, March. https://www.bis.org/bcbs/publ/wp35.pdf

Brei, M. – Gambacorta, L. (2014): *The leverage ratio over the cycle*. BIS Working Papers No 471, Bank for International Settlements, November. https://www.bis.org/publ/work471.pdf

De Larosière, J. (2009): *The High-Level Group on Financial Supervision*. Report, The de Larosière Group, 25 February. https://ec.europa.eu/economy_finance/publications/pages/publication14527_en.pdf. Downloaded: 25 February 2021.

Duren, C. – Clark, R. (2020): *More than 2,700 community banks say 'no thanks' to reg relief*. S&P Global Market Intelligence, 10 September. https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/more-than-2-700-community-banks-say-no-thanks-to-reg-relief-60270427. Downloaded: 22 February 2021.

EBA (2016): *Report on the Leverage Ratio Requirements under article 511 of the CRR*. EBA-Op-2016-13, European Banking Authority, August. https://www.eba.europa.eu/sites/default/documents/files/documents/10180/1360107/3889de6a-42d8-4bea-8ccb-ca7750085fbb/EBA-Op-2016-13%20%28Leverage%20ratio%20report%29.pdf?retry=1

EBA (2020a): *Risk Assessment of the European Banking System*. European Banking Authority, December. https://www.eba.europa.eu/sites/default/documents/files/document_library/Risk%20Analysis%20and%20Data/Risk%20Assessment%20Reports/2020/December%202020/961060/Risk%20Assessment_Report_December_2020.pdf

EBA (2020b): *Basel III Monitoring Exercise – Results Based on Data as of 31 December 2019*. EBA/Rep/2020/33, European Banking Authority, December. https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Reports/2020/960797/Basel%20III%20monitoring%20report%20-%20Dec%202020.pdf

ESRB (2014): *Is Europe Overbanked?* Reports of the Advisory Scientific Committee, No. 4/June 2014, European Systemic Risk Board. https://www.esrb.europa.eu/pub/pdf/asc/Reports_ASC_4_1406.pdf

Kenaissi, M. – Gimpelewicz, M. (2017): *Taking a long hard look in the mirror: should the leverage ratio reflect Pillar 2?* BankUnderground, 27 April. https://bankunderground.co.uk/2017/04/27/taking-a-long-hard-look-in-the-mirror-should-the-leverage-ratio-reflect-pillar-2/. Downloaded: 18 February 2021.

Loudis, B. – Nguyen, D. – Wix, C. (2020): *Analyzing the Community Bank Leverage Ratio*. FEDS Notes, May 26. https://www.federalreserve.gov/econres/notes/feds-notes/analyzing-the-community-bank-leverage-ratio-20200526.htm

Marquardt, R. – Blåvarg, M. (2010): *The socio-economic consequences of introducing a leverage ratio for banks*, Handelsbanken's Series of Small Publications No. 28, April. https://www.handelsbanken.com.sg/shb/inet/icentsv.nsf/vlookuppics/investor_relations_en_socio-econ_conseq_of_lev_ratio_apr10_en/$file/socio-ecomomic_consequences_of_leverage_ratio_april_2010.pdf. Downloaded: 26 February 2021.

Newell, J. (2016): *Doing the Math on the Leverage Ratio*. Bank Policy Institute, 14 July. https://bpi.com/doing-the-math-on-the-leverage-ratio/. Downloaded: 23 February 2021.

Smith, J.A. – Grill, M. – Lang, J.H., (2017): *The leverage ratio, risk-taking and bank stability*, ECB Working Paper Series No 2079/, June 2017, European Central Bank. https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2079.en.pdf?97048db54786167f5a45a6426ffd80d7

Smith, J. (2020): *The leverage ratio: a balance between risk and safety*. BankUnderground, 6 October. https://bankunderground.co.uk/2020/10/06/the-leverage-ratio-a-balance-between-risk-and-safety/. Downloaded: 24 February 2021.

Analysis of Retailer and Corporate Payment Habits in Hungary*

Vivien Deák – László Kajdi – István Nemecskó

The study looks at the payment habits of retailers and companies in Hungary, especially the acceptance and share of electronic payments in 2019. In doing so, data from two questionnaire-based surveys and the online cash register database are analysed using statistical methods, decision trees and regressions. The results show that retailer payments are typically cash intensive, while credit transfer transactions dominate at companies. The factors with the largest impact on card acquiring and the share of cash at points of sale is sales revenue and the value of the purchase in the case of retailers, and the proportion of cash wage payments in the case of companies. Costs also play an important role in card acquiring, therefore instant payment, which provides cheaper electronic payment solutions, could be crucial when it comes to smaller retailers and companies offering electronic payments. Public policy measures could mainly target retailers and the micro and small enterprise segment.

Journal of Economic Literature (JEL) codes: G20, D12, R11

Keywords: payments, card acquiring, SME, retailers

1. Introduction

The Magyar Nemzeti Bank (MNB, the Central Bank of Hungary) continuously examines the payment habits of various economic actors, in particular monitoring the possibility and extent of electronic payments. This is important for broadening knowledge on payments in general, but also because, as *Bartha et al.* (*2017, p. 310*) showed by summarising different analyses and results, the widespread use of electronic payments has a positive impact on the economy, a more efficient payments system is beneficial for economic competitiveness and growth, and when payments are cheaper for society as a whole, that also boosts the economy by releasing resources, improving the efficiency of companies and reducing the shadow economy. The MNB regularly conducts surveys on payment habits in the

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

Vivien Deák is an Analyst at the Magyar Nemzeti Bank. Email: deakv@mnb.hu
László Kajdi is a Senior Economic Analyst at the Magyar Nemzeti Bank. Email: kajdil@mnb.hu
István Nemecskó is an Analyst at the Magyar Nemzeti Bank. Email: nemecskoi@mnb.hu

The Hungarian manuscript was received on 11 March 2021.

DOI: http://doi.org/10.33893/FER.20.2.3359

Hungarian household and corporate sectors. The advantage of these surveys is that while in many cases the comprehensive administrative and bank reporting allows major payment trends to be tracked with great accuracy, the information gained from more detailed databases (such as the online cash register database) and the surveys providing even more additional information enable the identification of underlying correlations. This is especially important from the perspective of the state and the central bank because it may strongly facilitate efficient public policy measures fostering the widespread use of electronic payments.

Recent public policy measures have also significantly influenced the Hungarian payment market, particularly the corporate and retailer segment. One only needs to think of the public POS terminal deployment programmes or the widespread introduction of online cash registers. Therefore, it was high time that the MNB undertook another survey about payment habits among Hungarian companies and retailers after similar surveys conducted earlier. In addition, there are issues, such as the factors influencing card acquiring, where the analyses of the detailed online cash register (OCR) database covering a broad range of the retail transactions[1] enable a more robust examination of the retail sector for factors that cannot be surveyed. The paper also utilises this database, thereby supplementing the surveys that contain partly differing information.

This study takes an in-depth look at the following main research questions, before drawing public policy conclusions of practical relevance: 1) What characterises the payment habits of Hungarian companies and retailers, and are there any differences between the two groups or between this and similar surveys conducted earlier? 2) What characterises the financial awareness and knowledge of the two target populations regarding instant payment, the (banking) costs of payments, and can subgroups be identified that can use electronic payment solutions at a much higher price? 3) What characterises the Hungarian card acquiring network, and which factors influence card acquiring and cash use? In examining the data, general statistical correlations are identified, and the factors influencing card acquiring and cash payments are analysed with a decision tree and regressions to identify the main influencing factors as accurately as possible. Section 2 presents the findings in the literature so far, while Section 3 details the data and the methodology. Based on the data, the maturity of the acquiring network and transaction figures are presented in Sections 4 and 5. Section 6 summarises the questions on financial awareness that influence the choice between the various payment methods. Finally, Section 7 provides a summary and conclusions.

[1] Taxpayers can only fulfill their obligation of giving receipt with online cash register for certain activities.

2. Overview of the literature

Several studies have dealt with payment habits, but most of these have explored consumer choices, and therefore their results can only be used in this analysis for the retail segment and only to a limited extent. Polish surveys show that, although consumers are typically aware of electronic payment methods, consumer habits can only be changed slowly and with the advantages related to a particular form of payment (*Harasim – Klimontowicz 2013; Dahlberg – Öörni 2008*). This hinders the widespread adoption of electronic payment methods, since retailers often reject these new payment options due to the expected low transaction volume. A Dutch consumer survey (*Jonker et al. 2018*) showed that the switch from cash transactions to card payments depends largely on consumers' income and the value of the purchase, and it is more typical among businesses with a non-retail main activity.

In several countries, not only consumer surveys but also studies focusing specifically on businesses were conducted. The analysis of Finnish companies and retailers by *Leinonen* (*2008*) showed that electronic payments exceeded cash by far in the case of companies, and respondents expected a further increase in this respect. Another interesting finding was that in this segment the use of electronic payments is strongly influenced by the delivery channels offered by payment service providers to their corporate customers, and how these can be integrated into accounting and bookkeeping systems. However, for retailers the most important aspect is the speed (real time) and simplicity of financial transactions. This explains why cash use is so dominant in this sector, although it should be noted that several regulatory measures have been introduced on the card market since the survey to increase competition, and instant payment solutions have also become available. *Gresvik and Haare* (*2007*) examined transactions at physical points of sale. According to their results, the share of cash transactions was below 50 per cent in the Nordic countries more than ten years ago, and in the latest survey focusing on Danish B2B payments cash transactions were not even represented, as they were deemed so insignificant (*The Danish Payments Council 2019*). In other countries with a rather cash-intensive payments market, card acquiring is typically in line with the size of the retailer and is much more frequent at larger retailers, as pointed out by a survey of Canadian retailers (*Kosse et al. 2017*). *Loke* (*2007*) also reached similar conclusions while examining the Malaysian market, where – in addition to the volume of transactions – the specific retail segment was also decisive in the decision on retailers' card acquiring. *Bounie et al.* (*2017*) compared retailer and household surveys in an analysis of the French market, with a special emphasis on network effects, finding that card acquiring is influenced to a large degree by consumer

preferences between methods of payments, in other words the extent of customer demand for card payments.

The Hungarian situation was analysed by *Turján et al.* (*2011*), primarily from the perspective of the costs related to the different payment methods, while *Takács* (*2011*) and *Ilyés – Varga* (*2015*) looked at payment habits in the household sector, finding a major dominance of cash use. Focusing on card acquiring by retailers, *Ilyés – Varga* (*2018*) used the online cash register database of the National Tax and Customs Administration (NTCA) to show a massive dominance of cash in retailer payments, and it was found that according to data from 2016, the size of the business was the most important explanatory variable of card acquiring. Earlier analyses also confirmed that there are large differences across the various regions in terms of retailer card acquiring, which is less typical in the eastern part of the country and in smaller settlements (*Kajdi – Nemecskó 2020*). In her study using both qualitative and quantitative methods, *Bódi-Schubert* (*2014*) specifically focused on small and medium-sized enterprises. It was found that while B2B payments were clearly dominated by credit transfers, cash use was still frequent, which was mainly justified by respondents with a lack of confidence and the desire to avoid any gridlock. A later survey also including microenterprises (*Belházyné et al. 2018*), arrived at similar conclusions regarding the distribution of payment methods, but cash use was attributed to the established habits among partners rather than a lack of confidence. This study also confirmed that cash use decreases with a growth in company size.

3. Data and methodology

This study uses the data from two questionnaire-based surveys and the online cash register database available to the MNB as provided by the NTCA. The MNB commissioned Kutatópont Kft. to conduct two separate questionnaire-based surveys between December 2019 and January 2020 for the data describing 2019 in the retail sector and for the corporate sector with other activities. The sample size of successful responses (providing actual answers) in both surveys included 300 businesses. The corporate sample mostly contained service providers (vehicle repairs, real estate brokering, transportation), production companies (manufacturing of furniture and clothes) and building and construction firms (construction of roads and residential buildings). The corporate data were assigned weights and grossed up using the publicly available Hungarian Central Statistical Office (HCSO) data by region, main activity and headcount category.

The questionnaire-based retailer database includes businesses whose main activity is retail trade, and in their case the online cash register database taken over from the NTCA was also utilised during the weighting and grossing up. This meant 50,837 taxpayers with retail trade as their main activity, and based on this, the data are representative by region, transaction volume and main activity (NACE groups 47). The retailer sample only took into account retailers with a gross annual sales revenue of less than HUF 1 billion, excluding those above this figure, which are typically retail chains. The questionnaires could be filled out in person, over the phone or online. Since detailed data on financial management and finances had to be provided, the interviewers usually turned to firms' controlling departments. The questions spanned from specific data (e.g. distribution of incoming and outgoing payments by payment methods, banking costs, wage costs and the method of wage payment, headcount) to attitude-type questions, which were mainly suitable for assessing financial awareness and taking stock of plans for future developments.

Due to the small sample size, the analysis only presents the main descriptive data and distributions, supplemented by analyses examining the explanatory variables influencing cash use by consumers and the card acquiring service in more detail. The main explanatory variables were identified using the decision tree method based on machine learning, as well as regressions based on the statistical approach, which better describe the partial effect of explanatory variables. The logistic model was used in the analysis of card acquiring, while the Heckman selection model was employed in the examination of cash use, as this model addresses the selection effect caused by the stores accepting cards and those not accepting them.

Along with the survey data, online cash registers' retail information from 2019 was also evaluated with the same methodology to check the results of the analyses of the retail surveys and to add new analysis aspects, filtering out the data from the taxpayers with an annual sales revenue of over HUF 1 billion, a typical threshold for retail chains. Due to the large sample size, the analyses of the OCR database are more robust, as they contain all the receipt and simplified invoice data of retailers required to use online cash registers. The cash register data are also anonymous, but the transactions related to individual taxpayers, taxpayers' main activity and the actual place of the transaction at the level of districts can be identified using IDs. As the OCR database contains data broken down to the district level, the information does not clearly identify stores, and therefore the analysis used the aggregate data from taxpayers' so-called retail units that are engaged in the same activity in

a district.[2] In the case of OCR data, information identical to that contained in the questionnaire (taxpayers' annual revenue, region, NACE code of the main activity) was examined, as was the revenue and lifetime of stores, which allowed conclusions to be drawn as to differences between stores that were open all year long and those that were opened during the year. Further aspects included stores' activity, which is the ratio between the number of days when the store was open and lifetime, representing whether a store was open every day or perhaps only on a few days, and also the number of transactions in stores.

With respect to retailers' NACE activity, it should be noted that taxpayers' main activity may not reflect the actual business activity. Another difference between the retail questionnaire data and the online cash register database is that while in the case of the former the distribution of revenue across units cannot be broken down by stores, and therefore taxpayers' card acquiring is examined, in the case of online cash register data, taxpayers' data broken down by activity are aggregated at the district level, and these units can also be observed. With regard to territorial distribution, while the questionnaire data show taxpayers' registered location, the cash register database contains the actual place of transactions, which, however, does not influence representativeness.

4. Level of development of the card acquiring network

According to the survey, most retailers and companies have a single sales unit in the country, and just 3 per cent of retailers have more than two sales units, while the same ratio is 9 per cent for businesses. The number of sales units for medium-sized and larger enterprises varies between 1 and 23. In the case of companies, the sectors cannot be examined separately by NACE code due to the small sample size, but it must be borne in mind that firms may differ significantly. For example, while a construction firm probably has fewer sales units but a larger turnover, and card acquiring is not relevant, a transportation company or a vehicle repair network may

[2] Unit refers to a single store if the given taxpayer has only one store engaged in the same field of activity within the same district, or the aggregate data when there are multiple such stores. Therefore, the number of units is lower than the number of actual stores, while the amount of revenue or the number of transactions per unit may be higher than the actual figures. This can influence the two main characteristics under review, namely card acquiring and cash use if the given taxpayer has several stores engaged in the same activity in the same district. If all the stores accept cards, this distorts the proportion of card acquiring stores downwards, while it distorts the figure upwards if only non-acquiring stores are aggregated. If there are both acquiring and non-acquiring stores, the unit comprising them is represented as card acquiring. In this case, if the proportion of the card acquiring stores is larger than the original card acquiring rate, this distorts stores' card acquiring rate downwards, or when it is smaller, it does so upwards. As shown later, the questionnaire-based data confirm the hypothesis that the stores not offering card payments are almost exclusively those belonging to the largest group of the smallest businesses with a single sales unit. Therefore, there are probably only a few cases when only non-acquiring stores are aggregated, so the upwards distorting effect arising from this is only minor, if it exists at all. The distortion arising from aggregating only acquiring stores or those that include both acquiring and non-acquiring ones is also presumably small, as according to the questionnaire just 3 per cent of retailers have more than two sales units. As regards the cash use ratio, since a unit's transactions also include those of non-acquiring stores, the cash use ratio examined in acquiring stores may distort the outcome upwards, making it higher than the actual figure.

have several sales units, with lower turnover each, and in their case card acquiring is relevant and usually offered. Card payments are possible at about 40 per cent of companies, and where card acquiring is present, all sales units offer this. In the case of retailers, on average 71 per cent of the almost 65,000 sales units provide an option for card payment, and non-acquiring stores are almost exclusively those belonging to the largest group of the smallest businesses with a single sales unit. According to OCR data, card payments are offered in 58 per cent of retailers' almost 60,000 sales units.

The survey also examined card acquiring through qualitative questions, allowing respondents which only offer cash payments to mark several options as to why they do not offer card payments. In the case of non-retail companies, the most dominant factor was that customers did not demand it (61 per cent). In the case of a large portion of companies, their products are presumably purchased by retailers or even other companies in large quantities for further selling or use, or their main activity is construction or production, so in their case card acquiring is not relevant. Other major factors include high POS terminal and banking costs, with 20 per cent of the companies ticking each of these answers. In the case of retailers, the main argument was also that customers do not need the card payment option, with 62 per cent of non-acquiring businesses reporting this. The costs associated with card acquiring were also an important factor (high bank fees: 48 per cent, expensive POS terminals: 29 per cent) and the low speed of card purchases (21 per cent). In addition, around 20 per cent of respondents said that they had already tested card acquiring but without success.

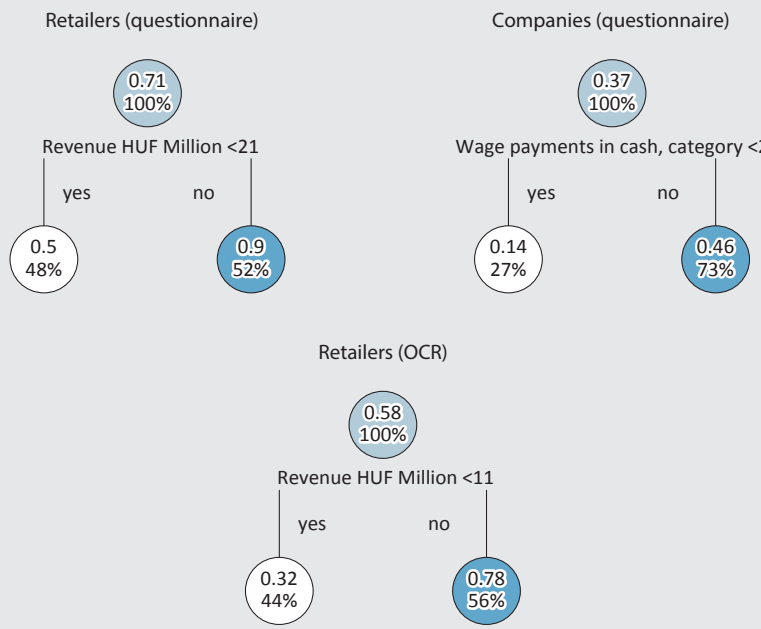
In the OCR database, the annual revenue of the commercial unit, the annual revenue of the taxpayer, the average value of purchases, the number of transactions, NACE codes and the lifetime and activity of the store all showed a significant correlation with card acquiring. No major difference was observed when examining the regions.[3]

The factors influencing card acquiring by retailers and companies were examined with a decision tree and logistic regression as well, so that the effect of explanatory variables on each other and any external influencing factors could be excluded to see which factors have the largest impact on the dependent variable under review. The decision tree based on machine learning can be used to identify the factors that make it easiest to decide whether a specific retailer or company is a card acquirer in the particular case under review. In addition, logit regression is a statistical method that enables the quantification of the partial effects and significance of explanatory variables, in other words whether the explanatory variables under review truly

[3] A more detailed description of the variables can be found in the discussion on the regression variables. Due to reasons of brevity, this study does not expound more on these basic statistics, but as can be seen below, the relationship between turnover and card acquiring, which is the most important variable, is presented in more detail in the Payment Systems Report. The 2019 data were discussed in the 2020 issue: https://www.mnb.hu/letoltes/payment-systems-report-2020.pdf.

have a significant impact, and if so, what the direction and extent of the resulting change is in the probability of card acquiring. The elements on the decision tree show the share of acquiring units within the group under review (upper value in the bubble), and the percentage of the group under review in the total population (lower value in the bubble). They also demonstrate that the variables shown are the explanatory variables that influence the dependent variable the most, and the classification into homogenous groups is undertaken along these lines.

Figure 1
Outcomes of the decision trees the most important factors influencing card acquiring



Source: Calculations based on MNB surveys and the NTCA online cash register database

According to the *decision tree* based on the data from the *retailer questionnaires,* card acquiring is influenced the most by annual sales revenue (*Figure 1*). 71 per cent of retailers accept cards, and 90 per cent of retailers with annual sales revenue of at least HUF 21 million accept cards, while only 50 per cent of those with sales revenue below that do so. It should be noted that an annual sales revenue of HUF 21 million amounts to less than HUF 2 million per month, which is a low value in nominal terms, in other words a quite high share of card acquiring can be observed among retailers, even at a relatively low revenue level. *In the case of companies,* sales revenue was less dominant in card acquiring, due to the sectoral differences mentioned in the previous section. According to the decision tree, card acquiring was influenced the most by the share of cash wage payment. The share of cash wage payment is a categorical variable, it takes a value of 1 if 100 per cent of wages are

paid in cash, 2 for 56–99 per cent, 3 for 45–55 per cent, 4 for 1–44 per cent and 5 for 0 per cent. Companies that pay 100 per cent of all wages in cash are typically not acquirers, as only 14 per cent accept card payments. This is probably attributable to the sectoral difference presented in Section 3. Companies that typically pay wages by credit transfer are more likely to be card acquirers (46 per cent). The results from the decision tree prepared for the *online cash register database* are consistent with the questionnaire-based survey in that card acquiring is influenced the most by the annual revenue of retail units. Based on data from 2019, 58 per cent of the commercial units of the retail companies observed from the database are acquirers, and within that 78 per cent of the units with annual revenue of at least HUF 11 million (less than HUF 1 million per month) are acquirers, and in the case of the stores with revenues below that 32 per cent offered card payments in 2019 (comprising 44 per cent of the total sample). The examination of the decision trees for the previous years shows that the acquiring rate increases over time, and within that the amount of annual revenue steadily diminishes across the breakdown into homogenous groups, which means that card acquiring is more and more common even among the units with lower annual revenues.

By adjusting for the various effects using logistic regression (correlation of explanatory variables, endogeneity issues), we can examine whether the different explanatory variables actually impact the dependent variable (whether they are significant), and if so, what the direction of their impact is. Similar to the decision tree, the value of a *logistic regression's* dependent variable is 1 if the given retailer or company is card acquiring, and 0 if it is not. The regression uses regional features as explanatory variables, since the probability of card acquiring may differ across the regions with varying levels of economic development. The factors describing the income position and payment habits of retailers and companies are also explanatory variables, as the variables related to size category and payment habits strongly influence card acquiring based on the decision tree. The explanatory variables can be used to analyse complex effects regarding card acquiring. *Table 1* shows the odds ratios of the logistic regression employed for the retailer and corporate questionnaires and the online cash register database. If the odds ratio of a given explanatory variable is below 1, that reduces the probability of card acquiring, while if it is above 1, then it increases the probability. In the models shown in the table, a significant impact was observed for all explanatory variables at the 95 per cent confidence level that was examined.

When analysing card acquiring by retailers and companies, the explanatory variable for cash wage payment was ultimately included in the model as a dummy variable to ensure homogeneity: above 55 per cent retailers and companies were deemed mostly cash paying, while those below it were deemed mainly non-cash paying. From a territorial aspect, large regions should be examined rather than regions.

The following equation was written for the logistic regressions of *corporate questionnaire data:*

$$y = \beta_0 + \beta_1 ln(Sales\ revenue) + \beta_2 Large\ region + \beta_3 Settlement\ type + \beta_4 Number\ of\ sales\ unit + \beta_5 Cash\ wage\ payment + \beta_6 NACE + \varepsilon \quad (1)$$

In the case of retailers, settlement type was not significant ($\beta_3=0$), while in the case of companies the NACE codes were excluded from the final model ($\beta_6=0$) due to the small sample size and the wide range of fields of main activity.

In the equation:

- dependent variable:
  – y: whether the retailer or company is card acquiring (0 or 1)
- explanatory variables:
  – logarithm of annual gross sales revenue
  – large region code (Central Hungary, Transdanubia, Great Plain and North)
  – settlement type: (Budapest, city with county rights, city, municipality)
  – number of sales units
  – cash wage payment (0=wages mainly paid in a form other than cash, 1=wages are mainly paid in cash)
  – NACE:[4] main activity of the respondent

Due to the different data structure of the *online cash register database,* the equation of the logistic regression for it differs from the previous one:

$$y = \beta_0 + \beta_1 ln(Sales\ revenue) + \beta_2 Number\ of\ transactions + \beta_3 ln(Average\ purchase\ value) + \beta_4 Lifetime + \beta_5 Activity + \beta_6 NACE + \varepsilon \quad (2)$$

In the equation:

- dependent variable:
  – y: whether the retail unit is card acquiring (0 or 1)
- explanatory variables:
  – logarithm of annual gross sales revenue of the retail unit[5]
  – number of transactions at the retail unit in the given year
  – logarithm of the average value of transactions at the retail unit[6]
  – lifetime of retail unit (number of days between the first and last transaction in the year)
  – activity of the retail unit (number of days with actual transactions/lifetime of the store)
  – NACE: main activity of the taxpayer

[4] Uniform Classification of Economic Activities, 2008
[5] The annual revenue of the retail unit and the taxpayer were both examined, and the revenue of the store was a better fit for the model.
[6] The average purchase value was calculated as the ratio of annual revenue and the annual number of transactions.

Table 1
Results of the logistic regressions for corporate and retailer card acquiring (odds)

Variable	Companies	Retailers	Retailers (OCR)
Logarithm of sales revenue	1.12* (87.34)	2.65* (73.50)	2.52* (–90.72)
Number of transactions	–	–	1.00* (–9.61)
Logarithm of average purchase value	–	–	1.08* (5.93)
Lifetime	–	–	0.99* (–0.01)
Activity	–	–	1.85* (0.62)
Large region (Central Hungary)			
Transdanubia	0.87* (–24.66)	1.16* (4.49)	–
Great Plain and North	0.77,* (–43.68)	0.51* (–21.29)	–
Settlement type (Capital)			
City with county rights	1.28* (38.50)	–	–
City	0.69* (–63.48)	–	–
Municipality	0.72* (–40.86)	–	–
Hungarian NACE Rev. 2 (471: Retail sale in non-specialised stores)			
472 (retail sale in specialised stores, e.g. butchers, bakery, tobacco store, grocery shop)	–	0.46* (–18.47)	0.93* (–2.05)
473 (automotive fuel)	–	1.00* (0.00)	0.54* (–4.86)
474 (IT, consumer electronics, telecommunication)	–	0.44* (–10.40)	1.21* (2.70)
475 (other household equipment, e.g. textiles, furniture, small electrical appliances)	–	0.28* (–27.95)	0.54* (–14.46)
476 (culture, recreation: books, newspapers, sports equipment, games and toys)	–	1.86* (11.50)	1.67* (9.29)
477 (clothing, footwear, pharmaceuticals, perfumery)	–	0.44* (–21.87)	0.93* (–2.52)
478 (stalls and markets)	–	0.13* (–43.33)	0.53* (–8.14)
479 (sales not in stores, mail order houses, internet)	–	0.19* (–29.83)	0.4* (–15.67)
Number of sales units	3.48* (216.40)	4.25* (12.82)	–
Cash wage payment	0.23* (–307.21)	0.51* (–25.57)	–
Constant	0.18* (–201.85)	0.12* (–17.25)	–14.07* (–90.72)
R^2	**0.12**	**0.3**	**0.3**
N	**300**	**300**	**57,848**

*Note: * Coefficients significant at the 95 per cent confidence level, with the values of the z-tests in brackets*
Source: Calculations based on MNB surveys and the NTCA online cash register database

Based on the *regression results from the data of the questionnaire,* the probability of card acquiring increases with the size of business: card acquiring is positively correlated with the sales revenue of retailers and companies, as is the case with the number of sales units; in other words, the bigger the firm is, the more likely that it offers customers this type of payment method, which is consistent with the findings of *Loke* (*2007*) and *Kosse et al.* (*2017*) and the earlier analysis of the situation in Hungary by *Ilyés – Varga* (*2018*).

In terms of regions, the probability of card acquiring is typically lower in the two large regions other than Central Hungary. The exception to this is Transdanubia in the case of retailers, which is attributable to the vibrant tourism and retail sector in the large region, and to the fact that only retailers with annual sales revenues under HUF 1 billion were included in the sample. Card acquiring is the lowest at both retailers and companies in the large region containing the Great Plain and Northern Hungary. In terms of settlement type, city with county rights, boast a significantly higher probability of card acquiring than Budapest, while municipalities have a lower probability. The regional card acquiring data are consistent with the earlier results of *Kajdi – Nemecskó* (*2020*).

At companies, wages are mostly paid through credit transfer, but cash wage payments have a negative effect on the probability of card acquiring. At retailers and companies where outgoing payments (e.g. wages) are mostly conducted in cash, incoming cash payments are probably preferred over card payments, which has a negative impact on card acquiring.

Based on the examination of main activities, retailers can also be segmented from the perspective of card acquiring: similar to non-specialised retailers, the probability of card acquiring is high at petrol stations and in the field of culture (newsagents, bookshops), but there is still considerable room for improvement among retailers selling via stalls and markets, and smaller specialised retailers.

The *regression using online cash register data* also confirms the positive correlation between the sales revenue of retail units and card acquiring.

As regards the fields of activity, the results are almost always the same as with the questionnaire, but in the case of stores with fields of activity related to automotive fuel and IT, consumer electronics or telecommunication, the cash register data shows the opposite as compared to the reference activity: in the case of automotive fuel, the probability of card acquiring is lower, rather than the same, as compared to retail sales in non-specialised stores, while the probability is higher at stores with a field of activity related to IT, consumer electronics or telecommunication. This difference may be attributable to the small sample size of the questionnaire. When interpreting the results, it must be borne in mind that the NACE code under

review indicates the reported main activity of the taxpayer, which may differ from the actual field of activity.

Although *Loke* (*2007*) also found that the field of activity of the retailer influences the probability of card acquiring, she analysed this with a much simpler variable using three categories, and thus the results cannot be directly compared. In the case of the variables that differed from those used for the questionnaire, an additional piece of information is that the number of transactions, which has a very significant impact, reduces the probability of card acquiring, albeit only slightly, which reflects the refusal of stores selling many smaller-value items to accept cards.

Average purchase value is also positively correlated with card acquiring, in line with the results of earlier studies, namely that card payments are more typical in the case of items with a higher value, which therefore indirectly influences card acquiring.

The lifetime of the store has a negative impact, which may suggest that newly opened stores are typically card acquiring. As regards the activity of the store, the more days it is open during the week, the more likely that it accepts cards. Regional differences were examined here as well, although this did not become a significant variable in terms of card acquiring for this database, which may be explained by the distorting effect arising from the clear unidentifiability of the real stores as described above.

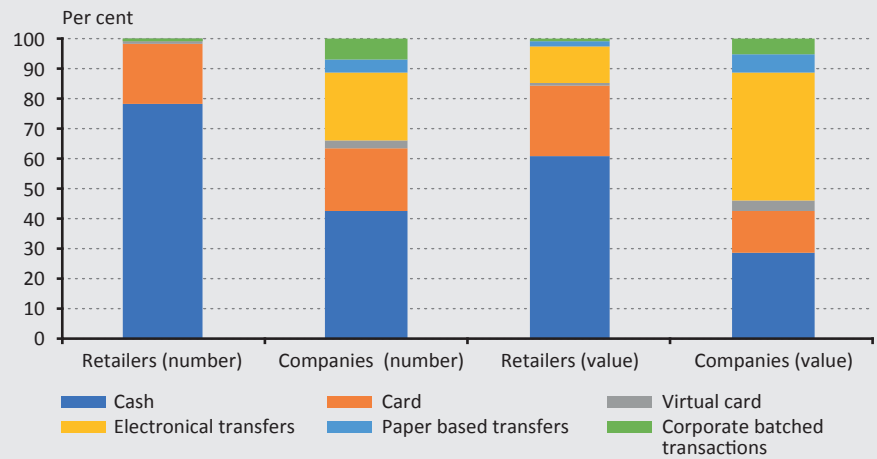
5. Turnover data

In the questionnaire-based survey, companies and retailers had to give a detailed account of their incoming and outgoing payments by number and value of transactions, broken down into different payment methods. This provides an opportunity to gain an accurate picture about the types of businesses where cash use dominates, and the method of incoming payments (received for the goods or services sold) and outgoing payments (to suppliers and employees) can also be identified, which supplements the OCR data.

Certain basic trends can be pinpointed in incoming payments. The payments to retailers are more typically made in cash than in the case of companies, with around 80 per cent of incoming payments conducted in this manner (*Figure 2*). This ratio is consistent with the results of the analyses of the online cash register database. With respect to the other countries in the region, the results presented here should be compared to those by *Górka* (*2012*) describing the Polish retail market. Górka's study showed almost 90 per cent cash use at physical points of sale. It should be noted, however, that cash use has probably also declined in Poland since that analysis was prepared. The latest survey of the European Central Bank (*ECB 2020*) on households' payment habits examined consumer habits rather than retailers, and

it also found, indirectly, that similar ratios were seen in most European countries regarding retail payments, in other words cash still dominates in physical purchase situations. When examining the distribution by value at retailers or companies, it is found that the value of cash payments is lower, which is attributable to the relatively small number of large electronic transfers. Similar trends can be identified with outgoing payments.

Figure 2
Incoming payment transactions of retailers and companies by payment methods



Source: Calculated on the basis of the MNB's corporate survey

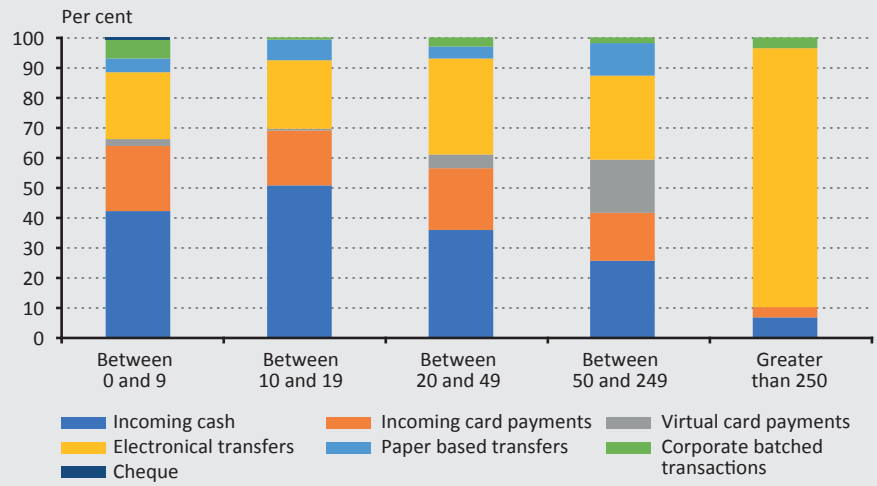
5.1. Headcount category differences

In analysing the *corporate data,* the sample was divided into groups by headcount category. Turnover data may vary widely across the different company sizes; the following categories were thus used: 0–9, 10–19, 20–49, 50–249, over 250 employees.

Based on the responses received, there seems to be a substantial difference between firms of different sizes in terms of the distribution by payment method of incoming transactions. While approximately 40–50 per cent of incoming payments are made in cash at smaller companies (with under 50 employees), the share of card payments and other forms of electronic payment is 20 per cent each (*Figure 3*). At larger companies, the ratio of cash payments has diminished, and in their case the ratios of cash payments, card payments (physical or online) and electronic transfers are more balanced (at 25, 35, 28 per cent, respectively). In the case of the largest companies (with 250+ employees), some 85 per cent of incoming payments

are made via electronic transfer, with only a small share remaining for the other payment methods. Examining the value of incoming payments, similar trends can be observed, but the share of electronic transfers is even higher. The results presented here are therefore consistent with the correlations identified between cash use and company size in *Belházyné et al.* (*2018*).

Figure 3
Distribution of the number of incoming payments by corporate headcount categories



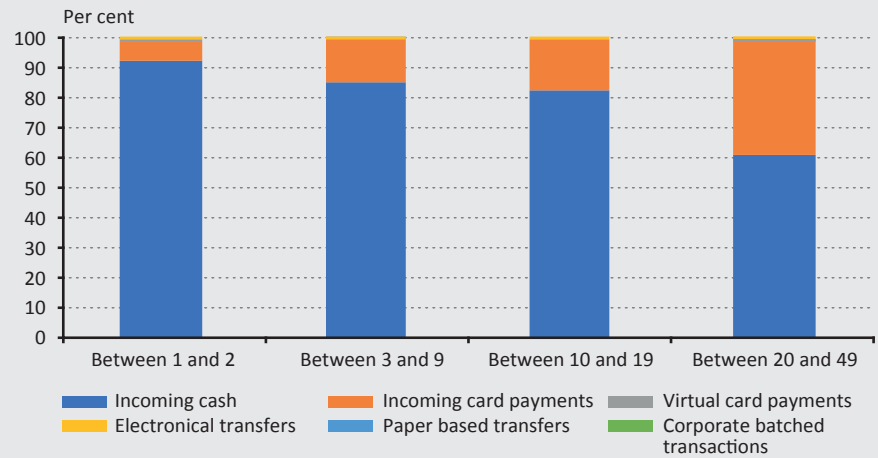
Note: Sample sizes: 0–9: 95 companies, 10–19: 90 companies, 20–49: 27 companies, 50–249: 24 companies, 250+: 6 companies

Source: Calculated on the basis of the MNB's corporate survey

On the whole, electronic payment methods are widespread among companies. Looking forward, the reduction of cash transactions should be an important objective mainly in the case of the firms with less than 50 employees.

Turnover in the different payment methods was examined for *retailers* as well, but with some differences. First, the number of retailers with a lower headcount is much higher, so the bottom category was divided further, and no retailer with a headcount of over 50 was included in the sample. Second, only cash, card and other payment methods were distinguished for incoming payments in retail sales. In this segment as well, the share of electronic (card) payments increases with size: while over 90 per cent of payments were made with cash in the smallest category, this figure fell to 60 per cent in the largest category (*Figure 4*).

Figure 4
Distribution of the number of incoming payments by retailer headcount categories



Note: Sample sizes: 1–2: 177 retailers, 3–9: 106 retailers, 10–19: 10 retailers, 20–49: 7 retailers
Source: Calculated on the basis of the MNB's retailer survey

In the analysis by the value of incoming payments, retailers also typically accept credit transfers, with this ratio at below 20 per cent at firms with less than 10 employees and at around 30–35 per cent at larger retailers. The data show that credit transfers are not widespread in the retail sector, and only a few large transactions are conducted in this manner. If only card acquiring retailers are considered, the situation also does not change much as regards the number of transactions or the distribution by value. This shows that the (cash) turnover of the retailers that do not offer card payments is relatively marginal from the perspective of the sector as a whole, and this also holds true for the retail units examined in the online cash register database.

5.2. Main factors determining cash use

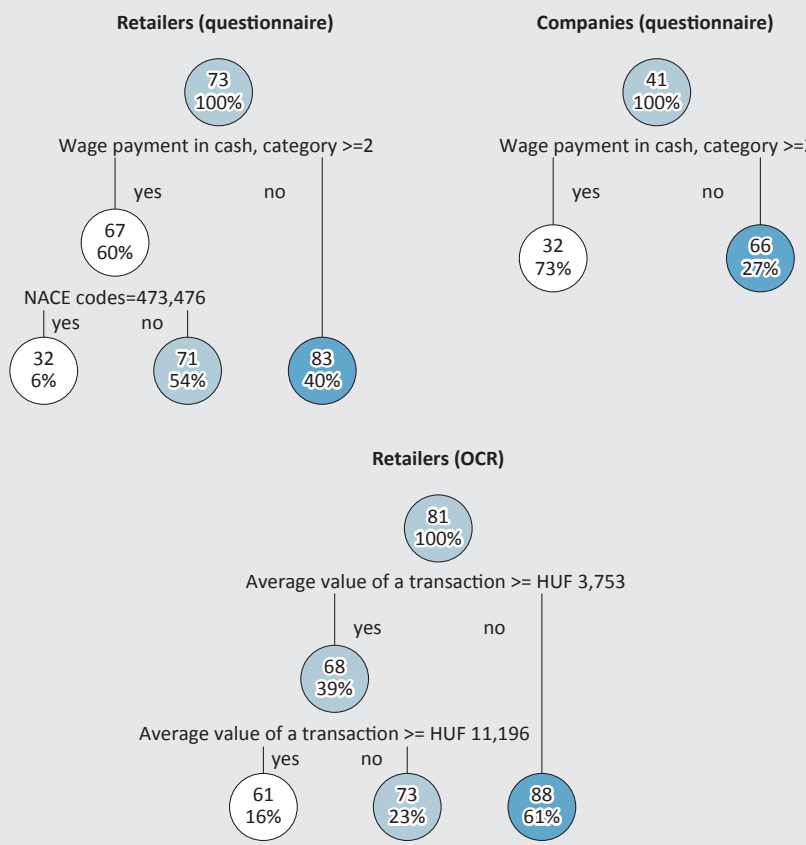
From a public policy perspective, it may be crucial to identify the factors that prompt companies to prefer cash use over electronic payment methods, since future regulatory measures and development projects in payments can be designed in a more targeted way using this information. First, a decision tree was prepared to pinpoint the key factors that determine the share of incoming cash within total turnover at acquiring stores. Then, the cause-and-effect relationships were explored using the Heckman selection model, which can be more readily interpreted for statistical purposes and also addresses the selection effect. In the latter case, the whole population was examined, and the two-stage regression model also handles the differences arising from card acquiring and non-acquiring.

Examination of the *decision trees* shows that *based on the retail questionnaire,* the factor with the largest impact on the share of incoming cash transactions in card acquiring stores is the proportion of cash wage payment,[7] and the NACE code also has a more substantial effect on cash use than the rest of the factors (*Figure 5*). At retailers where the share of cash wage payment is high, the ratio of incoming cash payments is also higher. *Based on corporate data,* cash wage payment is the factor influencing cash use the most: in other words, at firms characterised by cash wage payment, the proportion of incoming cash transactions is also higher.

In the *online cash register data,* analysis of the ratio of incoming cash transactions in card acquiring stores shows that based on the decision tree the most homogenous groups can be created on the basis of the average purchase value, which is thus the key factor influencing the cash ratio. At card acquiring retail units, the share of incoming cash transactions is 81 per cent overall. If the average purchase value is below HUF 3,753 at a given retail unit, the cash payment ratio is typically 88 per cent (with 61 per cent of the stores belonging to this category), while if the average purchase value is above that, the cash payment ratio is 68 per cent. The units can be divided into further groups by a further breakdown of the average purchase value.

[7] The share of cash wage payment is a categorical variable, it takes a value of 1 if 100 per cent of wages are paid in cash, 2 for 56–99 per cent, 3 for 45–55 per cent, 4 for 1–44 per cent and 5 for 0 per cent.

Figure 5
Decision tree results: most important factors influencing the proportion of incoming cash transactions



Source: Calculations based on MNB surveys and the NTCA online cash register database

Linear regression was used to analyse the other factors that could impact the ratio of cash transactions. The regression only included acquiring retailers and companies, and therefore the potential selection bias was addressed with the Heckman correction. Since the dependent variable is constrained to values between 0 and 1, a logit transformation of the cash use ratio is necessary in the regression, and thus the dependent variable is

$$y = ln[(Cash\ ratio+\mu)/(1-Cash\ ratio+\mu)], \quad (3)$$

μ=0.00001 constant (so the equation can be interpreted for a cash ratio of both 1 and 0). Therefore, the dependent variable can explain the evolution of the cash–

non-cash ratio. The *linear regressions* for the retailer and corporate sample can be stated with the following equation:

$$y = \beta_0 + \beta_1 Headcount\ category + \beta_2 NACE + \beta_3 Online\ sales + \beta_4 Ratio\ of\ outgoing\ cash\ payments + Lambda + \varepsilon \quad (4)$$

In the case of *companies,* the NACE codes were excluded from this model as well, due to the small sample size and the wide range of fields of main activity. In the case of *retailers*, only those respondents were considered in the model that offer card acquiring. The similar models were examined on the basis of the value of cash transactions rather than the number of such transactions. This yielded similar results, but their explanatory power was weaker, so they are not included here.

In the equation:

- dependent variable:
  - $y = ln[(Cash\ ratio+\mu)/(1-Cash\ ratio+\mu)]$, μ=0.00001 constant. Ratio of the number of cash transactions and non-cash transactions

- explanatory variables:
  - headcount category of the respondent company
  - NACE: main activity of the respondent
  - binary (dummy) variable for online sales: 0 for no online sales, 1 for online sales
  - proportion of cash transactions within all outgoing transactions (0–100 per cent)
  - lambda (inverse Mills ratio)

Due to the structural difference of the *online cash register database,* the equation for the regression of it is as follows:

$$y = \beta_0 + \beta_1 Region + \beta_2 NACE + \beta_3 ln(Sales\ revenue) + \beta_4 Number\ of\ transactions + \beta_5 ln(Average\ purchase\ value) + \beta_6 Store\ lifetime + \beta_7 Store\ activity + Lambda + \varepsilon \quad (5)$$

In the equation:

- dependent variable:
  - $y = ln[(Cash\ ratio+\mu)/(1-Cash\ ratio+\mu)]$, μ=0.00001 constant. Ratio of the number of cash transactions and non-cash transactions among the transactions of retail units defined in the online cash register

- explanatory variables:
  - region code, with Central Hungary including Budapest
  - NACE: main activity of the taxpayer associated with the transaction
  - logarithm of annual gross sales revenue of the taxpayer associated with the retail unit
  - number of transactions at the retail unit in the given year (thousands)
  - logarithm of the average value of transactions at the retail unit

– lifetime of retail unit (number of days between the first and last transaction in the year)
– activity of the retail unit (number of days with actual transactions/lifetime of the store)
– lambda (inverse Mills ratio)

The results of the regressions are shown in *Table 2.* The cells contain the exponential power of the coefficients of the significant explanatory variables in the analyses of the databases indicated in the column, representing the extent of the change in the dependent variable for each unit of change, with the t-value in brackets.[8]

Table 2
Estimated coefficients of the linear regressions explaining cash use

Variable	Companies	Retailers	Retailers (OCR)
Headcount category (under 3)			
Between 3 and 9	0.27* (–161.78)	0.22* (–47.94)	–
Between 10 and 19	0.75* (–9.18)	0.20* (–37.71)	–
Between 20 and 49	0.34* (–25.92)	–	–
Over 50	0.12* (–32.26)	–	–
Regions (Central Hungary)			
Northern Hungary	2.10* (52.96)	–	1.64* (8.32)
Northern Great Plain[8]	0.90* (–86.69)	–	1.34* (5.61)
Southern Great Plain	1.34* (21.18)	–	1.33* (5.17)
Central Transdanubia	1.25* (16.47)	–	0.81* (–3.52)
Western Transdanubia	0.86* (–10.77)	–	1.55* (7.18)
Southern Transdanubia	0.84* (–37.47)	–	1.37* (5.00)
Hungarian NACE Rev. 2 (471: Retail sale in non-specialised stores)			
472 (retail sale in specialised stores, e.g. butchers, bakery, tobacco store, grocery shop)	–	2.36* (12.67)	1.14 (2.54)
473 (automotive fuel)	–	–	3.06* (6.33)
474 (IT, consumer electronics, telecommunication)	–	0.96 (–0.38)	0.56 (–4.96)

[8] Due to a large enterprise from the Northern Great Plain, the share of cash transactions may be lower in the region than in the Central Hungary region.

Table 2
Estimated coefficients of the linear regressions explaining cash use

Variable	Companies	Retailers	Retailers (OCR)
475 (other household equipment, e.g. textiles, furniture, small electrical appliances)	–	1.43* (4.37)	6.41* (23.24)
476 (culture, recreation: books, newspapers, sports equipment, games and toys)	–	0.88* (–53.37)	0.15* (–19.68)
477 (clothing, footwear, pharmaceuticals, perfumery)	–	2.16* (10.77)	0.97 (–0.63)
478 (stalls and markets)	–	57.50* (29.74)	8.05* (15.27)
479 (sales not in stores, mail order houses, internet)	–	4.29* (28.01)	6.57* (17.27)
Internet sales	0.81* (–12.23)	0.70* (–44.20)	–
Share of the number of cash payments	1.11* (540.81)	1.04* (53.84)	–
Logarithm of sales revenue	–	–	0.07* (–52.49)
Number of transactions	–	–	1.00* (–6.12)
Logarithm of average purchase value	–	–	0.46* (–37.16)
Store lifetime	–	–	1.01* (19.68)
Store activity	–	–	0.98* (–18.47)
Constant	0.01* (–142.13)	37.06* (45.08)	142.22* (69.28)
Lambda[9]	0.05* (–50.45)	0.01* (–12.43)	0.02* (–25.08)
R^2	0.3	0.3	0.3
N	113	187	33,020

*Note: * Coefficients significant at the 95 per cent confidence level, with the values of the t-tests in brackets*
Source: Calculations based on MNB surveys and the NTCA online cash register database

In the models prepared on the basis of *questionnaire data,* company size was taken into account through headcount categories. One general trend is that larger companies and retailers see lower levels of incoming cash transactions. In a regional comparison of companies, the proportion of cash transactions is lower in the more advanced Transdanubian regions (car industry), and higher in the Northern and Great Plain regions. A breakdown by main activity was only analysed for retailers: the lowest share of incoming cash payments was observed at retailers operating in

[9] The lambda parameter (inverse Mills ratio) is significant for all regressions, therefore the filtering for card acquirers includes selection bias, which required an adjustment.

the IT and culture and recreation sectors, as well as those engaged in online sales. Online sales were examined separately with a dummy variable, and based on that the incoming cash turnover is also lower among companies that also sell online. A relationship was also detected with outgoing cash turnover, which may suggest that certain businesses prefer cash purchases because they have to make their outgoing payments in this manner.

Similar to the decision tree based on the *online cash register database,* the linear model also shows that the logarithms of sales revenue and average purchase value are the most important explanatory variables and are negatively correlated with the cash ratio. The regional variables have significant explanatory power here: compared to the benchmark of Budapest and Central Hungary, the cash use ratio is only lower in Central Transdanubia, while it is higher everywhere else. This may be related to the regional differences identified by *Kajdi – Nemecskó* (*2020*) regarding card use. When it comes to the fields of activity, compared to the benchmark of non-specialised retailers in stores, cash use is lower when the main activity of the taxpayer is in the IT, electronics or culture and recreation sectors, and almost the same or higher in the stores with other fields of activity. There was also variation based on the NACE code, which may be due to the small sample size in the questionnaire as mentioned before, and in interpreting the results it must be taken into account that the actual activity of the stores may differ from the registered main activity of the taxpayer.

6. Financial awareness

The choice between payment methods may be influenced by financial awareness, in particular the costs related to the different methods. This section describes the answers of companies and retailers to questions pertaining to this aspect in the questionnaire-based surveys. Most of this information comprises data on the costs of payment, i.e. the fees associated with providing cash-based and electronic payment methods. Moreover, several questions related to future development plans, in particular the introduction of instant payments in Hungary.

6.1. Cash use

In the case of firms, end-of-day cash holdings increase with size, while no such straightforward trend can be observed for retailers. In line with the turnover data, smaller companies record more cash transactions, while larger enterprises have an almost negligible amount of cash transactions. Smaller companies are characterised by cash withdrawals, while larger ones are characterised by cash deposits. This suggests that smaller firms have a stronger demand for cash and take out in cash the revenue received via credit transfer to cover their cash expenses. As presented in the analysis of turnover data, larger companies are characterised by

a low proportion of cash transactions, so they typically deposit the cash received to their bank account, supporting their online turnover, which has a greater volume. In the case of retailers, no clear-cut link to growth in headcount could be established. At the same time, retailer data show that the value of cash deposits usually exceeded withdrawals. This is probably because cash is more typical in the incoming transactions of smaller retailers anyway, which allows them to satisfy their demand for cash in this manner.

Companies typically pay their employees' wages via credit transfer. Looking at small enterprises, 35 per cent of them pay wages in cash, while larger ones do not do this at all. As presented above, a large portion of smaller firms' cash transactions are conducted in cash (*Figures 2, 3, 4*), which is consistent with the fact that they pay some of their wages in cash. Out of the companies that pay wages not only via credit transfer, 30 per cent claimed that this was due to high bank fees. At almost 50 per cent of companies, wages are paid in cash because employees prefer this method of wage payment. This ratio could shrink as electronic payments become widespread, as nowadays no electronic payment options are offered at several acquirers. In many regions, the acquiring network is not mature enough to offer electronic payments (*Kajdi – Nemecskó 2020*). The introduction of instant payments provides a wide range of retailers with an opportunity to accept electronic payments, which may reduce the share of cash payments. In the case of the retailers using cash wage payment, no clear underlying reason could be detected, with all three factors listed here (bank fees, cash revenues, employee preferences) reported by 60 per cent of respondents. This shows that all of these reasons play a crucial role in cash wage payments.

6.2. Choice of bank and banking costs

Businesses consider several aspects when choosing an account-servicing bank, which was assessed using qualitative questions. For companies, the most important issue is banking costs, with 30 per cent of respondents choosing a bank based on this. In-person administration at branches was important for 20 per cent of firms, the availability of ATMs was considered by 10 per cent, while 20 per cent chose the bank servicing their retail account. Favourable lending conditions, a card acquiring service and a mobile banking application were important for 5 per cent of companies.

In the case of retailers, 32 per cent made their choice based on costs, but in this segment the most important factor was in-person administration: 42 per cent of retailers deemed it crucial to have a branch nearby, and for 28 per cent the availability of ATMs was also key. The importance of existing banking relationships was similar to that seen with companies: while a relatively large group (one third) of retailers chose the bank servicing their retail account for their business needs,

existing loans played a minor role (8 per cent). In a positive development, 16 per cent reported that a mobile banking application was important.

6.3. Instant payment

Since the data were collected before the introduction of instant payments in Hungary on 2 March 2020, the preliminary information of Hungarian firms on instant payments could also be analysed. More than half of the respondents in the retail sector and two thirds of companies had heard about instant payments even before the service was launched. One third of retailers and 65 per cent of companies had heard that it was possible to connect to the central infrastructure not only through banks but also through non-bank service providers or even directly. This kind of financial awareness may enhance competition among service providers in the future.

As regards the acceptance of instant payments by retailers, 68 per cent reported that pricing was the most important aspect; in other words, they would consider introducing this option if the related fees were more favourable than the current card acquiring conditions. The immediate receipt of the purchase price was deemed the most important by a much smaller group (18 per cent), although this was typically the second most important factor behind pricing. Customers' aspects ('it should be at least as convenient as card payments') and the fact that they can gain an even better understanding of their customers' buying habits through mobile payments and the various related benefit programmes were only considered important by a small share of retailers. In the case of non-retail companies, there was no material difference when prioritising the above-mentioned aspects.

7. Conclusions

This study examined the payment habits of retailers and companies in Hungary, using the data from two questionnaire-based surveys, and other administrative databases (e.g. online cash register data) were also analysed to identify even more accurate correlations. Key differences were observed between the two sectors (retail and corporate) under review: while retailer payments are much more cash intensive and basically the only electronic payment method retailers use is bank card payment, credit transfers play a huge role in the lives of companies, and the cash use ratio is lower in this segment.

Major differences can be detected in payments across the different size categories based on companies' headcount, with smaller firms attaching much greater importance to cash. Considering smaller companies or the retail segment as a whole, the proportion of the businesses that pay the majority of wages in cash is still relatively high. This is probably because most of their revenues are also generated in cash.

Among the factors influencing card acquiring, size is the most dominant, and the results show that it is also negatively influenced by cash wage payments, which raises the question whether this is simply a feature of the shadow economy or it is also affected by earlier habits and employee preferences. The analysis shows that there is a positive correlation between average purchase value and card acquiring, which is consistent with past results indicating that card payments are more common in the case of larger-value purchases. This may be the cause of the indirect effect that people expect electronic payment alternatives in the stores where larger amounts are typically paid, thereby forcing stores to provide them. Although lifetime is a very significant variable, it has a slightly negative effect on card acquiring. This may be because the stores that were opened later are more likely to be acquirers. A review of the responses by those not accepting cards shows that customers do not demand the card payment option, although this is quite difficult to examine, and a web of interrelated causes is outlined: customers do not demand card payments (they do not say that they would like to pay electronically), therefore POS terminals are not ubiquitous, and due to the large amount of incoming cash payments and the lack of electronic payment methods, employees receive their wages in this manner. The other main reason for not providing a card payment option was high costs.

Accordingly, the micro and small enterprise segment should be primarily targeted with public policy measures if the more widespread use of electronic payment methods is to be achieved. Since the cost factor is key for this group, instant payments, which are much cheaper to establish relative to earlier acquiring methods, may play an important role in this as well.

The widespread application of instant payments and the requirement that retailers using an online cash register must accept electronic payments from 2021 could probably further boost the share of stores accepting electronic payments. For example, payment solutions based on credit transfers may appear in retail trade, and therefore this analysis may provide a useful snapshot of the period before instant payments and compulsory acceptance were introduced, later serving as a benchmark for comparing the next stage of development. As the widespread adoption of instant payments could provide a solution for several market issues, it is promising that the overwhelming majority of retailers and companies have heard about instant payments, which may lend impetus to the development of services from the demand side.

References

Bartha, L. – Luspay, M. – Varga, L. (2017): *Pénzforgalom és pénzügyi infrastruktúrák* (*Payments and financial infrastructures*). In: Vonnák, B. (ed.): Modern jegybanki gyakorlat *(Modern Central Bank Practices).* Magyar Nemzeti Bank, pp. 287–360.

Belházyné Illés, Á. – Végső, T. – Bódi-Schubert, A. (2018): *An Analysis of the Payment Habits of Hungarian Micro, Small and Medium-sized Enterprises – In Focus: Cash Usage*. Financial and Economic Review, 17(4): 53–94. http://doi.org/10.25201/FER.17.4.5394

Bódi-Schubert, A. (2014*): Bizalom*(*hiány*) *és fizetési magatartás a kis- és középvállalatok üzleti kapcsolataiban* ((*Lack of*) *Confidence and payment behaviour in the business relations of small and medium-sized enterprises*). MNB Occasional Papers 110, Magyar Nemzeti Bank. https://www.mnb.hu/letoltes/mt110-vegleges.pdf

Bounie, D. – François, A. – Van Hove, L. (2017): *Consumer Payment Preferences, Network Externalities, and Merchant Card Acceptance: An Empirical Investigation*. Review of Industrial Organization, 51(3): 257–290. https://doi.org/10.1007/s11151-016-9543-y

Dahlberg, T. – Öörni, A. (2008): *Understanding Changes in Consumer Payment Habits – Do Mobile Payments Attract Consumers?* Sprouts, Working Papers on Information Systems. https://www.academia.edu/5822166/Understanding_Changes_in_Consumer_Payment_Habits_Do_Mobile_Payments_Attract_Consumers. Downloaded: 23 January 2021.

The Danish Payments Council (2019): *Business-to-business payments entailed social costs of kr. 4.2 billion*. Series: Costs of payments in Denmark 2016. https://www.nationalbanken.dk/en/publications/Documents/2019/02/BR_Business-to-business%20payments%20in%20Denmark%202016.pdf. Downloaded: 19 January 2021.

ECB (2020): *Study on the payment attitudes of consumers in the euro area (SPACE)*. European Central Bank, December. https://www.ecb.europa.eu/pub/pdf/other/ecb.spacereport202012~bb2038bbb6.en.pdf

Górka, J. (2012): *Payment Behaviour in Poland – The Benefits and Costs of Cash, Cards and Other Non-Cash Payment Instruments*. https://www.bundesbank.de/resource/blob/635066/b8afafb1655f5d7d89332d836367454a/mL/2012-02-27-eltville-09-gorka-paper-data.pdf. Downloaded: 11 March 2021.

Gresvik, O. – Haare, H. (2008): *Payment habits at point of sale*. Norges Bank, Staff Memo No. 6. https://www.norges-bank.no/globalassets/upload/publikasjoner/staff-memo/2008/staff_memo_2008_06.pdf?v=03/09/2017122428&ft=.pdf

Harasim, J. – Klimontowicz, M. (2013): *Payment Habits as a Determinant of Retail Payment Innovations Diffusion: the Case of Poland.* Journal of Innovation Management, 1(2): 86–102. https://doi.org/10.24840/2183-0606_001.002_0007

Ilyés, T. – Varga, L. (2015): *Show me how you pay and I will tell you who you are – Socio-demographic determinants of payment habits*. Financial and Economic Review, 14(2): 26–61 https://en-hitelintezetiszemle.mnb.hu/letoltes/2-ilyes-varga-en.pdf

Ilyés, T. – Varga, L. (2018): *Acceptance of Payment Cards by Retailers in Hungary Based on Data of Online Cash Registers*. Financial and Economic Review, 17(1): 83–109. http://doi.org/10.25201/FER.17.1.83109

Jonker, N. – Hernandez, L. – de Vree, R. – Zwaan, P. (2018): *From cash to cards: how debit card payments overtook cash in the Netherlands*. De Nederlandsche Bank – Dutch Payments Association, Occasional Studies Volume 16-1. https://www.dnb.nl/media/kx1akmnb/201802_nr_1_-2018-_from_cash_to_cards_how_debit_card_payments_overtook_cash_in_the_netherlands.pdf

Kajdi, L. – Nemecskó, I. (2020): *Regional Features of Card Payments in Hungary*. Financial and Economic Review, 19(1): 65–89. http://doi.org/10.33893/FER.19.1.6589

Kosse, A. – Chen, H. – Felt, M. – Jiongo, V.D. – Nield, K. – Welte, A. (2017): *The Costs of Point-of-Sale Payments in Canada*. Bank of Canada, Staff Discussion Paper 2017-4. https://www.bankofcanada.ca/wp-content/uploads/2017/03/sdp2017-4.pdf

Leinonen, H. (2008): *Payment habits and trends in the changing e-landscape 2010+*. Bank of Finland Expository Studies A:111. https://www.finextra.com/finextra-downloads/featuredocs/a111.pdf

Loke, Y.J. (2007): *Determinants of Merchant Participation in Credit Card Payment Schemes*. Review of Network Economics, 6(4):1–22. https://doi.org/10.2202/1446-9022.1130

Takács, K. (2011): *A magyar háztartások fizetési szokásai* (*Payment Habits of Hungarian Households*). MNB Occasional Papiers 98, Magyar Nemzeti Bank. https://www.mnb.hu/letoltes/mt98.pdf

Turján, A. – Divéki, É. – Keszy-Harmath Zoltánné – Kóczán, G. – Takács, K. (2011): *Nothing is free: A survey of the social cost of the main payment instruments in Hungary.* MNB Occasional Papiers 93, Magyar Nemzeti Bank. https://www.mnb.hu/letoltes/op93-fmtk.pdf

Procyclical Effects of IFRS 9 – Illustrated by a Simulation on the Hungarian Banking System*

Gábor Szigel

The impact of the IFRS[1] 9 accounting standard on amplifying procyclical bank behaviour has been hotly debated since the introduction of the standard. This paper contributes to the debate by a unique simulation, in which we estimated, what the losses and capital position of the Hungarian banking system would have been during the 2008–2013 crisis episode if at international level subsequently adopted IFRS 9 had already been in effect at that time. Our results show that IFRS 9 would have led to the recognition of losses, which would have been more concentrated in the beginning of this crisis episode, (but not early enough, in the pre-crisis period). As a result, the banking system's aggregated capital adequacy ratio would have been more than 20 per cent (2.7 percentage points) lower at the onset of the crisis (end of 2008) than it was in reality (9.1 per cent rather than 11.8 per cent). This could have forced bank owners to undertake capital increases sooner and in larger amounts or to push their banks towards even stronger deleveraging, i.e. towards more procyclical behaviour. Our results are in line with the findings in the literature that the introduction of IFRS 9 increases the procyclicality of banks' impairments in such a manner that it shifts the recognition of impairments towards beginning of crises (but not towards pre-crisis periods!). Although the procyclical effect of IFRS 9 demonstrated in our simulation is quite large, this is attributable to the special depth and complexity of the 2008 crisis episode in Hungary, which involved a sovereign crisis, a banking crisis and a credit crunch at the same time. Thus, our results suggest that the procyclical impact of IFRS 9 can be more easily managed under 'normal' recession circumstances.

Journal of Economic Literature (JEL) codes: E32, E61, G21, M41, M48

Keywords: IFRS 9, actual impairment, banking supervision, macroprudential policy, procyclicality

---

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

Gábor Szigel is a Senior Manager at Deloitte Hungary. Email: gszigel@deloittece.com

The views expressed in this study are those of the author only, and they should not be construed as those of Deloitte in any way.

The Hungarian manuscript was received on 16 December 2020.

DOI: http://doi.org/10.33893/FER.20.2.6090

[1] IFRS: International Financial Reporting Standards

1. Introduction

How would the Hungarian banking system's accounting losses and capital adequacy have evolved if at international level subsequently adopted IFRS 9 accounting standard had been introduced before the 2008 crisis? Would Hungarian banks have behaved less or more procyclically? Would the probability of bank failures have been higher or lower?

These are interesting questions, as the literature usually attributes stronger procyclicality[2] to banks after the introduction of IFRS 9, and the 2008–2013 crisis in Hungary was so severe that if IFRS 9 does indeed have a considerable effect in terms of strengthening procyclicality, it would have certainly been felt under such circumstances. Therefore, this paper presents a scenario analysis (simulation) estimating how impairments would have evolved in the Hungarian banking system in 2008–2013 if IFRS 9 had been introduced before the crisis, for example from 1 January 2007. In doing so, based on the rate of the actual incurred losses, we estimate how much impairment banks should have recognised using the expected credit loss (ECL) approach of IFRS 9, assuming that their models would have been able to accurately predict the actual losses incurred.[3] In other words, the simulation uses a 'perfect foresight' assumption.

The paper is divided into the following sections. *Chapter 2* provides an overview on why the IFRS 9 standard amplifies banks' procyclicality. *Chapter 3* presents the relevant empirical findings in the literature. *Chapter 4* briefly describes the relevant key features of the Hungarian banking system's crisis episodes in 2008–2013. *Chapter 5* discusses the main assumptions of the simulation before the results are shown in *Chapter 6*. *Chapter 7* lists the imperfections in the simulation's assumptions and how they may distort the results. Finally, *Chapter 8* summarises the main conclusions.

2. The procyclical features of IFRS 9

At their 2009 meeting, G20 leaders called on international accounting bodies to reform the IAS 39 accounting standard for banks' provisioning based on incurred loss introduced in 1984. Although the stated objective of the G20 was to reduce the procyclical behaviour of the banking system, there is a general consensus in the literature in that the IFRS 9 accounting standard introduced in lieu of IAS 39

[2] There is no universally accepted definition of the procyclicality of banks' behaviour. In this paper, the procyclicality of the banking system means that the behaviour of the banking system continues to heat the economy during an expansion in the business cycle, while it causes a deeper recession during contraction. The crucial underlying mechanism is that in a crisis, increasing credit losses reduce banks' available capital, which prompts them to curb lending. At the same time, they become even more risk-averse due to the losses incurred in the crisis, which leads to an even stronger credit crunch.

[3] For more, see *Chapter 5* and *7*.

in 2018 increased the procyclicality of banks' impairment (see, for example: *ESRB 2019*; *Huizinga – Laeven 2019; Plata Garcia et al. 2017*).

The most important novelty in the IFRS 9 standard is the introduction of the ECL based estimation of impairment, even for the (performing) portfolio without objective evidence of impairment. Under IFRS 9, banks' financial assets that are measured at amortised costs (e.g. loans) are classified into the following three categories:

- *Stage 1*: assets without evidence of a significant increase in credit risk (SICR) since initial recognition. The impairment to be recognised for these equals the *12-month expected loss* of these assets;
- *Stage 2:* assets with evidence (e.g. payments 30–90 days past due, rating downgrade, restructuring) of a SICR since initial recognition. For these assets, impairment equals the *lifetime expected loss*;
- *Stage 3*: assets with objective evidence of incurred losses (e.g. payments over 90 days past due, other unlikely-to-pay (UTP) events). This category basically comprises transactions with objective evidence for incurred losses, for which impairment had to be recognised even under the old IAS 39.

Nevertheless, IFRS 9 also requires banks to take into account forward-looking information (FLI) when estimating ECL-based impairment. As a result, banks need to estimate the point-in-time (PiT) value of expected losses for Stage 1 and Stage 2 assets, reflecting the current position of the business cycle. This PiT estimate differs from the long-term through-the-cycle (TTC) type of parameters used in the internal rating-based approach (IRB) approach of the Basel capital requirements. The fact that the requirement of IFRS 9 to consider FLI (enforcing the PiT correction) conflicts with the prudential approach during an expansion in the business cycle has already been pointed out by others (*Borio 2018*).

Accordingly, the effects of IFRS 9 that amplify procyclicality arise from the following:

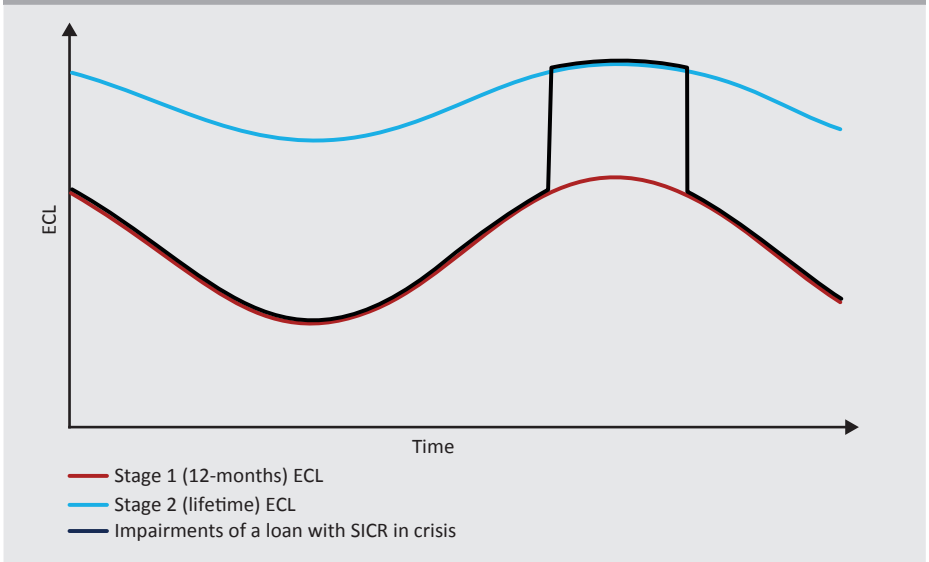
- *cyclical volatility in ECL impairment in all Stage 1 and in some Stage 2 assets:* when the state of the economy deteriorates, the 12-month expected loss values in Stage 1 increase in particular, but – to a smaller extent – so does the Stage 2 lifetime expected loss,[4]

[4] In Stage 2, cyclical volatility is lower, since the PiT correction aligned with the position of the business cycle is typically performed by banks for only the first 1–2 years of the given loans' total maturity, since no reliable forecast on the economy's health is available for farther down the forecast horizon. Therefore, the farther points on the forecast horizon are usually calculated with the TTC parameters, without cyclical movements.

- *due to the deterioration in portfolio quality, some customers migrate from Stage 1 to Stage 2 (and of course to Stage 3), where higher provisioning keys are assigned to them:* of course, migration to the non-performing (Stage 3) category was already present in IAS 39, as well, which also caused procyclicality. But the possibility of still-performing assets migrating to Stage 2 is a novelty in IFRS 9. Since for the same (still performing) loan, the 12-month ECL has to be recognised in Stage 1 and the lifetime ECL needs to be recognised in Stage 2, the Stage 2 impairment may be several times higher than in Stage 1, especially for long-term loans.

The change in the procyclicality in banks' impairment due to IFRS 9 is illustrated in *Figure 1*: it can be seen that the impairment of both Stage 1 and Stage 2 loans fluctuates with the business cycle. In fact, when a performing asset suffers SICR (significant increase of credit risk since the initial recognition) as a crisis unfolds, it must be classified as Stage 2, and an impairment based on lifetime ECL is assigned to it, instead of the 12-month ECL.

Figure 1
Illustration of procyclicality in IFRS 9



The fact that impairment exhibits a fluctuation does not in and of itself imply that this fluctuation is also procyclical, and indeed, the initial regulatory intention during the IFRS 9 introduction was to compel banks to recognise surplus impairment in 'good times'. However, this is not facilitated by the IFRS 9 framework, for various reasons:

- In Stage 1, with the 12-month ECL, potential economic shocks beyond the 12-month period cannot be taken into account. In other words, even if a bank was certain that a deep recession was looming two years down the road, it would be unable to incorporate its effect into the 12-month ECL;

- Although the standard requires banks to calculate expected credit loss as a weighted average of several macroeconomic scenarios (at least two), and dynamically changing the weighting of the scenarios (increasing the probability of a crisis scenario in 'good times' and decreasing it in a crisis) provides some opportunity for countercyclical behaviour, this has a very limited impact. During an expansion, banks need to assign a low weight to the scenarios with a deep recession and thus a large increase in impairment, in line with the general expectations. Unlike the calculation of capital requirements, IFRS 9 does not allow impairment to be calculated along conservative estimates, since the financial statements based on it have to reflect a true and fair view rather than a prudential one;

- The criterion for classification into Stage 2 is a significant increase in credit risk, which in practice often means payments past due over 30–90 days or a deterioration in the debtor's internal rating. However, these events typically occur when a crisis unfolds, rather than in the 'good times' before that.[5]

The procyclical effects of IFRS 9 are mitigated in case of banks that use an IRB approach to calculate the capital requirements of their credit risks, because the increased impairment during a crisis reduces the so-called IRB shortfall[6] at these institutions, which in turn improves own funds (see also *Háda 2019*). This can partly offset the profitability-reducing effect of increased impairment, which thus also reduces capital. Nonetheless, there is absolutely no such offsetting effect in the case of the banks using the Standard Approach (and the financial systems mostly consist of such banks).

Therefore, IFRS 9 has several elements that make it likely that the procyclicality of banks' impairment will eventually increase, even if unintentionally.

[5] A good example for this is that during the first months of the crisis related to the Covid-19 pandemic that unfolded from March 2020, banks' ratings of corporate credit portfolios improved, since the balance sheet ratings were based on the latest balance sheet data from 31 December 2019, and the impact of the crisis was often missing from the behaviour information known to banks.

[6] Pursuant to Article 159 of the European Capital Requirements Regulation, at banks using the IRB approach, the recognised impairment must cover the expected loss of the portfolio (expected loss = PD*LGD). Otherwise, an IRB shortfall occurs, which must be deducted from own funds (CET1 capital). However, excess provisions can be added to own funds, more specifically Tier 2 capital.

3. Overview of the literature

Not much time has passed since the introduction of IFRS 9 in 2018, therefore the empirical analyses that were first published mostly focused on the effects of the introduction itself. They usually showed that the transition to IFRS 9 slightly increased banks' impairments and reduced capital adequacy (for the Hungarian banking system, see: *Háda 2019* and *Csekei et al. 2018*). This is not surprising, since the impairment to be recognised for performing portfolios (in Stage 1 and partly in Stage 2) was a new element in the standard, while the impairment of the Stage 3 portfolio remained practically the same as under IAS 39.

However, in itself the *one-off* change in the amount of impairment is irrelevant from the perspective of procyclicality, which is determined by the dynamic change in impairment levels across years, as this is reflected in banks' impairment and own funds. Moreover, the one-time capital-reducing effects of the IFRS 9 transition are probably negligible compared to an additional capital shock that could be expected in a potential stress scenario, as demonstrated by *Plata Garcia et al. (2017)* in a simulation for Spanish banks.

The procyclicality of IFRS 9 was proven by *Abad and Suarez (2017)* with a simulation model. Although this was a theoretical model, its parameters were calibrated to actual banking data from the euro area. The authors found that IFRS 9 considerably increases banks' profitability in good times, and significantly reduces their capital position in times of crisis (thereby substantially increasing the probability of recapitalisation). Nevertheless, the authors argued that even if these effects are substantial, they can be offset by macroprudential supervisors' well-calibrated countercyclical capital buffers.

Gaffney – McCann (*2019*) examined the procyclicality of the Stage 2 classification of portfolios for Ireland: using a sample of 100,000 Irish mortgages, they estimated the share that would have been classified as Stage 2 between 2008 and 2013 if IFRS 9 had already been in effect at that time. The authors used the transactions' arrears status (31–90 days in arrears) and restructuring status (forborne) and a significant increase between the loan's PD at origination and its current PD re-estimated by the authors as triggers for classification as Stage 2. According to their results, the share of Stage 2 debtors would have exhibited significant procyclicality: it would have increased from 5 to 50 per cent between 2008 and 2012, before falling to 30 per cent by 2015 (while the proportion of NPLs was never over 20 per cent in this period). It should be noted here that more than half of the authors' Stage 2 debtors were classified there based on the rise in their PD, which is a rather speculative classification criterion, where banks' practices may differ widely (in contrast to the

other SICR criteria based on arrears for 31–90 days, which is straightforward and objective).

In another analysis, the ESRB (*2019*) compared the results of the ESRB's 2014, 2016 and 2018 Stress Tests. They concluded that in the 2018 stress test under the new IFRS 9 regime, the simulated losses of banks were more front-loaded to the first year of the hypothetical crisis, whereas in the 2014 and 2016 rounds (under the old IAS 39 regime), the incurred loss-based impairment was distributed much more evenly across the three crisis years.

Finally, an implicit acknowledgement of the excessive procyclicality of IFRS 9 can be seen in the fact that European supervisors and the EBA have issued several statements and recommendations starting from March 2020, in response to the Covid-19 crisis, urging banks to avoid practices leading to excessive procyclicality in impairment. Furthermore, the EBA published a recommendation on how banks should NOT consider debtors subject to a payment moratorium as restructured, which automatically classifies them as Stage 2. A useful overview of these measures can be found in *Boel – Gringel* (*2020*). On the other hand, the views of the same supervisors and the EBA shifted considerably towards the end of 2020: from December 2020 or even earlier, they urged credit institutions to recognise impairments reflecting the actual risks of the loan portfolios impaired by the Covid-19 crisis, instead of mitigating procyclical effects, (for example: *EBA 2020*; *ECB 2020*). This may suggest that after the initial 'shock', procyclicality was not considered as a severe risk to financial stability as insufficient provisioning.

All in all, there is consensus in the literature that IFRS 9 increased procyclicality in banks' impairments, although the fact that this was significant or represented a threat to financial stability does not seem to be clearly proven (especially in view of supervisors' responses in 2020). Nevertheless, as far as the author is concerned, no similar simulation based on data from a real crisis and covering the loss and capital adequacy data from the entire banking system has been produced on this topic. (In fact, the Covid-19 crisis will still not be fully suitable for testing the procyclical effect of IFRS 9, as this crisis was 'too sudden', and, as things at the time of writing of the study stand, it was followed by a similarly swift recovery: by the time it was possible to incorporate the expectations of a fairly deep recession in 2020 into banks' models, the timeframe for forward-looking information had already shifted to the 'bounceback' forecast for 2021, which did not require as extensive a PiT correction of PDs as in a drawn-out recession.)

4. The situation of the Hungarian banking system in the 2008–2013 crisis episode

The Hungarian banking system experienced a particularly deep crisis episode in 2008–2013, making this especially suitable for simulating the procyclical effects of IFRS 9. This study does not endeavour to provide a detailed summary of the post-2008 crisis in the Hungarian banking system, and only the most crucial phenomena necessary for the understanding of the topic of the paper are highlighted here in brief:

- *classic over-indebtedness crisis:* Hungary went into the 2008 crisis as one of the most heavily indebted countries in the EU, with its net external debt standing just a notch below 50 per cent of GDP. This debt arose from two main sources: the over-indebtedness of the state and the excessive and ill-structured indebtedness of households via the banking system, mainly in FX (Swiss francs);

- *sovereign debt crisis*: accordingly, the drying-up of money markets in 2008 immediately caused a sovereign debt crisis, reflected in a surge of sovereign risk premiums, which forced Hungary to enter into a stand-by arrangement with the IMF to avoid state bankruptcy;

- *'hidden bank crisis'*: the proportion of banks' non-performing loans peaked over 20 per cent in the household sector and the corporate sector. Total credit losses, including the losses arising from the government's debtor rescue campaigns[7] – amounted to close to 100 per cent (!) of the banking sector's own funds as at the end of 2008. Bank failures were avoided only because the owners, typically foreign parent banks, kept recapitalising the Hungarian credit institutions concerned at roughly the extent and pace of impairment recognition;

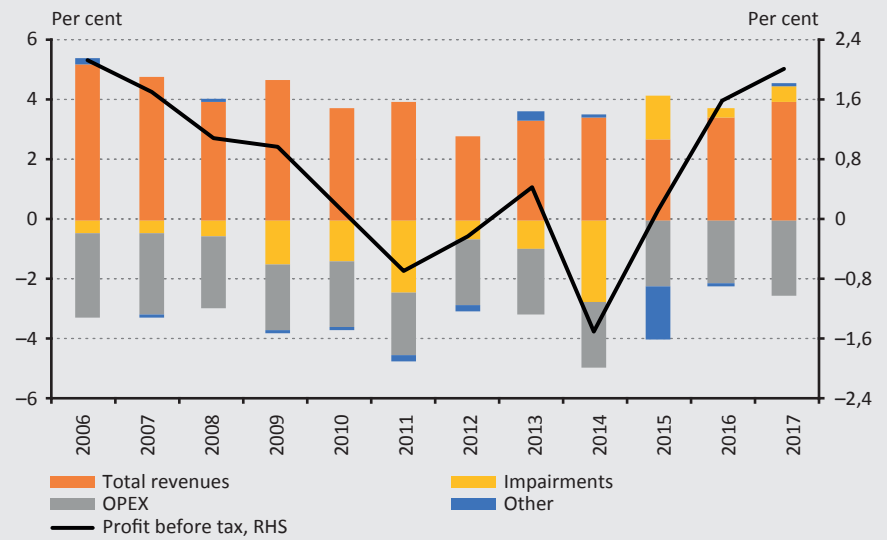
- *FX loan crisis*: the bulk of household loans were outstanding in a foreign currency, mainly Swiss francs, against debtors without currency hedging. Since the Hungarian forint depreciated against the Swiss franc by around 60 per cent between 2008 and 2012 and the interest on the loans did not decrease despite falling CHF-LIBOR due to banks' unilateral pricing policy, FX debtors experienced a shock of a similar extent in their payment instalments.

As a result, the Hungarian banking system was in a difficult position after 2008 (*Figure 2*): the impairment recognised based on the incurred credit losses jumped from 0.4–0.5 per cent of the balance sheet total before the crisis to around 1.5–2.5 per cent (a threefold or fivefold increase) between 2009 and 2014. At the same time, profitability declined as well: although in 2009 banks were still able to offset

[7] The 'preferential early repayment' at the turn of 2011 and 2012 and 'the holding of financial institutions to settlement and forint conversion' in 2014.

their increased risk costs by unilaterally raising customer interest rates, the banking sector suffered losses for five years in a row between 2010 and 2014. It must also be borne in mind that the recognition of impairments on an incurred loss basis ultimately proved to be *overly pessimistic* in the case of Hungarian banks: in the years after 2014 the banking system was able to make reversals from the released impairment on the recovering NPLs for years, increasing their net income. In this sense, the main criticism levelled against the incurred loss-based recognition of impairment, namely that the recognition of losses is thus 'too little, too late', was not true (at least as regards the 'too little' part), and in fact in this respect the old accounting standard also proved to be overly procyclical in hindsight.

Figure 2
The Hungarian banking system's profitability relative to the balance sheet total in 2006–2017

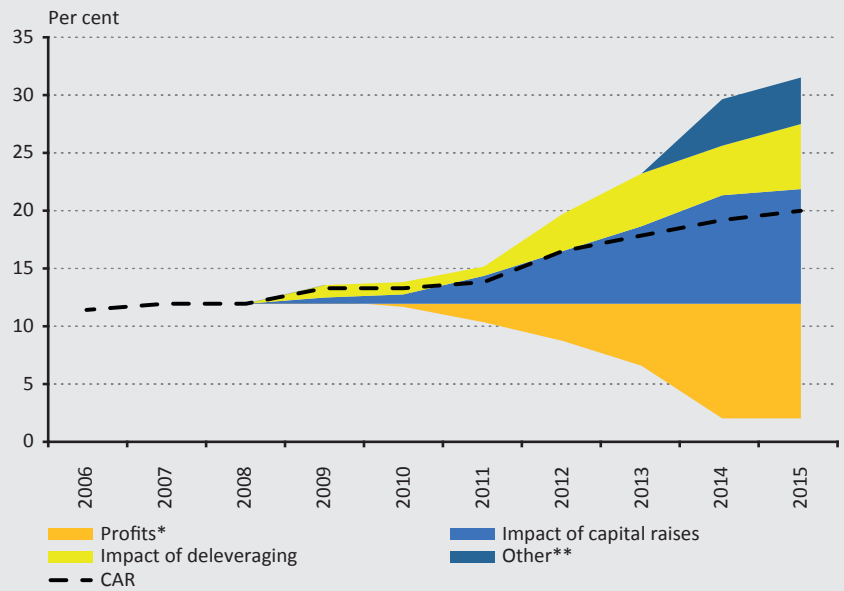


Source: Calculations based on the time series of the data from the sectors supervised by the MNB

Consistent with the above, the banking system's capital adequacy position also came under pressure (*Figure 3*): although the capital adequacy ratio almost doubled from 11.8 per cent at the end of 2008 to 19.9 per cent at the end of 2015, this was mainly due to capital injections from the owners (with an effect of +10 percentage points between 2008 and 2015). Moreover, the banks also engaged in considerable deleveraging, and the capital adequacy-improving effect of this amounted to half of the impact of capital increases (around +6 percentage points until 2015). Without the capital injections by the owners, the banking system's capital adequacy ratio would have been below 10 per cent at the end of 2015. It also

has to be underlined that the system-wide figure conceals the heterogeneity among banks: while certain banks proved to be more resilient, others performed below the banking system average. It is still certain that several large banks would have been unable to keep their capital levels above the minimum requirement without capital injections from the parent bank, possibly not even at the price of even more radical deleveraging.

Figure 3
The Hungarian banking system's capital adequacy ratio, and the decomposition of the change in the ratio relative to 2008



*Note: *Impact on net income: mostly impact on net income, the source does not specify other elements; ** Other effects: mostly the effect of regulatory changes (the introduction of the CRR from 2014)*

Source: Time series of the data from the sectors supervised by the MNB; Financial Stability Report, MNB, November 2015, Charts 70–71 and calculations based on the above

Overall, the Hungarian banking system thus experienced a significant deterioration in portfolio quality and a related loss of capital in the crisis episode that started in 2008, which not only prompted it to rein in lending activities in a procyclical manner, but would have also led to several bank failures in the absence of capital injections from parent banks. In other words, this was a very deep crisis, which is suitable for illustrating the procyclical effects of IFRS 9 precisely because it highlights cyclical fluctuations.

5. Simulation

In the simulation, the potential additional procyclicality arising from an imagined introduction of IFRS 9 *prior to* the 2008 crisis is quantified relative to the Hungarian accounting standards (HAS) in effect at that time.[8] HAS was selected as a basis of the comparison, because the available financial reporting of the Hungarian banking system was made by HAS (which was very similar to IAS 39).

First, a more detailed summary of the HAS-based regulations in effect at that time is necessary. According to HAS, bank assets had to be classified into the categories presented in *Table 1* based on expected losses (*Balás 2009*), and the impairment to be recognised was the expected credit loss. Nevertheless, in practice banks often classified assets into categories based on the number of days in default, especially in the household segment, using the following ranges: problem-free (overdue by 0 or 1–30 days), to be watched (overdue by 31–60 days), substandard (overdue by 61–90 days), doubtful (overdue by 91–365 days), bad (overdue by over 1 year). (In addition, especially in the mortgage credit segment affected by FX lending, certain banks classified the transactions with an increased loan-to-value ratio due to exchange rate changes into the 'to be watched' category, even if this was not standard practice.)

Table 1
Expected loss ranges for the different rating categories based on the Hungarian accounting standards in effect in 2009

Category	Expected loss
Problem-free	0%
To be watched	1–10%
Substandard	11–30%
Doubtful	31–70%
Bad	71–100%

Source: Balás 2009, p. 3.

Although at first glance the HAS approach is also based on ECL, it actually differs significantly from IFRS 9 in several respects:

- *no provisioning for problem-free transactions*: under HAS, impairment for expected credit loss only had to be recognised for transactions with objective evidence of probable losses that may not be fully recovered from the collateral.[9]

[8] These were stipulated in the version of Government Decree No. 250/2000 in effect back then.
[9] HAS also allowed collateral to be taken into account: for example in extreme cases, even a long-overdue item (clearly classified as Stage 3 under IFRS 9) could be classified as problem-free if it had collateral of exceptional quality and sufficient quantity (e.g. cash collateral in custody of the lender). By contrast, under IFRS 9 such a transaction would be Stage 3 with low LGD. Of course, this example was not frequent or realistic.

By contrast, under IFRS 9, for Stage 1 transactions impairment must be recognised without objective evidence of a probable loss (in other words for problem-free loans);

- *no increase in the customer's credit risk since origination is taken into account*: in HAS, only the current ECL counts, taking into consideration not only the probability of default (PD), but also loss given default (LGD). For example a customer experiencing a major rating downgrade can remain problem-free if there is no objective evidence of probable losses (e.g. no late payments);
- *the adjustment based on forward-looking information only affects the non-problem-free portfolio*: since in HAS zero impairment has to be recognised for the problem-free portfolio elements, which would be mostly classified as Stage 1 and to a lesser extent as Stage 2 under IFRS 9, its cyclical adjustment is not applicable.

The above disparities are more or less in line with the most important differences between IFRS 9 and IAS 39.

At the same time, the approach of HAS and IFRS 9 to non-problem-free portfolio elements according to HAS (which therefore fall into the 'to be watched' category or below) is not that different: basically, both standards require impairment to be recognised for the transactions overdue by over 30 days,[10] and it more or less equals the lifetime ECL in both cases. Although HAS did not explicitly require forward-looking information to be taken into account, its ECL-based approach actually included assumptions on the economic environment, even if they were not very significant, since expected credit loss was already recognised for the whole lifetime of the loan.

Accordingly, beyond the not very frequent exceptions, the basic differences between HAS and IFRS 9 would have been due to the fact that the problem-free portfolio is assigned a 0-per cent impairment under HAS:

- some of the problem-free portfolio would have been assigned impairment different from zero as Stage 1 under IFRS 9 (12-month ECL),
- and some of the problem-free portfolio would have been classified as Stage 2, with impairment recognised accordingly (based on lifetime ECL).

[10] There may be exceptions: IFRS 9 allows banks not to classify transactions overdue by over 30 days as Stage 2 with proper justification, and under HAS such transactions can remain in the problem-free category with strong collateral, but these are just the exceptions.

In the present simulation, these two effects are quantified retrospectively in the three dimensions below:[11]

1) Quantification of the impairment on the problem-free customer loan portfolio, separately for the portfolios potentially classified as Stage 1 and Stage 2,

2) The impairment dynamics of the potential classification of sovereign and interbank exposures as Stage 2,

3) The impairment dynamics of the classification of the performing FX loan portfolio as Stage 2.

The effects for the entire banking system are estimated separately for the three factors above, using the available data. The differences in the situation of individual banks cannot be taken into account due to the simulation methodology and lack of available data.

5.1. Assumptions for the problem-free customer loan portfolio (without the FX loan effect)

Stage 1 problem-free portfolio

Some of the problem-free debtors under HAS in the customer loan portfolio[12] would have remained in Stage 1 under IFRS 9. For these exposures, banks would have had to recognise impairments amounting to the 12-month ECL. To estimate this, banks' actual annual incurred loss relative to total credit as per HAS is established as follows:

- *the numerator of the loss ratio* is the annual net impairment recognised in the banking system's consolidated profit and loss account. Although this indicator could theoretically include losses from other portfolio types, in reality almost 100 per cent of Hungarian banks' losses were incurred on the customer loan portfolio, and therefore this approach is correct,
- *the denominator of the loss ratio* is the annual average gross total of customer credit in the banking system.

[11] The effects arising from the three dimensions are cumulative on each other in the order presented here, because it reflects the probability with which these effects would have contributed to the provisioning policies strengthening procyclicality (from the most likely to the least likely).
[12] The customer loan portfolio includes households and non-financial corporations. Debtors classified as financial corporations are discussed in the next subchapter.

In the simulation, it is assumed that the impairment of the Stage 1 portfolio, the 12-month ECL, equals in all years the loss rate (loss / total loan volume) actually recognised by banks under HAS in the following year. In other words, it is assumed that the impairment under HAS measured incurred losses accurately, and that with 'perfect foresight' banks would have been able to predict the losses for the following year based on this. Thanks to this assumption, it is not necessary to make speculative assumptions on banks' scenario planning, while the dynamics brought by the forward-looking PiT correction of IFRS 9 into provisioning can be still illustrated. (This is useful because the exercise does not seek to run a simple 'what if' scenario, but also to establish the procyclical dynamics of IFRS 9.) Nevertheless, two one-off items resulting from two government interventions are excluded from the loss rate used for the simulation: the one-off bank losses recognised due to the early repayment scheme at preferential exchange rates in 2011 and the losses related to the Settlement Act of 2014[13], as these cannot be assumed to have been foreseen by any bank's impairment model.

It is important to note that the perfect foresight for the loss path is only assumed from 2008, so the crisis unfolding at the end of 2008 takes banks by surprise in the simulation. This is a realistic assumption, since this is what actually happened,[14] (just as the crisis caused by the Covid-19 pandemic completely took market participants by surprise). One of the procyclical effects of IFRS 9 arises precisely from this: risk parameters deteriorate rapidly during unexpected crises due to the suddenly pessimistic forward-looking information.

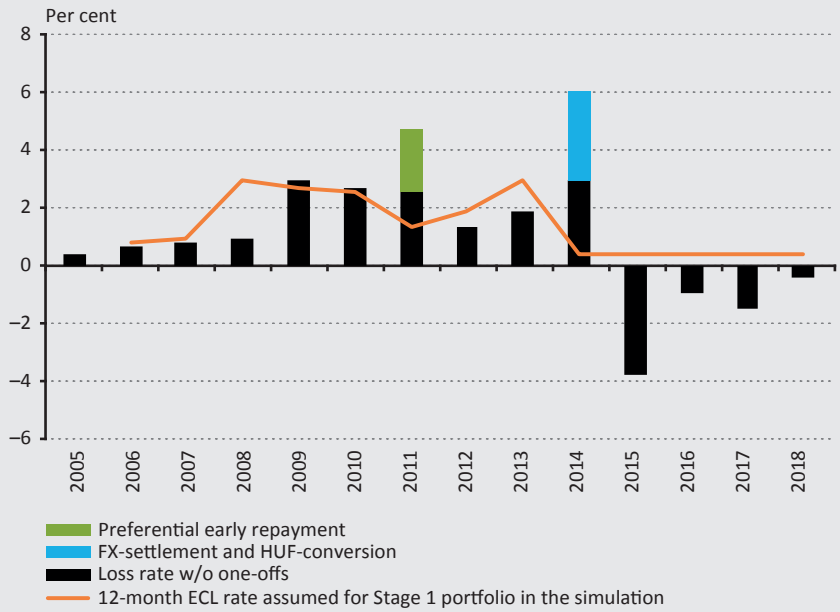
For the years where the banking system's impairment recognised as per HAS increased net income (a release occurred), a 12-month ECL of 0.5 per cent, roughly equalling the average loss ratio before the 2008 crisis, was assumed.

The annual loss rate estimated in this manner (the forward-looking 12-month ECL) can be seen in *Figure 4*. It clearly shows that in the simulation the IFRS 9 12-month ECL jumps at the end of 2008, as the effect of the unexpected crisis is incorporated into the forward-looking (PiT) adjustment of the ECL, and then it is smoothed back to the 'normal' value after the last crisis year of 2013.

[13] 2014. évi LXXVII. törvény az egyes fogyasztói kölcsönszerződések devizanemének módosulásával és a kamatszabályokkal kapcsolatos kérdések rendezéséről (Act 2014 LXXVII on the settlement of questions concerning changes in the currency of certain consumer credit agreements and interest rate rules): https://net.jogtar.hu/jogszabaly?docid=a1400077.tv

[14] For example the mean of the GDP forecast by the Magyar Nemzeti Bank for 2009 declined by over 10 percentage points between the publication of the August and December issues of the 2008 Inflation Report. A similarly dramatic decline was seen in the expectations of every other player.

Figure 4
Recognised annual impairment in the Hungarian banking system relative to total customer loans and the 12-month ECL assumed in the simulation for the Stage 1 portfolio in the given year



Source: MNB data and calculations based on such

For all years, the impairment in banks' income statements equals the annual change in impairment volume assumed for the Stage 1 portfolio as described above. In other words, it is affected not only by the Stage 1 ECL but also by the change in volumes. The volume of problem-free Stage 1 loans is estimated by deducting the estimate of the problem-free Stage 2 loans from total problem-free loans, as described in the next subchapter.

Stage 2 problem-free portfolio

Determining the portion of the portfolio deemed problem-free under HAS to be classified as Stage 2 is more challenging. Customers who were restructured or in default for 30–90 days during the crisis were mostly classified by banks in the 'to be watched' category or below in HAS as well, and ECL-based impairment was recognised for them. Therefore, the recognition of losses related to them would probably have not been much different under IFRS 9. On the other hand, the portion of the portfolio recorded as problem-free under HAS without objective default but with a significant increase in credit risk relative to the date of borrowing would have been classified into Stage 2 under IFRS 9. However, there are no backward-

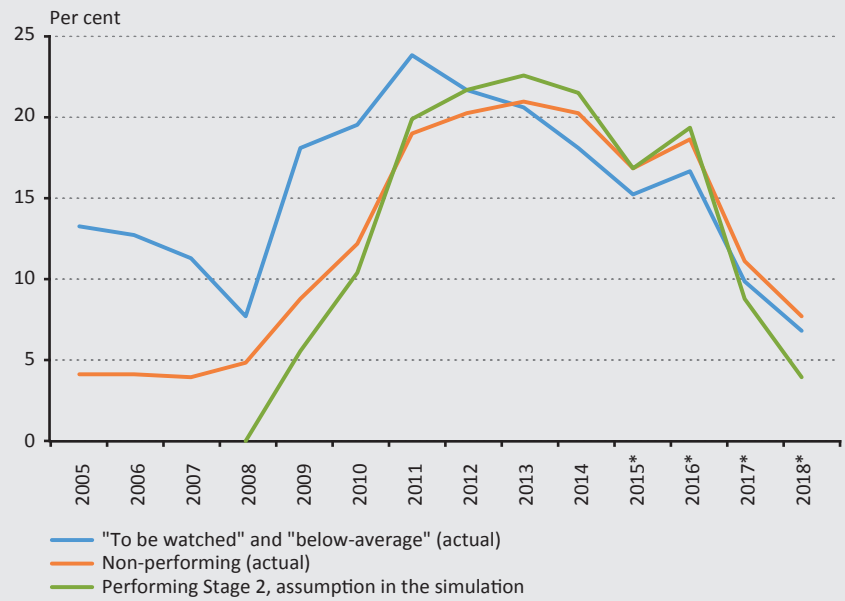
looking data on this. (The reclassifications related to FX lending are discussed in *Subchapter 5.3* rather than here.)

Therefore, we estimate the size of the problem-free Stage 2 portfolio by relying on a benchmark and utilising the calculations by Gaffney and McCann cited in the summary of the literature. They estimated that the share of the Irish mortgage loan portfolio to be classified as Stage 2 due to a rating downgrade was roughly 1.4 times the number of loans that were restructured or in arrears by 30–90 days (*Gaffney – McCann 2019*, *Figure 4*). Since the situation of the Irish banking system after 2008 was very similar to that of Hungary in 2008–2013, this proportion is considered a good benchmark.[15] However, statistics containing restructured transactions in Hungary are not available for the crucial years of 2008–2009, and therefore the volumes of loans classified in the 'to be watched' and 'substandard' categories under HAS were used as a substitute for this indicator. This is rational since banks were mostly required to classify the restructured transactions in the 'to be watched' category or below, and the transactions past due by 30–90 days were roughly covered in the 'to be watched' and 'substandard' categories,[16] so overall there is a substantial overlap between this indicator and the categories of Gaffney – McCann. (Nevertheless, the final results of the whole simulation are actually not that sensitive to this parameter (*Figure 7*).)

The 'problem-free Stage 2' ratio of the Hungarian customer loan portfolio calculated with the above assumptions is shown in *Figure 5*. If the portfolio classified as Stage 2 due to the rating downgrade as calculated above is added to the 'to be watched' and 'substandard' portfolios under HAS (which are presumably also Stage 2), it can be seen that the proportion of the Hungarian Stage 2 portfolio under IFRS 9 would have peaked slightly below 45 per cent during the 2008 crisis episode. This more or less tallies with the 50 per cent value estimated by *Gaffney – McCann* (*2019*) for the Irish mortgage portfolios.

[15] In both banking systems, the share of non-performing loans peaked around 20 per cent.
[16] Of course, this coverage is not perfect, since as noted above, under HAS the availability of collateral could considerably improve or reduce the rating.

Figure 5
Proportion of the 'problem-free Stage 2' and other portfolio quality indicators



*Note: Actual data are from the MNB. * No public data are available since 2015 for the portfolio rating categories as per HAS. The values for these were estimated based on the portfolio ratio in arrears for 90+ days as reported by the MNB.*

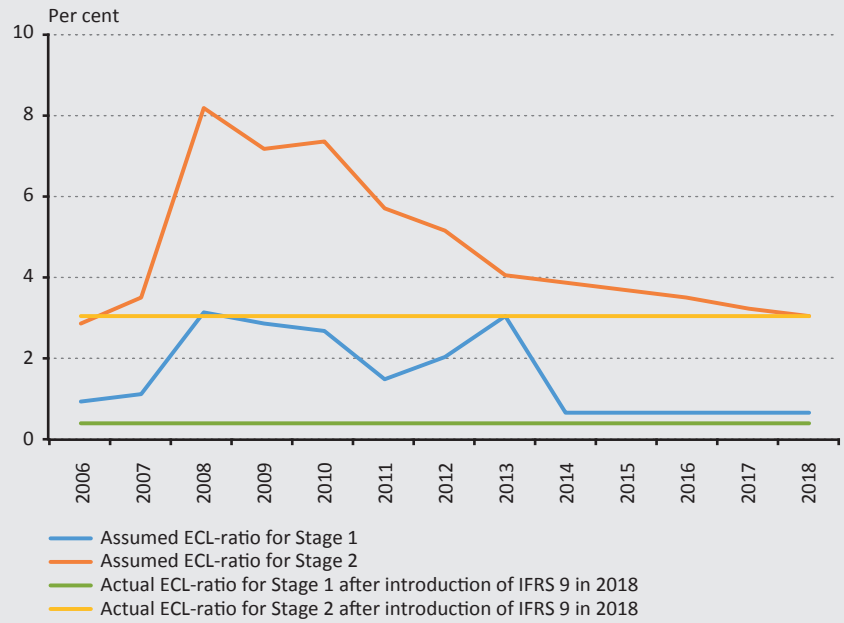
The lifetime ECL of Stage 2 loans is quantified as follows:

- we assumed the 'perfect foresight' already used for Stage 1 transactions. Thus, for all loans outstanding at the end of the *t*th, we apply the loss rates as per HAS between *t*+1 *t*+5 years. The latter parameters were chosen because the average residual maturity of the customer loan portfolio of banks was somewhat over 4 years in this period,
- the forward-looking ECL was discounted by the discount factors in line with the current interest rate environment,[17]
- from 2014, when banks' HAS impairments started to increase net income due to releases, Stage 2 ECL is calculated by interpolation between the value estimated for 2013 (the last year in the crisis) and the actual data for average ECL ratios according to IFRS 9 in 2018 (the year when IFRS 9 was introduced).

[17] The discount factor was calculated by estimating the average customer interest rate (effective interest rate). This was done by dividing the banking system's annual gross interest income by the portfolio of performing interest-bearing assets. The discount rate was calculated for the interest rates derived in this manner for the first four years.

The Stage 2 lifetime ECL values thus determined (and the Stage 1 ECL) are shown in *Figure 6*. It can also be seen there that the relative fluctuation of the Stage 2 ECL falls short of Stage 1, in line with the discussion in *Chapter 2*.

Figure 6
Time profile of annual ECL values assumed for the Stage 1 and Stage 2 portfolios



Note: Assumed ECL ratios are based on the author's calculations. Source of the actual data presented here: Háda (2019) Figure 6

The impairment in banks' income statements is calculated with the annual change in the assumed impairment volume for this portfolio segment as well.

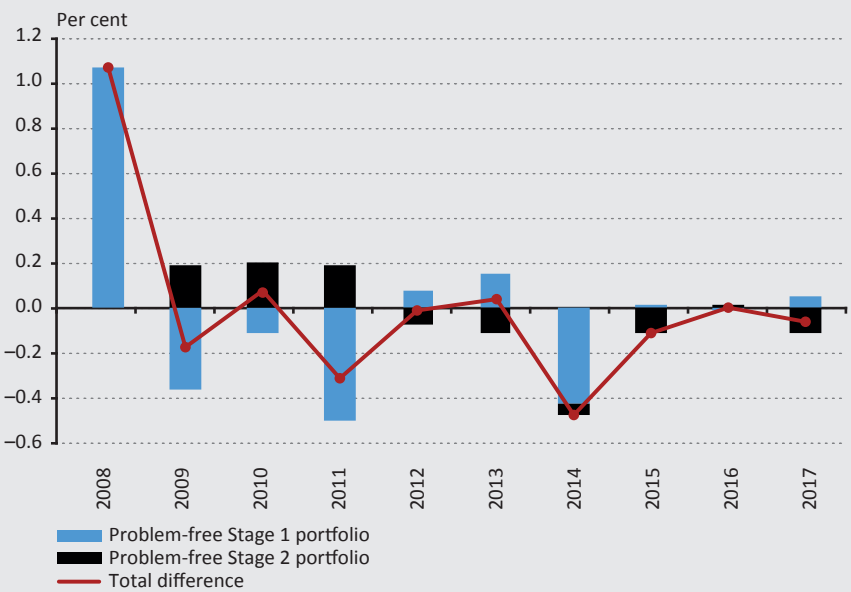
Total effect on the problem-free portfolio (Stage 1 + Stage 2)

Based on the above assumptions, the application of IFRS 9 to the problem-free portfolio at the end of 2008 would have required significant additional impairments as compared to HAS, while in the later crisis years additional releases would have been possible (*Figure 7*). All in all, during the period between 2008 and 2017, practically spanning an entire business cycle, impairment would have been the same under IFRS 9 as with HAS, because by the end of the period the ECL of the problem-free portfolio returned to the non-crisis state, where it had been before 2008. *Figure 7* also shows that additional impairment under IFRS 9 would have been influenced more by the ECL related to the portfolio remaining in the problem-free Stage 1 category, in other words: by the effect arising from the forward-looking

adjustment of risk parameters. This would have required provisioning of over 1 per cent of the banking system's balance sheet total in 2008 (HUF 320 billion). Compared to this, the migration of some of the problem-free portfolio into Stage 2 would have had a smaller effect, despite the substantial migration ratio (mostly because this migration would have taken place more gradually over the crisis years).

Between 2009 and 2011, when the net income-reducing impact of the problem-free Stage 2 portfolio is larger, the effect of the additional impairment of this portfolio segment exerted on the Gaffney–McCann parameter used for the size of the problem-free Stage 2 portfolio is more or less linear: by doubling the factor of 1.4 applied, which would entail the peaking of the Stage 2 transactions not in arrears at roughly 50 per cent of the total portfolio, the net income-reducing effect would be also almost doubled.

Figure 7
Additional impairment on the customer loan portfolio under IFRS 9 (relative to HAS) as a share of the balance sheet total, for the entire banking system (positive/negative values = higher/lower impairment)



5.2. Assumptions for sovereign and bank exposures

If IFRS 9 had been introduced prior to 2008, the forward-looking PiT correction would have been applicable to the risk parameters of sovereign and bank exposures, and the classification of exposures as Stage 2 should also have been considered. The latter is true despite the fact that credit institutions usually apply the IFRS 9

exemption for the so-called low default portfolios in the case of sovereign and sometimes also bank exposures. In other words, these exposures do not have to be classified as Stage 2 even if their risk has significantly increased since recognition, if remaining still low in absolute terms.

Nonetheless, the financial crisis that began in Hungary in 2008 was coupled with a sovereign debt crisis, which caused the government's risk premiums, such as its CDS spread, to spike (*Figure 8*) from close to zero before 2008 to 600–700 basis points. Hungary was repeatedly downgraded by credit rating agencies from 2008, and the country fell out of the investment category in 2011. Hungarian banks' risk premiums and their credit ratings, of the few institutions that had these at all, deteriorated in parallel with the sovereign rating.

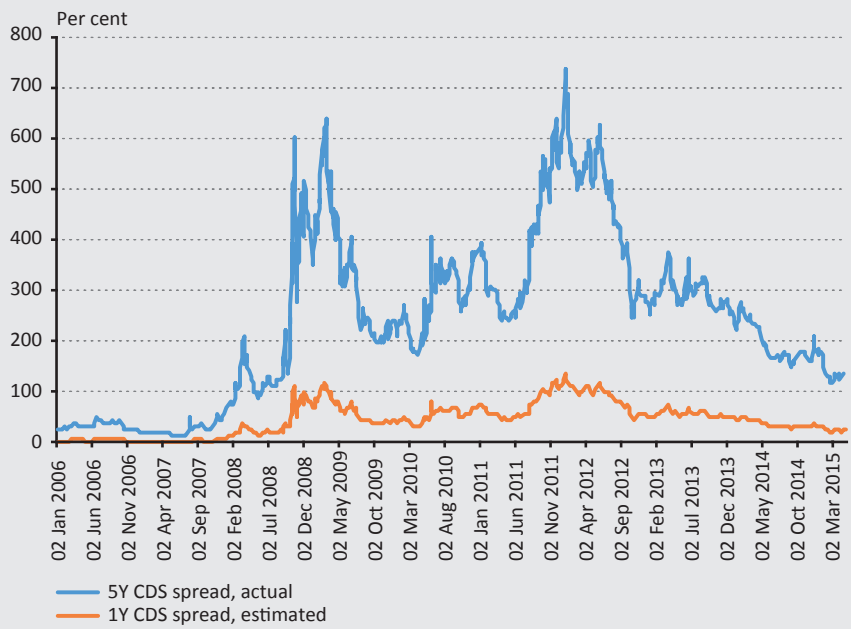
In the face of such significantly and objectively increasing credit risk, it would have been difficult to argue *against* the necessity to classify exposures vis-à-vis the Hungarian sovereign and perhaps even Hungarian banks as Stage 2 under IFRS 9. Therefore, our simulation also includes an estimation for this scenario.

In this, it is assumed that banks would have classified their Hungarian government bonds (in the banking book) as Stage 2 at the end of 2008 (as the surge in CDS spreads and the recourse to the IMF package occurred in late 2008), and they would have kept them there until the end of 2014. The government bonds in Stage 2 are assumed to receive the average 5-year CDS spread for the given year as lifetime ECL.[18] The basis for government bonds in Stage 1 is the 12-month ECL, which we assume to be equal to the average 1-year CDS spread as calculated from the 5-year CDS spread.

We have simulated the above impacts only for the sovereign portfolio, but no Stage 2 classification effect was quantified for bank exposures. This has several reasons: first, since most Hungarian banks had no readily measurable risk price indicators, a significant increase in credit risk would have been more difficult to establish here. Second, in the part of the banking sector owned by non-residents, the increase in credit risk could have been mitigated by the probability of support from the parent bank. Third, these bank exposures were also partly collateralised (with a low LGD). Furthermore, the amount of interbank loans in the Hungarian banking system was not really high (amounting to less than 5 per cent of banks' balance sheet total in 2008), and thus excluding this effect does not influence the overall picture.

[18] This is an acceptable benchmark as it is certain that the residual maturity of the government securities issued by the Hungarian state was around 3.5 years in early 2009 (*Bíró – Horváth 2020*), however, this includes the short-term treasury bills held by households, but excludes the typically longer-term bonds denominated in FX.

Figure 8
5-year and estimated 1-year CDS spread of the Hungarian state between 2006 and 2015



Note: The data on the 5-year CDS spread are from the MNB's Financial Stability Report, May 2015, Chart 13. The 1-year spread is the author's estimate.

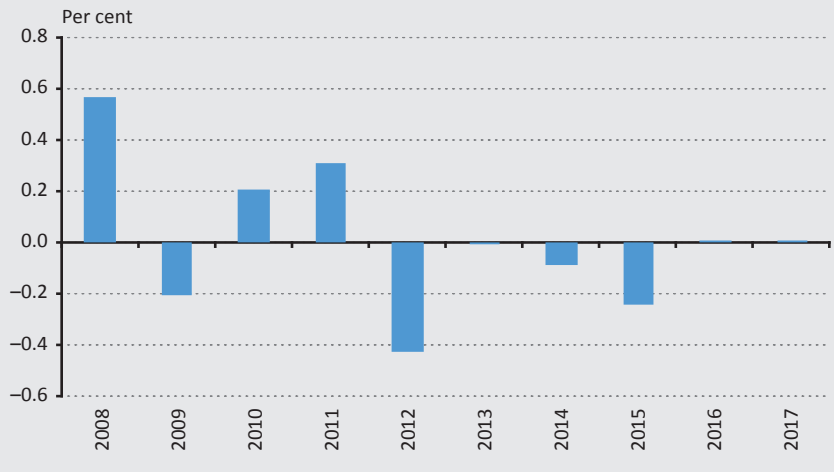
Of course, classifying the sovereign portfolio as Stage 2 in the simulation is a speculative decision, and it can be assumed that banks and the supervisory authority would have been eager to avoid this in the given situation. They could have found numerous arguments for this: first, the CDS spread shows the credit risk of government exposures denominated in FX, which is much greater by nature than the government debt denominated in the domestic currency (and Hungarian banks mostly held government securities denominated in forint). In addition, the loan arrangement signed with the IMF in 2008 also considerably reduced the default risk of the sovereign (although in Greece private investors also incurred losses in the end, despite the IMF–EC–ECB rescue package). However, when the stipulations in IFRS 9 are taken literally, the default risk of the Hungarian sovereign undoubtedly increased significantly in 2008 (along with other sovereigns in the EU), so this scenario was realistic.

The impairment in banks' income statements is calculated with the annual change in the assumed impairment volume for the sovereign portfolio segment as well.

Based on the above, the simulated additional impairments under IFRS 9 relative to HAS would mainly have been significant in 2008, the year when Hungarian government bonds would have been classified to Stage 2 and the rising CDS

spreads would have been first effective (*Figure 9*). After this, impairment would have reflected the dynamics of CDS spreads. Actually, since the price of Hungarian government securities was basically determined by the risk premium in this period, the introduction of IFRS 9 together with the significant increase in the chance for a state bankruptcy would have put the assessment of the banking book government bond portfolio on a quasi-mark-to-market basis.

Figure 9
Additional impairment on the sovereign portfolio under IFRS 9 (relative to HAS) as a share of the balance sheet total, for the entire banking system (positive/negative values = higher/lower impairment)



5.3 Assumptions for the problem-free FX loans

During the 2008–2013 Hungarian crisis episode, one of the most important sources of the financial system's vulnerability was undoubtedly the household debt in FX, which was mostly denominated in Swiss francs. Since retail FX debtors had no natural currency hedge (FX income), the depreciation of the forint, mainly against the Swiss franc, that started after 2008 had a substantial negative impact on their financial position. As *Figure 10* shows, the forint had already lost almost 20 per cent of its value against the Swiss franc by late 2008 relative to 2007, and the depreciation was over 60 per cent by 2011. In most cases, the repayment instalments of Swiss franc debtors increased even more, because banks failed to pass on, through customers' lending rates, the reduction on Swiss franc interest rates that occurred at that time, and instead of that, banks made unilateral interest increases.

Although the IFRS 9 standard has no rules related specifically to FX loans, a major exchange rate shock affecting the borrower is difficult to interpret in any way other than a significant increase in credit risk since recognition, in other words an event

triggering Stage 2 classification under IFRS 9. Although in such a situation banks would have definitely tried to separate the borrowers with an appropriately low payment-to-income ratio that prevented a substantial impact of the exchange rate shock on their financial position, due to the massive size of the shock and the loose lending conditions that prevailed prior to 2008, there would probably have been only a handful of such cases. Therefore, the simulation used a conservative approach and estimated a scenario in which banks would have been forced to reclassify all problem-free household FX loans as Stage 2. It is assumed that this would have occurred at the end of 2009, since the forint exchange rate had already depreciated by 30 per cent during the year relative to the pre-2008 figure, when the majority of the Swiss franc loans were originated.

The same assumed Stage 2 ECL is used for quantifying the relevant impairment effects as presented in *Subchapter 5.1*. Although the Stage 2 ECL calculated there also contains corporate portfolio data, the distortion arising from this does not substantially influence the overall picture, as the NPL ratios and loss ratios developed similarly in the household and the corporate portfolios. Regardless of the FX effect, the classification as Stage 2 is not duplicated for the loans that had already been classified as Stage 2 due to the rating downgrade, as shown in *Subchapter 5.1*, and so no additional impairment is recognised for these due to the Stage 2 classification on account of their being denominated in a foreign currency, because they were already Stage 2 due to the rating downgrade (and, of course, the same goes for non-problem-free FX loans).

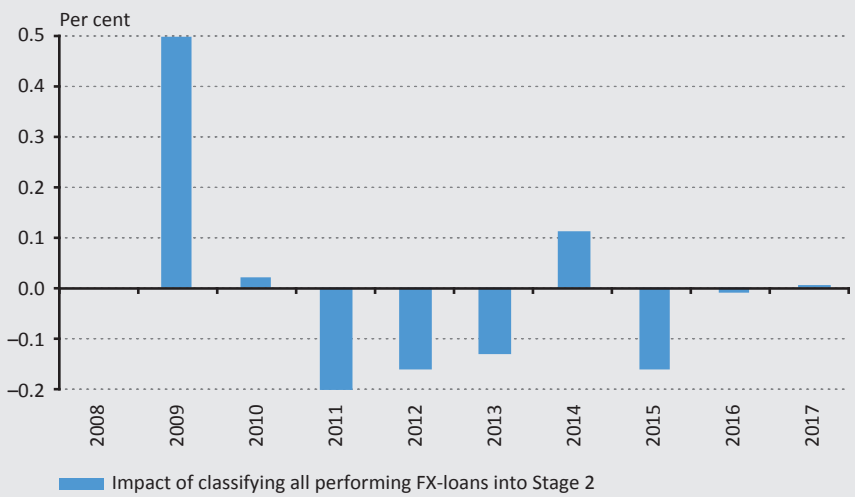
Figure 10
CHF/HUF rate (average of January 2007–September 2008 = 100)

Source: MNB

The impairment in banks' income statements is calculated with the annual change in the assumed impairment volume for the reclassified problem-free FX loans as well.

Accordingly, the simulation shows that the additional Stage 2 classification of the household FX loan portfolio, affecting the portion not already classified as Stage 2 due to the rating downgrade and other indicators, would have mainly caused a major one-off loss to Hungarian banks in 2009 (*Figure 11*), the year when the reclassification would have occurred. After this, the impairment of this portfolio segment would have been determined by the PiT corrections based on forward-looking information as applied to lifetime ECL (as shown in *Subchapter 5.1*).

Figure 11
Additional impairment on the household FX loan portfolio under IFRS 9 (relative to HAS) as a share of the balance sheet total, for the entire banking system (positive/negative values = higher/lower impairment)



6. Results of the simulation

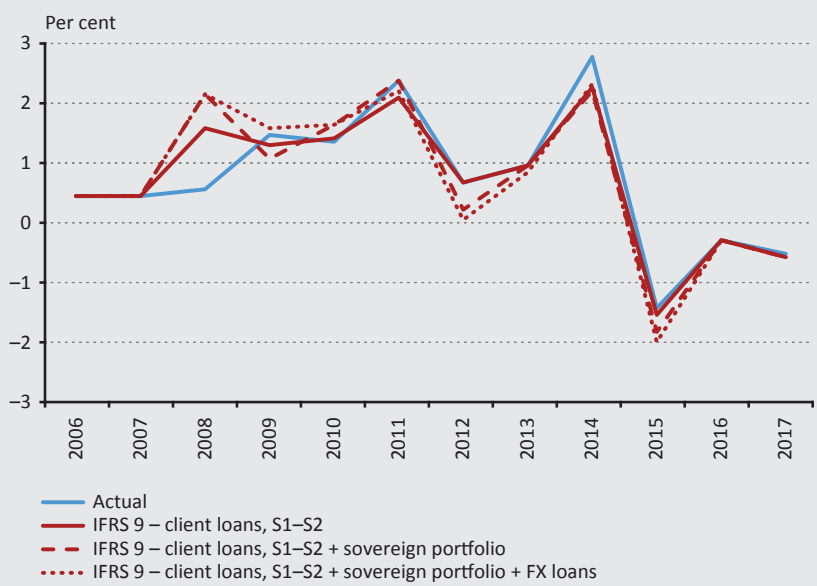
The results of the simulation are presented by layering the above three effects upon each other, as their partial effect on annual impairments has already been illustrated on separate figures above. When calculating the combined impact, first only the effect of the impairments for the Stage 1 and Stage 2 problem-free loans is estimated (because this is the least country- and position-specific, it simply results from the logic of IFRS 9). After this, the effects of the reclassification of the sovereign portfolio as Stage 2 are quantified, and then the classification of the FX loan portfolio as Stage 2 is added to that.

The results of the simulation corroborate the findings in the literature: if IFRS 9 had been introduced in Hungary prior to the 2008–2013 crisis episode, the banking system's losses and recapitalisation needs would have been more front-loaded, materialising mostly during the onset of the crisis in 2008–2009. The more factors are taken into account, the more pronounced this effect is.

In themselves, the PiT-corrected Stage 1 impairment for problem-free customer loans and reclassification of some of the problem-free customers as Stage 2 exert the greatest impact: this would have been enough to reduce the strong pre-tax profits of the banking sector in 2008 to zero (*Figure 13*). In exchange, banks' losses would have been smaller in 2011–2014. It is important to see that the introduction of IFRS 9 would not have affected the amount of banks' actual total credit losses over the whole economic cycle, only the distribution over time of the recognition and reversal (!) of the losses.

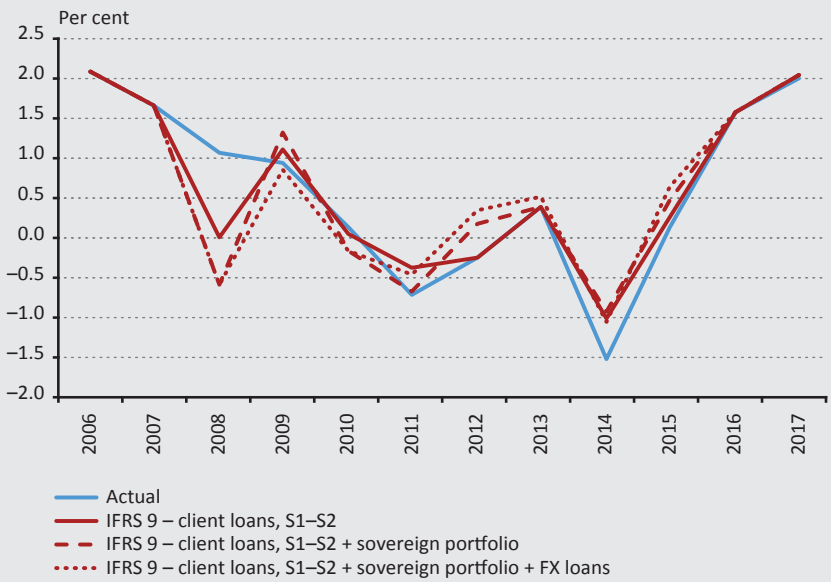
If the IFRS 9 effects simulated for the problem-free customer loans is supplemented with the classification of sovereign exposures to Stage 2, the losses to be booked in 2008 would have been even more dramatic (*Figure 12*), making 2008, the eve of the crisis, the year with the greatest losses during the entire crisis episode. Added to this, the reclassification of all the problem-free FX loans as Stage 2 would have resulted in only a minor increase in losses, mostly in 2009, which would have been followed by steadily diminishing reversals distributed over the following years.

Figure 12
Annual impairment recognised by the banking sector in the simulated scenarios



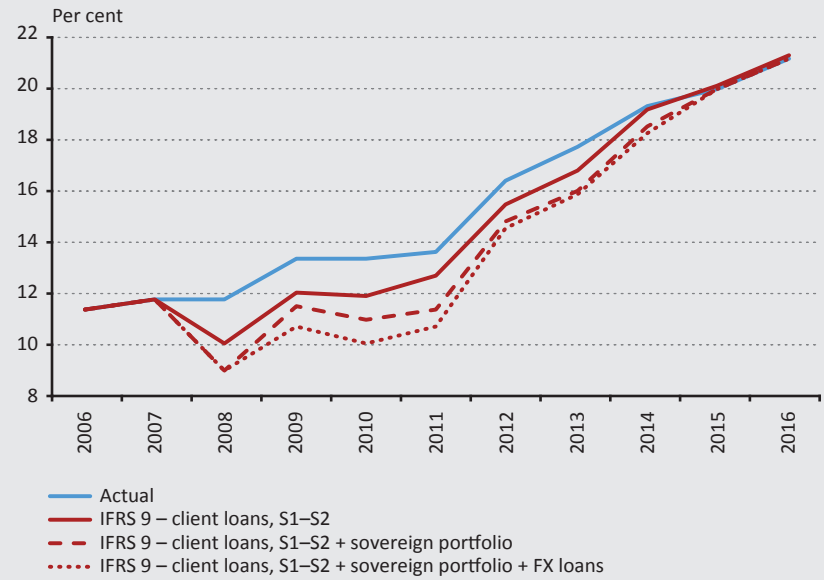
It should be noted that when the effects of all three simulated factors are taken into account, the application of IFRS 9 would have completely transformed the dynamics of the banking system's profitability. In reality (under HAS), after a final strong year in 2008, banks' profits declined practically continuously until 2014, but if IFRS 9 had already been applied, they would probably have experienced improving profitability following a huge loss in 2008. It cannot be ruled out that this latter scenario, i.e. the quicker recognition of losses, would have had a more positive effect on banks' willingness to lend.

Figure 13
The banking sector's pre-tax profits in the simulated scenarios



On the other hand, the introduction of IFRS 9 would have placed the banking system's capital adequacy under great pressure much sooner: the simulation shows that, *ceteris paribus*, the sector-wide 11.8-per cent capital adequacy ratio in 2008 would have diminished by 23 per cent (2.7 percentage points) to 9.1 per cent (*Figure 14*) if IFRS 9 had applied. If banks' owners had wished to maintain the same capital adequacy level until 2011 as in reality under HAS, they would have had to implement a capital increase amounting to 2.5–3.0 per cent of the banking system's risk-weighted assets (RWA) in 2008. This would have amounted to HUF 600 billion, roughly a quarter of the actual own funds of the banking system in 2008 or about 2 per cent of Hungary's GDP back then, in other words it would have been a massive amount. In the absence of this, banks would have been required to make stronger deleveraging efforts.

Figure 14
The banking sector's capital adequacy ratio in the simulated scenarios



All in all, the owners of the banks in need of a capital injection would have had much less time to prepare for the losses and arrange the capital increases. This would have entailed the risk that Hungarian banks respond to the emerging situation by even more deleveraging, which, by definition, would have been even more procyclical behaviour. Had IFRS 9 been introduced, the banking groups in the region would have been faced with a similar (though maybe less severe) situation in several countries at the same time, and in extreme cases this would have jeopardised certain regional banking groups' ability or willingness to recapitalise their subsidiaries.

Admittedly, however, macroprudential supervision has come a long way since 2008, and almost at the same time when IFRS 9 was introduced, countercyclical elements appeared in regulation that were not available to supervisors in 2008, such as the countercyclical capital buffer and the capital conservation buffer. In this context, the 2.7-percentage point decrease in the capital adequacy ratio simulated for the IFRS 9 introduction in 2008 does not seem that bad. Most of it could have been offset by an adequately calibrated countercyclical capital buffer (if the buffer would have been at its maximum of 2.5 per cent on the eve of the crisis, and then it would have been immediately reduced to zero by supervisors). In other words, macroprudential supervisors would have been able to offset the procyclical effects of IFRS 9, although this would have also meant that the buffer could no longer be used to encourage actual countercyclical bank behaviour, only to neutralise the immediate capital effects of the new accounting standard.

7. Assumptions influencing the results

There are several factors that make it likely that in reality the procyclical effects of IFRS 9 would have been more muted than presented here:

- *More optimistic expectations instead of perfect foresight*: since the deterioration in banks' portfolio quality was a gradual, protracted process after 2008 (the volume of NPLs only peaked in 2012–2013), the expectations would only have caught up with the worsening situation later. This is all the more likely as the deterioration of certain economic indicators, especially the CHF/HUF rate, which is key from the perspective of FX loans, reached numerous historic highs, and most analysts did not expect this. It is therefore not unrealistic to assume that in reality banks would have calculated the forward-looking ECL of Stage 1 and Stage 2 portfolios with more optimistic parameters than what actually occurred, especially because they would have been interested in doing so. And due to the lack of earlier experience from crises of such magnitude, it would have been difficult to quantify the development of actual credit risk.

- *Supervisory interventions*: just as in present Covid-19 crisis, regulatory bodies would have had strong incentives at their disposal to prevent the use of loss estimates for accounting purposes that would have endangered financial stability. In this manner, they would probably have been able to prevent the classification of the entire FX loan portfolio and sovereign exposures as Stage 2, even if this had run counter to the spirit and expectations of the IFRS 9 standard.

All in all, it can be assumed that the authorities and market participants would have tried to make use of the large leeway in the estimation of ECL due to IFRS 9 to mitigate procyclical effects.

8. Conclusions

This analysis examined how much stronger procyclical effects would have been exerted on the Hungarian banking system during the crisis episode of 2008–2013 if the IFRS 9 standard based on expected credit loss had been introduced before that. The simple simulation model prepared for this showed that, in line with the findings in the literature, the recognition of the Hungarian banking system's losses during the crisis would have been much more front-loaded and occurred in 2008 or 2009 if IFRS 9 had been applied. In parallel with this, banks' capital adequacy would have sustained a major shock of over 20 per cent (−2.7 percentage points) at the end of 2008, the eve of the crisis. To restore this, bank owners would have been forced to make relatively large capital injections amounting to 2 per cent of Hungarian GDP, or, failing that, compel their banks to press ahead with even more deleveraging.

Overall, the analysis confirmed the perception that IFRS 9 increased bank impairment relative to the earlier rules, while making the dynamics of impairments more procyclical. In reality and in this simulation as well, this is because under IFRS 9 the impairment of Stage 1 and Stage 2 transactions has to be aligned with the current state of the economy (point-in-time correction), and the transactions with an increased risk since recognition that are nevertheless performing are to be classified as Stage 2; all of this front-loads the recognition of losses at the onset of a crisis. Meanwhile, the standard does not provide banks a proper opportunity to offset this by establishing more impairments in the 'good times' to prepare for a crisis.

It also has to be underlined that although the reduction in capital resulting from the simulation seems to be very large, it tends to suggest that the procyclical effects of IFRS 9 are manageable. First, the 2008–2013 Hungarian crisis episode was extreme by any standard, compounded by a balance of payments crisis, a sovereign debt crisis and an FX debt crisis. Under 'normal' recession circumstances, the procyclical effect of the standard may also be more subdued. Second, the instruments of macroprudential supervisors have expanded considerably since 2008, with the addition of tools (countercyclical capital buffer, capital conservation buffer) which – if used wisely – may have been able to neutralise the major procyclical effects seen in the simulation. However, it must also be added that the primary objective of introducing these instruments was to offset banks' inherent procyclical behaviour, rather than to neutralise the procyclical accounting effects that did not exist before IFRS 9. This increased the complexity of the aspects to be taken into account by supervisors.

Therefore, in the future, supervisors need to pay more attention to managing the procyclical effects arising from banks' recognition of losses, and signs of this can already be seen in the current crisis related to Covid-19.

References

Abad, J. – Suarez, J. (2017): *Assessing the cyclical implications of IFRS 9 – a recursive model*. ESRB Occasional Paper Series No 12, European Systemic Risk Board, July. https://www.esrb.europa.eu/pub/pdf/occasional/20170717_occasional_paper_12.en.pdf

Balás, T. (2009): *Comparison of the indicators describing the loan portfolio quality of the banking sector*. Report on Financial Stability, Update, Background Study III, Magyar Nemzeti Bank. https://www.mnb.hu/letoltes/stabjel-3-balas-200911-en.pdf

Bíró, G. – Horváth, D. (2020): *Újabb lépés segíti az államadósság hátralévő futamidejének növelését* (*Another step towards extending the residual maturity of government debt*). Szakmai cikk (Article), Magyar Nemzeti Bank. https://www.mnb.hu/letoltes/biro-gabriella-horvath-daniel-ujabb-lepes-segiti-az-allamadossag-hatralevo-futamidejenek-noveleset.pdf. Download date: 16 December 2020.

Boer, M. – Gringel, S. (2020): *Modeling ECL during the COVID-19 pandemic: Providing flexibility to avoid procyclicality*. Institute of International Finance, April. https://www.iif.com/Portals/0/Files/content/Regulatory/04_07_2020_impact_ecl_modeling.pdf. Download date: 16 December 2020.

Borio, C. (2018): *New loan provisioning standards and procyclicality*. BIS speech, 24 October. https://www.bis.org/speeches/sp181024.htm. Download date: 16 December 2020.

Csekei, E. – Inzelt, Gy. – Szakál, Gy. (2018): *Nagy átállás a magyar bankoknál: mit hozott az új számviteli rendszer?* (*Hungarian banks in transition: what changes has the new accounting system introduced?*) Portolio.hu, 5 July. https://www.portfolio.hu/bank/20180705/nagy-atallas-a-magyar-bankoknal-mit-hozott-az-uj-szamviteli-rendszer-290968. Download date: 16 December 2020.

EBA (2020): *Guidelines on legislative and non-legislative moratoria on loan repayments applied in the light of the COVID-19 crisis*. EBA/GL/2020/15, consolidated amended version issued, Consolidated version updated on 2 December. https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Guidelines/2020/GL%20amending%20EBA-GL-2020-02%20on%20payment%20moratoria/960349/Final%20report%20on%20EBA-GL-2020-02%20Guidelines%20on%20payment%20moratoria%20-%20consolidated%20version.pdf

ECB (2020): *Identification and measurement of credit risk in the context of the coronavirus (COVID-19) pandemic*. Letter to the 'To the CEO of the significant institution', SSM-2020-0744, Frankfurt am Main, 4 December. https://www.bankingsupervision.europa.eu/press/letterstobanks/shared/pdf/2020/ssm.2020_letter_credit_risk_identification_measurement~734f2a0b84.en.pdf

ESRB (2019): *The cyclical behaviour of the ECL model in IFRS 9*. European Systemic Risk Board, March. https://www.esrb.europa.eu/pub/pdf/reports/esrb.report190318_reportonthecyclicalbehaviouroftheECLmodel~2347c3b8da.en.pdf?5c889599e33525ff8da981347ea84ce3

Gaffney, E. – McCann, F. (2019): *The cyclicality in SICR: mortgage modelling under IFRS 9*. Working Paper Series No 92, European Systemic Risk Board, May. https://www.esrb.europa.eu/pub/pdf/wp/esrb.wp92~bf769a68b8.en.pdf

Háda, A. (2019): *Banking Supervisors Tracing the Transition to IFRS 9*. Financial and Economic Review, 18(4): pp. 77–111. http://doi.org/10.33893/FER.18.4.77111

Huizinga, H. – Laeven, L. (2019): *The procyclicality of banking: evidence from the euro area*. ECB Working Papers No 2288, European Central Bank, June. https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2288~e0622ceb43.en.pdf

Plata Garcia, C.T. – Rocamora, M. – Rubio, A. – Villar Burke, J. (2017): *IFRS 9: Pro-cyclicality of provisions. Spanish banks as an illustration*. BBVA Research, Madrid, October. https://www.bbvaresearch.com/wp-content/uploads/2017/10/2017-10-IFRS-9-Pro-cyclicality-of-provisions-in-Spanish-banks-1.pdf

ESG Investing: The Use of ESG Ratings in a Smart Beta Strategy*

Balázs Stempler

ESG investing has recently been growing in popularity but the range of investment products available could still be widened. One possible approach is a combination of ESG ratings and the smart beta strategy that modifies index weighting based on a factor; thus, it contains elements from both active and passive fund management. The hypothetical funds created in this paper using this method achieved returns of over 50 per cent between 2015 and 2019, while the benchmark EURO STOXX 50 only provided a 19 per cent profit for investors during the five-year period. ESG ratings were found to be significant as a variable, suggesting that they can influence returns but other factors such as size or earnings growth have higher explanatory power. Also, while currently the possibilities for ESG investments are limited in Hungary, market players are starting to realise the potential of ESG, and with the suggested approach new investors could be attracted by funds.

Journal of Economic Literature (JEL) codes: G11, G15, G23, G24

Keywords: ESG investing, fund management, stock indices, smart beta

1. Introduction

ESG[1] investing has been expanding rapidly in terms of volume as investors are becoming more conscious of the allocation of their savings. In this paper, I examine how fund managers can fulfil this demand from their clients with a new product type.

In order to determine the environmental, social, and governance performance of a company, ESG ratings are created by agencies. However, these ratings can have more applications than just filtering out the laggard firms. The goal of this paper is to show a way in which stronger focus could be put on ESG ratings with the use of

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

Balázs Stempler is a Finance MSc Student at Budapest University of Technology and Economics.
E-mail: stemplerbalazs@gmail.com

An earlier version of this paper won 1st place in the 2020 MNB-BME Research Competition in the green financing questions category. I would like to thank András Póra and Dr. András Bethlendi for their guidance throughout the process.

The English manuscript was received on 7 September 2020.

DOI: http://doi.org/10.33893/FER.20.2.91116

[1] ESG: environmental, social, governance

the smart beta investing strategy, aiming for both higher returns and encouraging companies to try to perform better in socially important areas.

The paper showcases an investment area that is becoming more and more popular every year, and it helps to understand how fund managers can improve their services and shift to a more socially desirable way of conducting business even in a highly profit-oriented industry. I seek to understand the influence of ESG ratings on returns and I also show the method's applicability to the current Hungarian fund market.

2. The concept of ESG investing and its popularity

ESG investing refers to the use of ESG factors in the selection of companies for investment, i.e. putting more focus on those that function in a "socially responsible" way. The abbreviation comes from the three areas that are considered regarding the organisation's impact: environmental, social, and governance activity. ESG investing was born in a society that came to believe that focusing solely on generating profit should not be the way any company operates. Nowadays, when climate change is becoming an issue in our everyday life and news regarding mistreatment of workers can reach the majority of our population in minutes, a corporation that disregards social topics in favour of more profit puts its reputation at risk.

As ESG aspects in society became more and more important, they were soon incorporated into investment decisions as well. According to an *Ernst & Young* information material[2], since 2012 ESG investing has grown by 107 per cent every year and in 2017 18 per cent of assets belonged to such investments. The inflow of capital to ESG funds has increased even more in the last few years: *Iacurci*[3] reports that in 2019 USD 20.6 billion were invested in mutual funds and exchange-traded funds that focus on ESG investing, which is four times larger than the amount in 2018. The report also identifies that the number of funds that offer such investments has increased to over 300 globally.

Alongside ESG investing, there are several terms that are often used interchangeably in discussions, such as sustainable investing, socially responsible investing (SRI), green investing and ethical investing. They share a common goal: to make investment decisions based on more than just profitability. However, differences between these approaches can be found. Socially responsible investing is rooted in the principal social issues of the last century (e.g. the civil rights movement

[2] *Sustainable Investing: the millennial investor*. Ernst & Young, 2017. https://www.ey.com/Publication/vwLUAssets/ey-sustainable-investing-the-millennial-investor-gl/$FILE/ey-sustainable-investing-the-millennial-investor.pdf. Downloaded: 28 December 2020.
[3] Iacurci, G.: *Money moving into environmental funds shatters previous record*. CNBC. https://www.cnbc.com/2020/01/14/esg-funds-see-record-inflows-in-2019.html. Downloaded: 28 December 2020.

and the opposition to the Vietnam War in the USA), and is based solely on values, unlike modern ESG which uses non-traditional data to assess company performance (*Townsend 2020*). Ethical investing resembles SRI due to its focus on morality, while green investing refers only to the environmental pillar of ESG. Finally, sustainable investing is generally concerned with the goal of sustainable development, i.e. meeting present needs without compromising the ability of future generations to do the same. A less common but nonetheless relevant investment strategy is investing based on religious beliefs. The idea is to select only companies that are in line with for example Christian or Islamic values. Faith-based investing can be considered a subset of socially responsible investing, which bases its values on religion.

In general, there are three different methods to conduct ESG investing:

1. Negative screening: avoiding investments in companies that operate in a sector that damages the environment or society,

2. Positive screening: selecting companies that are known best for their responsible operations,

3. Impact investing: finding a desirable goal and investing in companies working on achieving that goal.

Obviously, negative screening filters out only certain areas, whereas positive screening and impact investing can restrict investments to an even smaller number of possibilities. While all of these approaches put more focus on ESG considerations than regular investment strategies, ESG investing should be considered on a scale because of the many options to choose from, and it is recommended to be clear whether we mean best-in class selection or negative screening when we talk about the topic.

Unsurprisingly, young generations especially favour the sentiment of ESG investing as issues such as climate change and social equality are closer to their mindset. Apparently, 95 per cent of millennials find ESG investing appealing, but it is also important to note than they are the not the only ones: 85 per cent of all answers express some interest in the concept[4]. However, age is far from being the only factor that affects the attractiveness of ESG investing as gender, income, and education can also impact investors' attitude towards this investment strategy (*Cheah et al. 2011*).

The moral benefit of ESG investing is undoubtable; if investors cannot go to bed knowing that their money is used to finance destructive operations, ESG investing

[4] *Morgan Stanley Survey Finds Investor Enthusiasm for Sustainable Investing at an All-Time High*. 12 September 2019. https://www.morganstanley.com/press-releases/morgan-stanley-survey-finds-investor-enthusiasm-for-sustainable-. Downloaded: 28 December 2020.

becomes not merely an option to consider but the only option. However, since not every investment decision is based on morality, more aspects need to be reviewed.

As already mentioned, ESG-oriented strategies restrict the number of available instruments for investment which logically leads to missing out on those returns as well. Furthermore, the number of industries excluded from the investment range can have a significant impact on the risk-adjusted returns, suggesting that there is an opportunity cost to negative screening (*Trinks – Scholtens 2015*). As highlighted by *Muller*[5], some companies can claim to be environmentally and socially responsible but use it only as a marketing trick instead of actually functioning that way (e.g. the Volkswagen diesel scandal), which is often referred to as "greenwashing". Also, what is considered acceptable from an ESG standpoint is not set in stone. The topic is subjective and widely discussed among thinkers which makes any decision about ESG more complex. From a financial point of view, an additional factor to bear in mind is that if extreme restrictions are applied to the portfolio, concentration risk increases due to the lack of proper diversification (*Arribas et al. 2019*).

However, on the other side of the argument it can be claimed that filtering out companies does not necessarily reduce returns. For example, *Bernow et al.* (*2017:3*) point out that reputational damage can be a major risk-factor for companies. By filtering out those companies that are likely to face lawsuits, pay fines for their actions or have their brands associated with bad behaviour, investors can actually increase their returns by not having these stocks in their portfolio.

Table 1
Returns of selected indices and their ESG versions

Index name	2016	2017	2018	2019	Cumulative return
S&P 500	9.5%	19.4%	–6.2%	28.9%	58.08%
S&P 500 ESG Index	9.9%	18.7%	–5.9%	30.6%	60.32%
FTSE 100	16.8%	13.1%	–9.5%	19.2%	48.80%
FTSE 100 ESG Select	20.4%	10.7%	–8.9%	17.7%	42.91%
MSCI ACWI	7.9%	24.0%	–9.4%	26.6%	53.46%
MSCI ACWI ESG Index	7.2%	24.1%	–9.3%	28.0%	54.45%

[5] Muller, C. (2020): *The Pros and Cons of Socially Responsible Investing*. DoughRoller. https://www.doughroller.net/investing/pros-and-cons-of-socially-responsible-investing/. Downloaded: 28 December 2020.

According to an *Etergino Group* report[6] in 2018, between 2009 and 2017 the MSCI ACWI ESG Index produced almost identical returns (0.1 percentage point higher per annum) than the original MSCI ACWI Index which captures the performance of many developed and emerging equity markets. In the MSCI ACWI ESG Index, there were 1,904 stocks selected, while the non-ESG index had 2,450 components in 2017. The ESG index removes companies with the weakest ESG profiles and changes the original weighting as well. The similarity of results may indicate that the reduction of options for investment consideration is offset by the effect of decreasing operational and reputational risks associated with better ESG profiles.

To obtain a slightly more representative picture, I collected the most recent annual returns of three indices at the time of writing and compared them to their ESG versions (*Table 1*). The difference is larger than the 0.1 per cent mentioned earlier but overall, the returns are still similar on a yearly basis. The trend based on the data seems to be that if the ESG index outperformed or underperformed the original index in one year, the opposite would happen in the following year. While the ESG version of the S&P 500 outperformed its benchmark, the returns of the FTSE 100 were not matched by its modified version. The difference between the above mentioned MSCI ACWI and its ESG counterpart was the least significant among the three pairs.

The previously quoted statistics reflect usual market conditions. On the other hand, the Covid-19 pandemic and its initial negative effect on stock markets give us a chance to look at stressed economic circumstances, to see how ESG performs when the economic outlook worsens. As a consequence of the global pandemic, in March 2020 stock markets suffered some of their worst days ever recorded. Under market stress, the focus of investment turns to safe havens such as gold and USD, while investors that stay on the stock market shift their attention (and capital) to defensive stocks that outperform cyclical assets in a downturn. If the use of ESG can actually reduce risks, ESG-conscious corporations should have outperformed the general market under these conditions. *Hale* compared the first-quarter returns of 206 funds and found that ESG-focused ones performed better. 70 per cent of ESG funds achieved better than average returns in their markets and only 11 per cent of such funds belonged to the worst quartile based on performance. He examined the geographic distribution as well: 10 of 12 US ESG funds managed to beat their benchmark, on average by over 1 percentage point, while in other developed markets each ESG fund outperformed its benchmark, with a surplus return of close to 2 percentage points. He found that a contributing reason to the phenomenon is that ESG funds do not include, or at least underweight, some stocks in the energy

[6] *The Benefits of ESG Investing: How Socially Responsible Investing Can Drive Outperformance*. Etergino Group, 2017. https://us.rbcwealthmanagement.com/documents/170410/170426/18-WG-774_Etergino+Group_Benefits+of+ESG+Investing+Flyer_evite.pdf/2f645a56-155e-4b55-8bc2-3e1a61fc84b6. Downloaded: 28 December 2020.

sector that did especially poorly in March. However, he notes that this observation is only secondary in significance based on his attribution analysis. The primary reason, according to him, is that companies with higher ESG ratings treat their stakeholders better and function in a more responsible way which makes them perfect candidates to survive unexpected shocks[7].

3. ESG ratings

3.1. The benefits of ESG ratings

If investors wish to invest their capital based on ESG considerations, they face a time-consuming obstacle, as it can be a cumbersome task to determine how ESG-friendly a company is in reality. An initial negative screening seems to be the simplest part; some industries can be excluded objectively from ESG investing, e.g. tobacco. However, after having determined an industry-level classification, a company-specific decision proves to be more difficult.

An organisation might build its brand to appear focused on ESG, which creates an unconscious bias in the individual who makes the investment decision. This bias can only be overcome with detailed research which is difficult for multiple reasons:

1. Companies are motivated to highlight positive views about themselves in their reports, while possibly attempting to bury potentially damaging information about their environmental or social performance. Such practices were uncovered in the energy sector by *Talbot – Boiral* (*2018*).

2. Regulations differ significantly among regions and countries. The European Union (in the Non-Financial Reporting Directive) requires large companies to publish sustainability reports based on international or national standards, such as the ISO 26000 or OECD guidelines, while in the United States corporate sustainability reports are not mandatory. These reports could serve as one of the sources of ESG information but sustainability reporting still often contains only a few, poorly detailed figures which are not enough for investors to make a well-founded decision[8].

3. Companies usually use metrics that are considered important in their own industry, making the situation even more complicated for investors who do not possess considerable knowledge of several industries.

[7] Hale, J. (2020): *Sustainable Funds Weather the First Quarter Better Than Conventional Funds*. Morningstar. https://www.morningstar.com/articles/976361/sustainable-funds-weather-the-first-quarter-better-than-conventional-funds. Downloaded: 28 December 2020.
[8] *What investors want to know about ESG metrics*. EY Reporting, 2018. https://www.ey.com/en_gl/assurance/what-investors-want-to-know-about-esg-metrics. Downloaded: 28 December 2020.

All of these difficulties can be understood as advantages of ESG ratings which are made by analysts specialised in particular businesses. With ESG ratings, all the complex, time-consuming tasks are left to professionals who translate them into a final figure that summarises the company's ESG performance. The end-user (whether it is a retail investor or a fund manager) only needs to make sure that the methodology used by the rating agency is in line with their expectation and can then comfortably rely on the result.

3.2. ESG rating agencies and the MSCI rating methodology

The emergence of ESG rating organisations preceded the substantial volume surge in ESG investing seen in the last few years. By 2010 there were already ten agencies providing this service. Back then, these agencies differed significantly in their rating methodologies and not a single industry was unanimously excluded by them; areas were often only marked as "controversial" (*Escrig-Olmedo et al. 2010*). The agencies also took into account different standards, some basing judgement on e.g. ISO standards, the Kyoto protocol and/or the UN Declaration of Human Rights.

However, the ESG rating industry has changed since its inception. *Douglas et al.* (*2017*) highlighted that the industry underwent consolidation, thanks to several acquisitions that were made in order to provide more comprehensive services to customers. Some of the ten specialised agencies examined in 2010 still operate, but larger market players that provide additional databases appeared, indicating how the inclusion of previously rarely considered ESG factors became a part of mainstream investment decisions.

Such database providers include Bloomberg, FTSE Russell, MSCI and Thomson Reuters. They offer ESG ratings, decomposition of individual factors and several indices (*Douglas et al. 2017:5*). To access the details of their calculations, one must pay a fee, but MSCI, unlike its competitors, provides the final ratings free of charge, thus making its service attractive for retail investors as well, while fund managers and professional investors will have access to these databases anyway.

A recent publication finds that, compared to one decade ago, agencies have improved their models by including new criteria to better reflect new challenges, but the process is still not perfect and one should always become familiar with the details of the methodology used before accepting the final results (*Escrig-Olmedo et al. 2019*).

MSCI provides an overview of its methodology on its website which I will now summarise to understand how final ESG ratings are decided[9]. The other goal of this demonstration is to introduce this methodology due to its relevance to the investing strategy I later discuss.

MSCI assesses ESG performance based on both quantitative and qualitative data. They identified 37 Key Issues that could expose an organisation to ESG risks, but they also provide an opportunity if those risks are managed properly. The Key Issues belong to environmental, social and governance pillars. The pillars are then divided into ten themes: climate change, natural resources, pollution & waste and environmental opportunities in the environmental pillar; human capital, product liability, stakeholder opposition and social opportunities in the social pillar; and corporate governance and corporate behaviour in the governance pillar. The issues considered to be key are reviewed every year and updated if necessary.

Key Issues are weighted differently based on two factors on an industry level: the level of contribution to environmental and social impact, and the expected time frame for the risk/opportunity to materialise. According to MSCI's example, a high impact and short-term issue has a three-times higher weight than a low impact, long-term issue.

For each Key Issue, both the level of risk exposure and the quality of risk management are taken into account to determine how a company fares in an industry. The idea behind this is that if a company has high exposure to some risk (for example using outdated, polluting technologies), higher risk mitigation is required from their management, whereas a company with low exposure can get away with moderate risk management. Controversies are also given attention: based on the scale and nature of the impact, every event is categorised and assigned a weight to include into the final calculation. MSCI also gives organisations the chance to offer additional data to obtain a more comprehensive picture of the firm's activity.

The final result is a rating between AAA and CCC. Similar to credit ratings, AAA is considered the best. Each of the seven ratings covers one seventh of the 0–10 scale which is the final result of the calculations committed. Currently thousands of equities are rated, reviewed, and updated on a yearly basis. The final ESG rating, the rating history, the rating distribution in the industry, and examples of areas where a company performs well and poorly are available free of charge but to access to weights and detailed scores, one must pay a premium.

[9] MSCI ESG Research (2019): *ESG Ratings. Measuring a company's resilience to long-term, financially relevant ESG risks*. https://www.msci.com/documents/1296102/14524248/MSCI+ESG+Ratings+Methodology+-+Exec+Summary+2019.pdf/2dfcaeee-2c70-d10b-69c8-3058b14109e3?t=1571404887226. Downloaded: 28 December 2020.

4. Smart beta investing

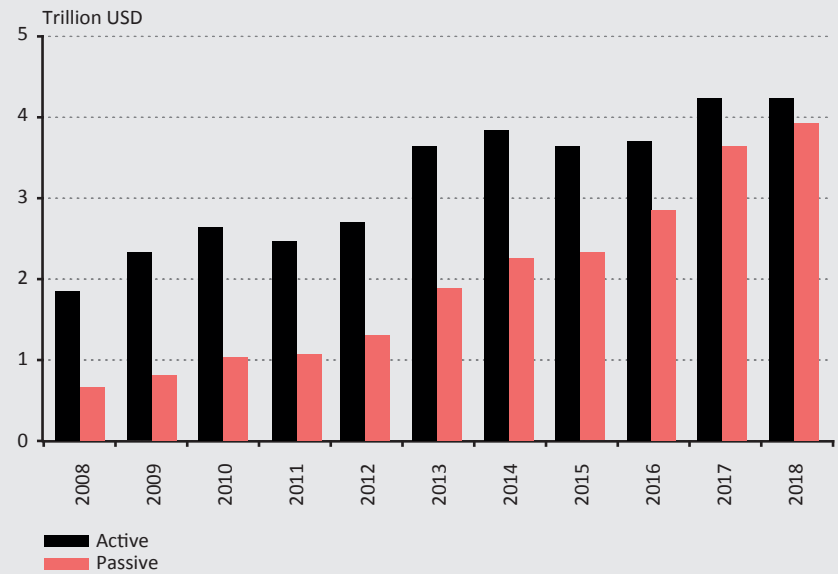
4.1. Active and passive fund management, and the concept of smart beta

Traditionally, we can differentiate between two categories of portfolio management: active and passive. Actively managed funds usually aim to outperform their benchmark, or they have a particular investment objective. Active investing builds on the abilities to select stocks and time the market, which are challenging tasks, and thus such fund managers charge relatively high management fees for their expertise. On the other hand, the goal of passive fund management is to replicate the returns of a market index as closely as possible; therefore, the allocation of the investment is based on the composition of an index, while active investors can employ more unique strategies. With passive investing, there is no need to perform extensive research into industries and prices, and thus the fees of such funds are much lower than those of actively managed funds.

The argument for investing in actively managed funds is the possibility to outperform the market. However, in the last ten years only 23 per cent of active funds managed to beat their passive counterpart. *Riquier* also highlights the large differences between market segments: only 8 per cent of US large blend funds (that invest in both US large-cap value stocks and growth companies) were able to outperform their benchmark, while 82 per cent of funds that invest in non-US small and medium capitalisation firms did[10]. The stock picking and market timing skills of fund managers have been thoroughly examined by researchers, leading to varying results depending on the frequency of data and the time horizon used (*Rompotis 2009*).

[10] Riquier, A. (2019): *More evidence that passive fund management beats active*. Marketwatch. https://www.marketwatch.com/story/more-evidence-that-passive-fund-management-beats-active-2019-09-12. Downloaded: 28 December 2020.

Figure 1
Assets under management of US equity funds by fund management type



Source: Stein, C.: Shift From Active to Passive Approaches Tipping Point in 2019. Bloomberg article, 31 December 2018. https://www.bloomberg.com/news/articles/2018-12-31/shift-from-active-to-passive-approaches-tipping-point-in-2019. Downloaded: 28 December 2020.

Passive investing has become more popular in recent decades: first, it was the theory of efficient markets that gave this approach a theoretical foundation, then the appearance of index funds and decreasing costs motivated investors to rethink their need for actively managed portfolios. The increasing popularity of passive investing shown in *Figure 1* is accompanied by the growth of ETFs, which are mostly used as a passive investing tool by investors to replicate the returns of an index. They have been growing steadily in the last decade as well and are now responsible for one third of the trading activity in the USA. USD 3.5 trillion was allocated to them over the last ten years, which shows how significant they have become[11]. It should be noted though that the recent success of passive investing occurred in a long bull market and during most market corrections active managers tend to perform better[12]. The shift from active to passive investing also has impacts on the financial system, including increased industry concentration, the effect of index-inclusion, and amplified volatility due to leveraged and inverse ETFs (*Anadu et al. 2020*).

[11] Flood, C.: *Popularity of passive investing changes rules of the game*. Financial Times, 22 October 2019. https://www.ft.com/content/3cc857e0-d0c0-11e9-b018-ca4456540ea6. Downloaded: 28 December 2020.
[12] Friedmann, C. (2020): *To Be Active Or Passive During The Coronavirus Crisis*. The Wealth Advisor, 6 May. https://www.thewealthadvisor.com/article/be-active-or-passive-during-coronavirus-crisis. Downloaded: 28 December 2020.

Smart beta investing offers a third option alongside active and passive fund management. Its name refers to beta which is the measurement of volatility in finance. The beta of index tracking funds equals one in theory and these funds only carry systemic risk as they have the same composition as the market benchmark, while the beta of active funds is based on the construction of the portfolio and active investing also involves idiosyncratic risk. The name of the smart beta strategy is technically not related to this financial measure, instead it is used only as a marketing tool for a type of investment product.

The strategy originates from the fact that most market indices are market capitalisation weighted. As market cap is the product of the number of shares outstanding and the current stock price, the higher these figures are the larger their weight will be in the index. This approach may be counterintuitive for investors that do not follow a momentum-based investing strategy, i.e. they do not wish to allocate more of their savings to a security when its price increases (all else remaining unchanged).

With the market cap-based index weighting system, the value of an index is concentrated in a handful of securities of companies with very high market capitalisation. At the beginning of 2020, Apple, Microsoft, Alphabet, Amazon and Facebook accounted for 17.5 per cent of the S&P 500, undermining the goal of the index, which is to provide exposure to a well-diversified US market (*Levy – Konish 2020*). This ratio increased further during the rally following the crash in March, reaching 24 per cent by the end of August.

Smart beta modifies the weights of index components, i.e. under or overweighting them compared to their exposure in the benchmark index. The modified weights are based on a factor that is believed to be closely related to higher returns. There are many options for the selection of such a factor (e.g. size, volatility or dividend yield) and sometimes more than one factor is used.

Table 2
Comparison of the characteristics of active and passive fund management, and smart beta

	Active fund management	Passive fund management	Smart beta investing
Basis for investment	Consideration of the fund manager	Tracks an index	Based on selected factors
Management fees	Relatively high	Significantly less than for active funds	Lower than for active funds
Rebalancing	Consideration of the fund manager	Only if the composition of the index changes	When the factor values change
Risk profile	Idiosyncratic risk	Systemic risk	Modified systemic risk
Transparency	Investment decisions are not necessarily communicated	Highly transparent	Investing is based on a predefined rule

Smart beta combines elements of both passive and active funds, and its characteristics are shown in *Table 2*. It can be considered passive because it follows a rule which defines exactly how the money allocation is performed. However, as it deviates from the original composition of the index, it can be thought of as active investing. Its risk profile is closer to that of passive investing as it uses the constituents of some benchmark index but by modifying the weights it deviates from pure systemic risk by a certain degree.

Smart beta portfolios require some management because the factor has to be determined, and the weights must be calculated and have to be rebalanced when the values of the factor change (usually on a yearly or quarterly basis depending on the selected factor); thus, the management fees should exceed those of passive funds but should be lower than active fund fees. This theory seems to be consistent with practice as well; *Rabener*[13] found that the average expense ratio of smart beta funds is around 0.3 per cent which is between the asset-weighted average expense ratios in the USA of 0.13 per cent and 0.66 per cent for passive and active funds, respectively[14].

Unlike managers of active funds, smart beta managers do not make decisions based on their judgement as they have to follow the selected factor at all times, making such funds more transparent than active funds where investors do not always know beforehand or agree with the decisions of the portfolio manager.

[13] Rabener, N. (2020): *Factor Scoring Smart Beta ETFs*. Factorresearch.com, January 2020. https://www.factorresearch.com/research-factor-scoring-smart-beta-etfs. Downloaded: 28 December 2020.
[14] Liu, E. (2020): *Investing Gets Cheaper as Fund Fees Continue to Fall*. Barron's, 9 June. https://www.barrons.com/articles/mutual-fund-fees-etf-passive-investing-financial-advice-morningstar-51591719173. Downloaded: 28 December 2020.

4.2. ESG as a smart beta factor

The emergence of the smart beta philosophy and the rising demand for ESG investment opportunities can be combined to offer new products for investors. ESG in smart beta may sound attractive to those that wish to gain access to a diversified stock (or bond) portfolio but do not like the fact that large indices include companies or industries that cause damage to the environment or mistreat their employees, or if they wish to achieve higher returns than passive ESG funds.

Funds have already been created that use some ESG criteria in a smart beta strategy, and researchers have started to derive ESG performance factors from broad data sources (e.g. *Giese et al. 2016, Bender et al. 2017*). According to a recent survey, the percentage of asset owners with smart beta strategies that look to apply some ESG considerations to their method increased from 40 to 60 percent since 2017, signalling the growth of ESG in this product type as well[15].

Since ESG ratings are widely available, the weights can be based upon them. It is up to the fund manager to decide the weight of each rating, and thus multiple versions can be established, ranging from a mild modification (where the weights of different rating classes are close to each other) to a drastic overhaul with a large tracking error. The latter option can be subject to criticism if many companies are completely excluded from the index (i.e. have a weight of zero) which can lead to higher concentration risk (*Pfeuti 2019*)[16]. On the other hand, the former approach might only seem like a weak attempt to appear ESG friendly. As the preference of customers is not uniform, several such fund versions are recommended to be created to allow investors to choose the one they prefer. Based on the nature of smart beta investing, the cost of maintaining multiple funds should not be too high and would enable more investors to find a suitable fund, resulting in increased revenues for fund managers.

The idea behind a smart beta fund that is based on ESG ratings as a factor sounds justifiable from an ESG point of view, but if the returns are not competitive then they may never become popular. In the following section, I demonstrate what such a fund would look like and what performance it can be capable of.

[15] Fedorova, A.: *Investors are marrying ESG with smart beta*. ESG Clarity, 20 August 2020. https://esgclarity.com/ftse-russell-research-august-2020/. Downloaded: 28 December 2020.
[16] Pfeuti, E.: *Smart Beta: Is this a match made in heaven?* Funds Europe, December issue. https://www.funds-europe.com/dec-2019-jan-2020/smart-beta-is-this-a-match-made-in-heaven. Downloaded: 28 December 2020.

5. ESG weighted smart beta EURO STOXX 50

In my example, I assigned weights to the companies in the EURO STOXX 50 index based on their MSCI ESG ratings. I chose this index because it covers several major European markets, includes many industries and each component has an MSCI ESG rating. The index is weighted by free-float market cap which will be of great importance to us.

Table 3
MSCI ESG ratings of EURO STOXX 50 constituents between 2015 and 2019

Rating	2015		2016		2017		2018		2019	
	No.	Of total market cap	No.	Of total market cap	No.	Of total market cap	No.	Of total market cap	No.	Of total market cap
AAA	15	22.7%	18	31.7%	18	32.0%	17	31.2%	17	32.1%
AA	12	24.9%	12	22.7%	9	18.0%	8	17.1%	8	13.6%
A	11	24.6%	10	24.5%	12	28.6%	16	34.4%	17	36.7%
BBB	10	22.8%	8	17.1%	9	17.6%	6	11.0%	5	12.0%
BB	0	0.0%	0	0.0%	1	1.5%	2	3.6%	2	3.2%
B	1	1.5%	1	1.6%	0	0.0%	0	0.0%	0	0.0%
CCC	1	3.5%	1	2.5%	1	2.3%	1	2.7%	1	2.5%

Note: No. denotes the number of companies in the index.

Due to the significance of the index, all fifty of its components have had an MSCI ESG rating for at least five years. *Table 3* provides an overview of how the ratings and the relative market caps changed between 2015 and 2019. The only company with a CCC rating is Volkswagen, which remained in the index despite suffering great reputational damage in the diesel scandal and losing the trust of many ESG investors. Overall, we can see that by 2019 the number of AAA-rated components increased, while some of the AA-rated companies in 2015 dropped to an A rating by 2019. A similar change can be observed from the market cap data as well, with AAA ratings becoming more substantial at the expense of AA ratings. The number and market cap of A ratings also increased due to improvements in the rating by some BBB companies.

I created two portfolios: one will be referred to as the Mild ESG portfolio because the weights are not very different between ratings, whereas the other is more drastic and thus will be referred to as the Drastic ESG portfolio. The returns of the portfolios for a certain period can be obtained from the following weighting system:

$$r_{portfolio} = \sum_{i=1}^{n} \frac{x_i}{\sum x} \cdot \frac{P_t - P_{t-1}}{P_{t-1}} \quad (1)$$

where n is the number of components in the index, P_t is the closing price of the component in the period, P_{t-1} is the closing price of the component in the previous period,

for the Mild ESG portfolio:

$$x_i = \begin{cases} 3 & if\ rating = AAA \\ 2.5 & if\ rating = AA \\ 2 & if\ rating = A \\ 1.5 & if\ rating = BBB \\ 1 & if\ rating = BB \\ 0.5 & if\ rating = B \\ 0 & if\ rating = CCC \end{cases} \quad (2)$$

for the Drastic ESG portfolio:

$$x_i = \begin{cases} 10 & if\ rating = AAA \\ 5 & if\ rating = AA \\ 2.5 & if\ rating = A \\ 1.25 & if\ rating = BBB \\ 0 & if\ rating \leq BB \end{cases} \quad (3)$$

The Mild ESG portfolio was weighted based on the following rule: in a given year, if a company had an AAA rating, it was given 3 points and for each rating below AAA 0.5 point was deducted. The reasoning behind this system was to assign a positive value to each class other than the weakest while keeping the difference between rating classes constant. The weights were then calculated by dividing a company's points with the sum of all points in that year. The Drastic ESG portfolio had a different point system: AAA equalled 10 points and the points were halved for each rating below AAA, while any rating less than BBB equalled zero points in order to put more focus on higher ratings and exclude the worst rating classes.

In both portfolios, the weights change on a yearly basis based on what rating the company held that year and how other companies were rated. However, it should be noted that MSCI publishes ESG ratings for companies in multiple batches each year, so quarterly rebalancing might be necessary in practice. Also, in the Mild ESG portfolio any occurrence of a zero weight for a component with a non-CCC rating is due to the fact that no companies achieved that particular rating in that year, whereas in the Drastic ESG portfolio three rating categories are excluded from the original index portfolio which amounts to a total of two or three companies each year, while the Mild ESG portfolio only excludes one company out of fifty. This demonstrates that even the stricter portfolio does not considerably harm the principle of diversification. However, no companies were filtered out based on the industry they operate in, and thus several oil and gas companies are included in the portfolios which is debatable but at least they are only considered to the extent that their ESG rating allows.

Figure 2
Comparison of the different weighting methods of the EURO STOXX 50 in 2019

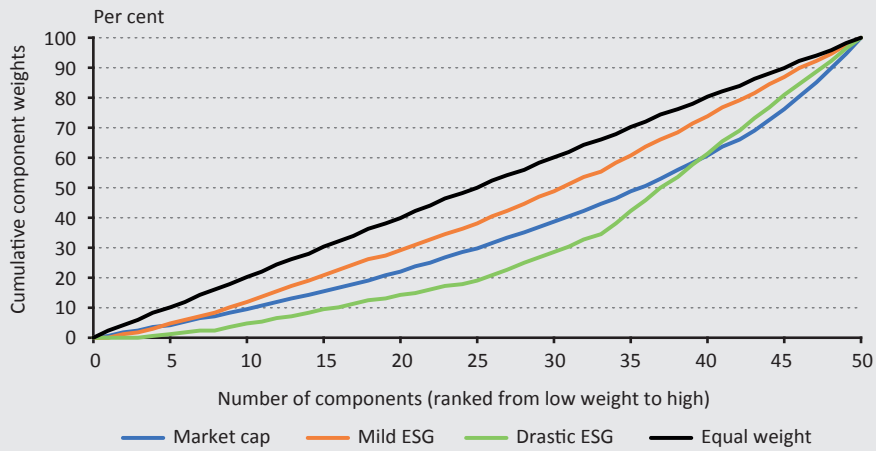


Figure 2 shows how the different weighting methods allocate weights to index components of the EURO STOXX 50. The Mild ESG portfolio is the closest to an equally weighted portfolio, while the Drastic ESG portfolio underweights those components that have a weak ESG rating more than the benchmark underweights those with small market cap. However, at the fortieth component these two methods intersect, and to the ten most impactful components the Drastic ESG portfolio assigns lower weights than the benchmark. This phenomenon shows that the Drastic ESG weighting method contributes less to the portfolio's performance being too reliant on a handful constituents than the benchmark. In the benchmark, the five largest companies in terms of market cap had a cumulative weight of 24 per cent in 2019, whereas in the Mild ESG portfolio the five best rated companies had a total weight of about 13 per cent and in the Drastic ESG portfolio the figure was around 19 per cent.

Table 4
Yearly returns of the EURO STOXX 50 and the two ESG portfolios between 2015 and 2019

Portfolio	2015	2016	2017	2018	2019	Cumulative return	Sharpe ratio	Sortino ratio
EURO STOXX 50	3.85%	0.70%	6.49%	–14.34%	24.78%	19.03%	0.30	0.66
Mild ESG	11.79%	6.58%	11.52%	–9.90%	26.11%	50.98%	0.71	2.06
Drastic ESG	12.68%	8.37%	12.38%	–10.31%	29.38%	59.24%	0.74	2.25

The returns of the benchmark portfolio and the two ESG portfolios are shown in *Table 4*. It can be seen that both portfolios outperformed the original, market cap-weighted one by quite a large margin. The Mild ESG portfolio was only able beat

the Drastic ESG portfolio once in the five-year period, when during the downturn in 2018 the price of AAA-rated companies fell more than the average, while both portfolios outperformed the benchmark in every year.

The better returns each year add up to a significant difference in the five-year period: the Drastic ESG portfolio achieved a return three times better than the benchmark, but even the Mild ESG portfolio beat the market by more than 31 percentage points. The risk-adjusted returns of the ESG portfolios were also significantly higher in the period. Though, as the two portfolios are merely hypothetical and not available for actual investment (i.e. no existing investment fund follows this logic), those that could not afford to buy each component were not able to achieve such returns. However, the returns would certainly justify the creation of such funds in practice as well. Under different market conditions, geographical locations, industries or weighting methodologies the outcomes could vary but in the case of the EURO STOXX 50 index between 2015 and 2019 it can be concluded that with the use of this ESG weighting system the returns would justify creating such funds as they could provide excess returns for investors while supporting ESG-related causes.

Table 5
Average return of each rating class between 2015 and 2019

Rating	2015	2016	2017	2018	2019
AAA	14.12%	12.59%	13.50%	–12.14%	34.53%
AA	11.26%	–1.89%	10.74%	–3.78%	20.10%
A	11.36%	4.27%	7.86%	–10.70%	19.13%
BBB	5.12%	4.32%	13.15%	–1.77%	18.32%
BB	0.00%	0.00%	–12.38%	–37.85%	19.32%
B	52.85%	12.57%	0.00%	0.00%	0.00%
CCC	–20.99%	–3.90%	23.36%	–17.55%	24.55%

To better understand what drove these returns, it is worthwhile to look at the average return of each rating class. In *Table 5* it can be seen that AAA-rated companies outperformed the other classes in four out of five years (excluding those classes that had only one component). The outperformance of components with an AAA rating and their frequency in the index explain why the deviation from the benchmark is so great. However, it is not apparent if the higher ESG rating was in fact the cause for the high returns of those components. To test this theory, I examined two other factors besides ESG ratings in the form of regression analysis (*Equation 4*).

$$Y = \beta_0 + \beta_1 X + \in \tag{4}$$

The first factor was company size, with the book value of equity used as a proxy measure. Book value is often used in investing (especially the price-to-book ratio); however, other proxies would be acceptable as well (see *Al-Khazali – Zoubi* (*2005*) for more). The other variable examined was growth in earnings per share, while for the ESG ratings the weighting system of the Drastic ESG portfolio was used as it highlights that it is more difficult to improve a higher ESG rating than a lower one.

Table 6
Regression results of ESG rating, size, and earnings growth

	ESG rating	Size	Earnings growth
β_0	–0.01005	0.11009	0.03116
β_1	0.00995	–0.00173	0.22237
Standard error	0.10834	0.09981	0.09980
P-value	0.0277	0.000378	0.000376
R^2	9.70%	23.35%	23.37%

Table 6 shows the results of the relevant regressions. With a p-value of 0.0277, ESG ratings were found to be significant at α = 0.05 level, as were the other two variables. However, ESG ratings possessed low explanatory power compared to size and earnings growth, suggesting that those factors contributed more to the outperformance of the hypothetical funds. When the three factors were put into a single model, the p-value of ESG ratings increased above 0.05 but it was a significant variable at α = 0.1.

$$Y = \underset{(0.0895)}{0.07} + \underset{(0.00016)}{0.01\ ESG\ rating} - \underset{(0.00014)}{0.0016\ Size} + 0.20\ Earnings\ growth + \in \quad (5)$$
$$adj.R^2 = 45.4\%$$

The other two factors were still significant at α = 0.05. The three selected factors explain 45.4 per cent of the returns. This result shows that while ESG ratings should be included in investment decisions, one should consider other aspects as well.

These findings are in line with other studies examining ESG criteria in portfolios. *Breedt et al.* (*2019*) examined MSCI ESG ratings between 2007 and 2017 and found that while the ESG factor does not reduce returns, it also does not contribute to excess return, due to other factors (Small-minus-Big, momentum, and low beta) explaining the outperformance. In this study, the ESG factor was found to be significant for the EURO STOXX 50 but its contribution to the explanation of outperformance is limited, and secondary to that of size and earnings growth. A similar outcome was observed by *Naffa – Fain* (*2020*) who examined ESG megatrends and concluded that environmental megatrends (and one governance megatrend) could yield positive alphas, but the outperformance was explained by the variables of the Fama-French 5-factor model.

6. Application to the Hungarian market

6.1. ESG in Hungary and in the EU

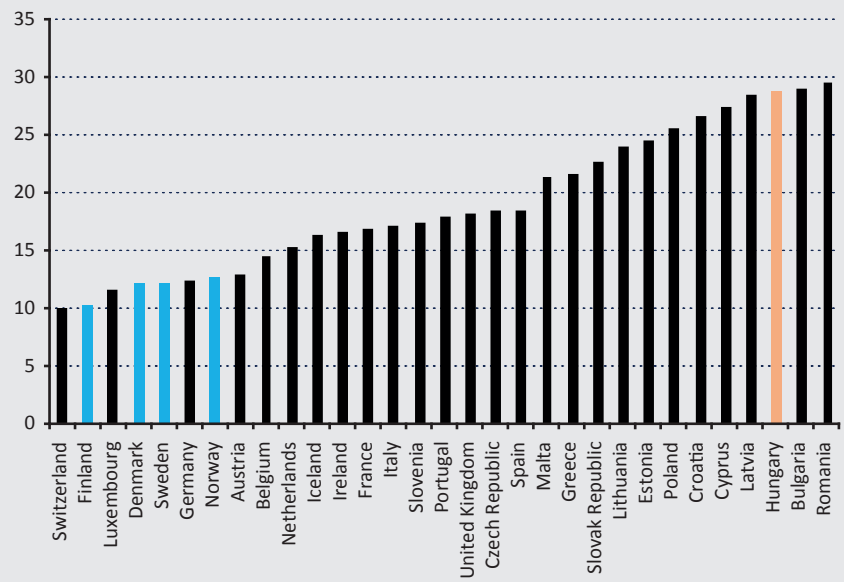
In general, the European Union focuses substantially on sustainability in terms of regulation and investment. Europe emerged as the leader in ESG investments and is still prominent in this area despite the increased interest in ESG all over the world. In 2012, ESG investments in Europe amounted to USD 8.8 trillion, accounting for 66 per cent of all ESG investments worldwide. By 2018 this ratio had fallen to 46 per cent, but the growth in European ESG investments (to USD 14.1 trillion) still put the continent ahead of all other regions[17]. This interest in ESG investments is expected to grow further in Europe due to new EU regulation anticipated to come into effect in 2021. This would mandate funds to make the ESG categorisation of their portfolios available for investors, putting pressure on fund managers and their senior management to assess the impact of their funds and make necessary alterations regarding their selection of investments in order to obtain a higher ESG classification. The importance of this issue could be quite high considering that institutional clients of the funds (e.g. pension funds) would have a difficult time explaining to their stakeholders why they decided to invest in socially destructive funds. As retail investors will not be directly affected by the regulation, they could theoretically invest in anything, but due to the increasing interest in ESG shown by the general public and the fact that fund managers would presumably not create products deliberately with a bad ESG classification (as they could expose their employer to reputational risk even if those did promise higher returns), it is expected that this segment will shift to being more ESG-intensive as well.

However, the situation in the EU is heterogeneous in this regard. The Scandinavian countries are often regarded as world leaders in ESG, both with companies and countries of the region topping the ESG leaderboards (*Figure 3*). The underlying cause of this phenomenon is often associated with the historical relationship of Nordic people with nature, but the real reason appears to be the combination of stronger "feminine" characteristics at the corporate level (e.g. focusing on consultation instead of competition and high status), more equal income distribution and higher transparency (*Potter 2020*)[18].

[17] Ghosh, I.: *Visualizing the Global Rise of Sustainable Investing*. Visual Capitalist, 4 February 2020. https://www.visualcapitalist.com/rise-of-sustainable-investing/. Downloaded: 28 December 2020.
[18] Potter, M.: *Are Nordic businesses more sustainability conscious?* Neste.com, 18 February 2020. https://www.neste.com/corporate-info/news-inspiration/articles/are-nordic-businesses-more-sustainability-conscious. Downloaded: 28 December 2020.

As displayed in *Figure* 3, Hungary is a laggard in ESG on the continent, performing better than only Bulgaria and Romania. From an investing point of view, buying green equity is difficult in the country, not mainly because Hungarian companies operate in a less ESG-friendly way than anywhere else, but because most of them are not listed on the stock exchange, thus their securities cannot be purchased. As of 2020, only 37 Hungarian companies are listed on the Budapest Stock Exchange of which only 20 are in the Premium category. Even though the stock exchange, in association with financial institutions, is trying to promote the advantages of going public to companies, currently investors that seek to find ESG opportunities on the Hungarian market face the obstacle of not having a sizeable enough pool to choose from, which could lead to significant concentration risk. This notion is amplified by the fact that due to the low market cap of most publicly traded Hungarian firms, ESG rating agencies usually do not evaluate their performance, and thus they do not possess an ESG rating. For instance, MSCI assigned a rating only to the three largest publicly traded Hungarian companies (OTP, MOL, Richter) in 2020, which makes ESG investing in Hungary more difficult. This phenomenon can be observed in other emerging markets as well, requiring additional work from ESG rating agencies in the future in order to make ESG investing more widespread in these markets as well.

Figure 3
ESG Index (ESGI) scores of European countries in 2020 (lower values meaning better results)



Source: https://risk-indexes.com/esg-index/. Downloaded: 28 December 2020.

6.2. Applicability of smart beta ESG investing for Hungarian funds

The alternative to picking green stocks is investing in funds that do so for us. Certain asset management firms in Hungary offer some ESG funds but usually not more than one or two options. According to Zsuzsa Zobor, CEO of K&H Fund Management, not many Hungarians are aware of ESG and the company only allocates a small portion of its assets to ESG investments, immaterial compared to the fact that 40 per cent of new investments of its Belgian parent company are related to ESG funds.[19]

She suggests that the Magyar Nemzeti Bank (the Central Bank of Hungary, MNB) should offer support by reducing the supervisory fee (which is basically a tax on funds) of ESG funds. Her recommendation is in line with the already ongoing activity of the MNB which tries to make finance greener in Hungary by offering consultations and education to increase the interest of households in the concept. Besides the MNB, other institutions are also working towards improving the country's ESG performance. In 2020, the first green bond issuances took place both on the government and corporate levels. These initiatives generated significant interest from the market, suggesting that steps taken towards ESG issues in the country may be worthwhile from a financial point of view as well. BAMOSZ (The Association of Hungarian Investment Fund and Asset Management Companies) also realised the increasing demand for ESG products and announced that from 2021 all Hungarian funds will be categorised based on ESG criteria. Funds that remove "unacceptable" securities from an ESG standpoint will be deemed *ESG-qualified*, while those that move beyond this approach and overweight assets with positive ESG performance can enter the *ESG-plus* category. The top category is *ESG-impact*, meant for funds that follow an impact investing strategy[20] (*BAMOSZ 2020*).

Before this categorisation happens, investors face difficulties finding ESG funds. According to a consultation document issued by the MNB, only a few funds' names contain any reference to ESG, adding up to 0.4 per cent of the total asset value of the fund market (*MNB 2019:11*). The fact that an estimation could be made based only on a weak indicator such as the funds' name highlights that previously there was no database which contained ESG funds in Hungary, leading to a notion that Hungarian investors mostly lacked interest in such investments in the past. The authors of the aforementioned document seem to agree with this statement as they suggest that Hungarian retail investors should hold investments in ESG funds

[19] Xforest interview with Zsuzsa Zobor, available at https://xforest.hu/befektetes-es-klimavaltozas/. Downloaded: 28 December 2020.

[20] *Fenntartható fejlődéssel kapcsolatos minősítési szempontokkal egészült ki a befektetési alapok kategorizálása* (*Rating criteria related to sustainable development has been added to the Categorization of investment funds*). BAMOSZ Press release. https://www.bamosz.hu/en/web/guest/hirek?p_p_id=62_INSTANCE_aU2V&p_p_lifecycle=0&p_p_state=maximized&p_p_mode=view&p_p_col_id=column-1&p_p_col_count=1&_62_INSTANCE_aU2V_struts_action=%2Fjournal_articles%2Fview&_62_INSTANCE_aU2V_groupId=10157&_62_INSTANCE_aU2V_articleId=192365&_62_INSTANCE_aU2V_version=1.0. Downloaded: 28 December 2020.

for at least five years but that does not coincide with their usual behaviour as they mostly have low risk appetites (*MNB 2019:12*).

Table 7
ESG funds of the ten largest Hungarian fund management firms

Asset management company	Total assets under management in 2019 (mn HUF)	Total ESG assets under management in 2019 (mn HUF)	Share of ESG funds from total assets	Number of ESG funds in 2019	New ESG funds created in 2020
OTP Fund Management	1,073,448	8,094	0.75%	1	0
Erste Fund Management	1,036,022	0	0	0	0
K&H Fund Management	891,141	3,197	0.36%	2	1
OTP Real Estate Investment Fund Management	605,292	0	0	0	0
CIB Investment Fund Management	433,341	0	0	0	2
Hold Fund Management	415,642	0	0	0	0
Budapest Fund Management	317,032	0	0	0	1
MKB-Pannónia Investment Fund Management	307,139	2,624	0.85%	1	0
Aegon Hungary Investment Fund Management	281,265	0	0	0	1
Diófa Fund Management	281,107	0	0	0	1
Total	**5,641,429**	**13,915**	**0.25%**	**4**	**6**

Note: Source for AUM: MNB Golden books 2019. https://www.mnb.hu/en/supervision/time-series/golden-books

Table 7 shows the ESG funds offered by the ten largest asset management companies in Hungary. The total share of ESG funds was only 0.25 per cent in 2019, even less the MNB's calculation. The difference is due to the fact that their calculation occurred as of 31 January 2019, while I used end of year data. Also, only the ten largest asset management firms are included in *Table 7*, but there are several other, smaller players on the market. The table shows that there were only four ESG funds offered by Hungarian asset management firms, all of which are actively managed. However, several fund management firms started to offer ESG funds or expanded their already existing ESG product portfolio in 2020. The number of ESG funds increased from four to ten in a span of just one year, showing

that fund managers see a potential increase in demand for ESG investments. While most of the new funds are still actively managed, the first Hungarian passive ESG fund was created in 2020 as well. Also, it is worthwhile to mention that some larger European fund management firms have subsidiaries among the ten largest ones in Hungary, and Hungarian investors can access ESG funds of the parent companies through the subsidiaries if they wish to gain ESG exposure. However, as these are not managed in Hungary, they are usually denominated in EUR.

In 2020, 66 per cent of the Hungarian population had some savings, increasing by 13 percentage points since 2017 and by 24 percentage points since 2015.[21] However, most savers do not invest in anything, instead opting to keep their money on their bank account (35 per cent of those with savings) or in cash (25 per cent). This behaviour cannot be considered financially sound but if they decided to start investing a portion of their savings, smart beta ESG investing would be a good starting point:

1. As shown before, smart beta funds have relatively low (0.3 per cent on average) expense ratios which can be attractive to new investors who do not want to give away a significant portion of their returns to fund managers.

2. One disadvantage of ESG funds according to MNB's consultation document is the extra resources needed by them due to the difficulty of researching and selecting the adequate stocks. However, with a smart beta method this is no longer a problem if the ESG rating agency is trusted by the managers of the funds and the factor is the ESG rating itself, making the strategy a less resource-intensive endeavour for fund managers (*MNB 2019:12*).

3. The returns of the last few years, as examined before, seem to indicate that ESG investments are at least as profitable as regular investments, while combined with smart beta they have the potential to outperform the benchmark (as presented in the case of the EURO STOXX 50) and can survive external shocks better due to the lower risk levels associated with them.

However, for both demand and supply-side benefits to manifest, fund managers must provide the opportunity for investors to explore these options. Currently, no smart beta ESG funds can be found on the Hungarian market, but the increasing number of ESG funds and the appearance of the first passive ESG fund are promising steps in financial product development. The data presented in *Figure 3* show that Hungary is lagging behind most European countries in terms of ESG, but the efforts of the MNB, BAMOSZ and the fund managers themselves show that they realise

[21] Based on *A magyarok 66 százaléka rendelkezik megtakarítással* (*66 Per Cent of Hungarians Have Savings*). https://www.budapestbank.hu/sajtoszoba/1097-202002201453 and *A magyar lakosság pénzügyi kultúrája* (*The Financial Culture of Hungarian Population*). https://penziranytu.hu/magyar-lakossag-penzugyi-kulturaja. Downloaded: 28 December 2020.

the growing importance of ESG and are working towards improving the current situation.

7. Conclusions

The obvious benefit of ESG investing is that investors can support the movement for enhanced corporate activity by avoiding socially destructive companies, but it has also been shown that ESG indices mostly matched or outperformed their benchmarks in recent years. It also seems that during an external shock (like the Covid-19 pandemic) investments with higher social responsibility can reduce losses.

As determining the ESG performance of companies is a task far too challenging for individuals, ESG rating agencies have emerged. Their services are mostly available only for a fee but investors that do not wish to pay a premium can still access the final results of the MSCI ESG rating methodology.

Passive investing has been gaining ground on active investing in the last decade, but there is an alternative approach to choosing between the two sides: the smart beta strategy. It has some characteristics from both approaches, but its uniqueness comes from a factor that modifies the original weighting of the benchmark index. This way, investors can avoid involuntarily allocating most of their capital invested in an index to the few companies with extremely high market cap, while paying less in management fees than for active funds.

Because the factor chosen for weighting in the smart beta method can take many forms, ESG ratings can be used to include ESG in the portfolio. With this approach, I found that in case of the EURO STOXX 50 index, the benchmark can be significantly outperformed by ESG rating-weighted portfolios. Based on this result, I recommend constructing funds that follow this approach in practice as well, because the excess returns and the focus on ESG can attract new customers for fund managers. However, while ESG ratings were found to be significant, other variables such as size and earnings growth had more impact on the returns.

Having examined the situation of ESG investments in Hungary, I conclude that there are not currently very many options for ESG investing in the country for retail investors; that said, fund managers and the MNB are working on changing the status quo. Smart beta ESG investing can be a good starting point for new investors as it can provide substantial financial gains in addition to the lower management fees compared to actively managed funds. The establishment of such funds does not require vast resources from fund managers as the ESG ratings are readily available and only their methodology needs to be reviewed.

References

Al-Khazali, O. – Zoubi, T. (2005): *Empirical Testing Of Different Alternative Proxy Measures For Firm Size.* Journal of Applied Business Research, 21(3): 79–90. https://doi.org/10.19030/jabr.v21i3.1471

Anadu, K. – Kruttli, M. – McCabe, P. – Osambela, E. (2020): *The Shift from Active to Passive Investing: Risks to Financial Stability?* Financial Analysts Journal, 76(4): 23–39. https://doi.org/10.1080/0015198X.2020.1779498

Arribas, I. – Espinós-Vañó, M.D. – García, F. – Tamošiūnienė, R. (2019): *Negative screening and sustainable portfolio diversification.* Entrepreneurship and Sustainability Issues, 6(4): 1566–1586. https://doi.org/10.9770/jesi.2019.6.4(2)

Bender, J. – Sun, X. – Wang, T. (2017): *Thematic Indexing, Meet Smart Beta! Merging ESG into Factor Portfolios.* The Journal of Index Investing, 8(3): 89–101. https://doi.org/10.3905/jii.2017.8.3.089

Bernow, S. – Klempner, B. – Magnin, C. (2017): *From 'why' to 'why not': Sustainable investing as the new normal.* McKinsey & Company. https://www.mckinsey.com/~/media/McKinsey/Industries/Private%20Equity%20and%20Principal%20Investors/Our%20Insights/From%20why%20to%20why%20not%20Sustainable%20investing%20as%20the%20new%20normal/From-why-to-why-not-Sustainable-investing-as-the-new-normal.ashx. Downloaded: 28 December 2020.

Breedt, A. – Ciliberti, S. – Gualdi, S. – Seager, P. (2019): *Is ESG an Equity Factor or Just an Investment Guide?* The Journal of Investing ESG Special Issue, 28(2): 32–42. https://doi.org/10.3905/joi.2019.28.2.032

Cheah, E.-T. – Jamali, D. – Johnson J.E.V. – Sung, M.-C. (2011): *Drivers of Corporate Social Responsibility Attitudes: The Demography of Socially Responsible Investors.* British Journal of Management, 22(2): 305–323. https://doi.org/10.1111/j.1467-8551.2011.00744.x

Douglas, E. – Van Holt, T. – Whelan, T. (2017): *Responsible Investing: Guide to ESG Data Providers and Relevant Trends.* Journal of Environmental Investing, 8(1): 92–115. https://cbey.yale.edu/sites/default/files/Responsible%20Investing%20-%20Guide%20to%20ESG%20Data%20Providers%20and%20Relevant%20Trends.pdf. Downloaded: 28 December 2020.

Escrig-Olmedo, E. – Munoz-Torres, M.J. – Fernandez-Izquierdo, M.A. (2010): *Socially responsible investing: sustainability indices, ESG rating and information provider agencies.* International Journal of Sustainable Economy, 2(4): 442–461. https://doi.org/10.1504/IJSE.2010.035490

Escrig-Olmedo, E. – Fernandez-Izquierdo, M. – Ferrero-Ferrero, I. – Rivera-Lirio, J. – Muñoz-Torres, M. (2019): *Rating the Raters: Evaluating how ESG Rating Agencies Integrate Sustainability Principles*. Sustainability, 11(3): 915–931. https://doi.org/10.3390/su11030915

Giese, G. – Ossen, A. – Bacon, S. (2016): *ESG as a Performance Factor for Smart Beta Indexes.* The Journal of Index Investing, 7(3): 7–20*.* https://doi.org/10.3905/jii.2016.7.3.007

Levy, A. – Konish, L. (2020): *The five biggest tech companies now make up 17.5% of the S&P 500 — here's how to protect yourself.* CNBC*.* https://www.cnbc.com/2020/01/28/sp-500-dominated-by-apple-microsoft-alphabet-amazon-facebook.html. Downloaded: 28 December 2020.

MNB (2019): *Green Finance in Hungary.* Consultation document by the central bank of Hungary. Magyar Nemzeti Bank. https://www.mnb.hu/letoltes/green-finance-in-hungary-consultation-paper.pdf. Downloaded: 28 December 2020.

Naffa, H. – Fain, M. (2020): *Performance measurement of ESG-themed megatrend investments in global equity markets using pure factor portfolios methodology.* PLoS ONE, 15(12): 1–34. https://doi.org/10.1371/journal.pone.0244225

Rompotis, G. (2009): *Active vs. Passive Management: New Evidence from Exchange Traded Funds.* https://doi.org/10.2139/ssrn.1337708

Talbot, D. – Boiral, O. (2018): *GHG Reporting and Impression Management: An Assessment of Sustainability Reports from the Energy Sector*. Journal of Business Ethics, 147: 367–383. https://doi.org/10.1007/s10551-015-2979-4

Townsend, B. (2020): *From SRI to ESG: The Origins of Socially Responsible and Sustainable Investing.* The Journal of Impact and ESG Investing, 1(1): 1–16. https://www.bailard.com/wp-content/uploads/2020/09/History-Socially-Responsible-Investing-and-ESG-Investing.pdf?pdf=SRI-Investing-History-White-Paper. Downloaded: 28 December 2020.

Trinks, P.J. – Scholtens, B. (2015): *The Opportunity Cost of Negative Screening in Socially Responsible Investing.* Journal of Business Ethics, 140: 193–208. https://doi.org/10.1007/s10551-015-2684-3

How Does the Market Price Responsible and Sustainable Investments?*

Barnabás Timár

In my study, I investigate whether it is possible to prove the hypothesis that investing in responsible, sustainable companies can be financially more rewarding from the perspective of investors, i.e. can result in higher profit than investing in companies that ignore these aspects. My further assumption is that this profit can be increased if I apply different restrictions or relative scores. I tested my hypotheses empirically on data from the New York Stock Exchange, both on investment strategies (portfolio creation) and at stock level (regression). I performed the tests for the total market, in detailed industry breakdowns and groupings as well. I tested the examined indicators (ESG, ENV) in isolation and with a relative approach, over several time horizons. For most of the tests, I obtained non-significant results; for some industries a minor negative impact can be seen, and for the regressions I obtained coefficients that are significant, but of negligible economic significance. Temporal decomposition shows the increasing significance of ESG and ENV, but even for the later time series it is not considered significant. The results suggest that the aspects under investigation are not yet priced by the market, so my hypotheses were not confirmed. This could be due to the greenwashing phenomenon or the developed US market.

Journal of Economic Literature (JEL) codes: G17, G32, G41

Keywords: Fama–French, ESG, ENV, environmental protection, factor, sustainability, return, US, stock exchange

1. Introduction

Nowadays, responsible and sustainable investment is increasingly important and popular (*Kuzmina – Lindemane 2017*). Growth and profit no longer preclude environmental protection (*Németh-Durkó 2019*). Corporate management has also recognised the importance of environmental consciousness and sustainability (*Bank 2018; Ransburg – Vágási 2011*). The ESG score is commonly used to measure

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

Barnabás Timár is an Undergraduate Student at the Corvinus University of Budapest.
Email: barnabas.timar@stud.uni-corvinus.hu

The first version of the study was prepared for the 'Green Finance' research competition organised by the Corvinus University of Budapest MNB Institute and the Institute of International, Political and Regional Studies, where it won 1st place.

The Hungarian manuscript was received on 15 September 2020.

DOI: http://doi.org/10.33893/FER.20.2.117147

this (*Townsend 2020*). ESG is composed of three pillars:[1] the environment and its protection (environmental; hereinafter ENV), social and corporate governance criteria (governance). The score measures compliance with the criteria, so it can be used to measure sustainability. In my study, I consider ESG and ENV as an appropriate approximation of responsible and sustainable investments, as these indices are basically designed for this purpose, but, of course, this approach also has shortcomings and can be criticised (see *Kotsantonis – Serafeim 2019*). Nevertheless, following the international literature, I also view this value as normative (*Auer – Schuhmacher 2016)*. Its growing importance can be seen from the fact that while in the 1990s only a few companies disclosed their ESG score, today, thousands of companies do so regularly (*Kotsantonis et al. 2016*). Responsible behaviour can bring a number of benefits to a company, for example, it can provide a competitive advantage in labour, product or capital markets (*Kotsantonis et al. 2016*). Using ESG, several studies have examined the impact of responsible management on a given company. *Buallay* (*2019*) finds that the indicator can also affect firm performance, ROE[2] and ROA[3]. Similar results are obtained by *Deák and Hajdu* (*2011*), who find that enterprises with a positive assessment of environmental performance have higher ROE. *Gillan et al.* (*2010*) provide evidence of increased efficiency, and *Kotsantonis et al.* (*2016*) report a lower cost of capital for companies with higher ESG. This suggests that it makes financial sense for a company to strive for sustainable operation.

Another side of the question is whether investing in responsible and sustainable companies can be financially rewarding from the perspective of investors. My study focuses on this question and seeks to answer it. The explanation of returns has been a topic of interest for financial researchers for many years, and several theories have been put forward. The best-known theory since the 1960s is the Capital Asset Pricing Model (CAPM). This theory offers a comprehensive model to explain the expected returns. However, it has been subject to numerous criticisms, and many have shown that it does not work well in practice (*Berlinger – Walter 1999; Fama – French 1996; Lai – Stohs 2015; Fernandez 2015*). This has led to the development of factor models, which use other factors to try to forecast expected returns more accurately. *Fama and French* (*1992*) can be considered the creators of factor models, but before them, others also carried out similar studies (on market anomalies). Factor models are now able to explain returns in a statistically significant way and are accepted today (*Fain – Naffa 2019*). *Carhart's* (*1997*) four-factor model can be taken as a basis, in which he uses CAPM beta, size (market capitalisation), book-to-market ratio and momentum to explain returns.

[1] See *Subchapter 1.1.* for more details.
[2] Return on equity
[3] Return on assets

In my study, I examine in detail the relationship between responsible and sustainable management (ESG and ENV) and future stock returns. I test ESG and ENV, among other things, as a possible factor for forecasting returns, thereby examining the profitability of the strategy. The underlying assumption is that investors find it more valuable, and reward responsible and sustainable management. This is reflected in stock prices as well and hence in returns (*Hassel – Semenova 2013*). Another possibility is that the market is sensitive to outlier scores, and thus, for example, it penalises particularly polluting companies with unfavourable pricing. One method used to investigate the relationship is to analyse a trading strategy that sells low-scoring stocks and buys high-scoring ones, thus providing a comprehensive picture, whatever the relationship between the ESG and the returns might be. I also examine the relationship, using *Fama–MacBeth* regression (*see Fama – McBeth 1973*), controlling for several factors. I perform the analysis on the stocks of the New York Stock Exchange, looking at the total market and using detailed industry breakdown and industry grouping. I conduct the tests for both the ESG and the environmental component of ESG (ENV) separately and also take a novel approach by testing relative ESG and relative ENV, which examines the deviation from the industry mean. My proposed hypothesis is that investing in companies with responsible and sustainable management can result in higher profit than investing in companies that ignore these aspects. An additional hypothesis is that this profit can be increased if I apply different restrictions or relative scores.

The existing literature is divided on this topic, as several studies have been done with different results. *Verheyden et al.* (*2016*) find a positive relationship when dropping the worst-scoring firms from the portfolio (10 per cent of the total), but can only show a positive impact for risk-adjusted returns. The research by *Landi – Sciarelli* (*2019*) examines Italy and finds no positive relationship when using different ESG criteria in portfolio creation. *Torre et al.* (*2020*) find no relationship between ESG and the returns of the major European stocks, even when using several ESG indicators. *Maiti* (*2020*) concludes that with the use of ESG a better-performing model than the *Fama – French* (*1992*) three-factor model can be constructed. Here, however, the focus is more on risk and its management; and again, the results hold true for the risk-weighted return. *Halldórsdóttir* (*2020*) uses the event study methodology to investigate the relationship between ESG and returns with regard to Covid-19. She concludes that ESG has no impact on the US market. *Jain et al.* (*2019*) look at a number of major markets around the world, seeking to answer the question of whether sustainability indicators can be used to achieve higher returns. Their finding is that the use of conventional as well as responsible and sustainable methods leads to similar returns. According to *Kumar et al.* (*2016*), while ESG may not have an impact on returns, the price volatility of firms with a good score is significantly lower. A study by *Khan* (*2019*) constructs a model that takes into account the ESG score in the investment process and concludes that there

may be value in ESG for investors. In their study, *Sahut and Pasquini-Descomps* (*2015*) examine the United States, Switzerland and the United Kingdom over the period 2007–2011 and find ESG to be significant only for the United Kingdom. *Auer – Schuhmacher* (*2016*) conduct a global study at the industry level, in which they find no difference between market and ESG portfolio performance in the US and Asia-Pacific markets. In Europe, however, it can be seen that investors pay a premium for responsible investments. *Kumar* (*2019*) reports in his study that the ESG has no additional information content compared to the factor models for the European market. *Aouadi – Marsat* (*2018*) examine the impact of ESG on the market value of companies at the international level between 2002 and 2011. Their conclusion is that it has no direct impact on it. *Buallay* (*2019*) examines the impact of ESG on US banks between 2007 and 2016 and finds a significant impact on market performance. A study by *Maiti* (*2020*) finds ESG to be a suitable risk management factor. *Gloßner* (*2017*) and *Landi – Sciarelli* (*2019*) find a negative relationship. These issues have also been addressed in the case of investment funds, and ESG funds generally perform better here (*Wimmer 2013; Henke 2016; Bóta 2014*). Also important is the conclusion of *Halbritter – Dorfleitner* (*2015*), according to which a number of factors can influence the results, such as the time horizon, the industry, the score calculation method and the database from which the data is derived. In areas where there is no consensus in the academic literature, further research is certainly worthwhile. This paper adds value to the existing literature, as it presents the results of a more detailed, comprehensive study of the US market by examining a longer time horizon and more time periods, and by applying several constraints and restrictions to ensure the analysis and robustness of the results.

1.1. Indices of responsible and sustainable investments (ESG and ENV)

Today, there are many indices of responsible and sustainable investment. Among them, ESG is one of the most effective and widely used (*Talan – Sharma 2019*). As noted above, the ESG indicator is composed of three pillars: environment and its protection (environmental), social criteria (social) and corporate governance criteria (governance). The three pillars can be considered individually, on their own merits, but it is common to consider them together as ESG; this allows us to obtain a comprehensive picture of how well a company is following the expected guidelines and how sustainable the investment is (*Ribando – Bonne 2010*). The environmental pillar includes the company's relationship with nature, its energy use, waste management, pollutant emissions, use of renewable energy and potential environmental risks. Thus, the ENV pillar is an effective index of sustainable investment (*Van Duuren et al. 2016*). Social criteria assess how a company interacts with employees, suppliers, customers and the related communities. The corporate governance pillar examines whether the management really represents the interests of shareholders, how the board function (is it sufficiently diverse and independent?

are its members suitably experienced?) and whether the company has adequate internal regulations to avoid illegal activities and fraud.

Furthermore, ESG is an increasingly popular indicator among investors, which enables them to assess companies. More and more investment funds and brokerages offer ESG-based investments. A study by the *US SIF Foundation* (*2018*) shows that investors in the USA hold nearly USD 12 trillion in ESG-based investments, and this number is growing dynamically. The ESG indicator can be calculated in several ways and measured on different scales. In my study, I use the scale of 100 published by Thomson Reuters (*Ribando – Bonne 2010*), as it is one of the most widely used and provides the necessary nuance for the application of statistical methods (*Li – Polychronopoulos 2020*). In the market being studied, this indicator is available in the case of most companies. Another advantage is that it can be accessed from the same database as the other data I use, which reduces the possibility of data errors. In addition to specific scores, other criteria and expectations can also be set, such as exposure to coal or the military industry or avoidance of companies involved in workplace discrimination scandals. This can be of help in finding truly responsible companies and in making sustainable investment decisions, but I will leave that aside for now. Due to its definition, ESG is an excellent index of responsible and sustainable management, and thus suitable for the studies to be carried out. Climate change and other factors are making environmental protection and specifically green investments increasingly significant, and thus in this study I examine not only ESG, but also the ENV pillar individually, due to its growing significance.

2. The methodology used

The tests presented in this study are based on the methodology used in the literature for testing new factors (*Mérő et al. 2019*). I use two important testing tools: the investment strategy analysis with the univariate sort and the individual stock-level analysis with the *Fama–MacBeth* regression.

2.1. Investment strategy analysis

A common method in the academic literature for testing the effect of a given variable is the univariate sort. This is a testing of the returns of a trading strategy that, according to a given variable, buys high-value stocks and sells those of low-value. To test the returns of the strategy, I first sort the stocks by ESG or ENV value for each month. Then, I sort them into quantiles to create portfolios. Where the element number of the sample allows, I also perform a decile-based and tercile-based test (*Fama – French 1992*). Based on that, I calculate portfolio returns both in equal- and in value (market-capitalisation-) weighted form to correct for possible

biases (*Csillag – Neszveda 2020)*. With equal weighting, the investment ratio is the same for all stocks in the portfolio. In the case of weighting by value, the investment is made in proportion to the market share of the company in question, which is necessary to test robustness. Finally, I take the mean of the monthly portfolio returns to obtain an approximation of their expected value. As for the return of the investment strategy, I calculate it by subtracting the bottom-quantile return from the return of the portfolio containing the top quantile. Thus, in the trading strategy under consideration, the portfolio with the lowest value is basically sold, while the one with the highest value is bought each month. I test the significance of the resulting return by using the corrected t-statistics developed by *Newey – West* (*1987*). This method corrects for fundamental biases such as autocorrelation or heteroskedasticity and provides much more robust results. I consider the usual significance levels of 10, 5 and 1 per cent authoritative for the tests.

The univariate sort is relatively simple and easy to interpret, but on its own it can give misleading results in some cases. Its advantage is that we do not need to make any assumptions whatsoever about the relationship between the variable being tested and the return. Its disadvantage is that we can only look at one factor at a time and thus may capture another effect. This needs to be checked by further control tests.

2.2. Individual stock-level analysis

In the *Fama–MacBeth* regression, it is possible to use several control variables and to take into account individual stock-level information. In the test, I first estimate the explanatory variables for each month, using cross-section regression. I take the mean of the resulting monthly coefficients and then also test it using the *Newey–West* corrected t-statistics. The accuracy of the results is ensured by the use of cross-section regression on a monthly basis, which does not require the assumptions necessary for time series analysis.

Both methodologies have their advantages and disadvantages. Examining the issue using only one method can significantly distort the obtained results: hence the need for the relatively complex and comprehensive study described.

3. Data

Much of the financial research focuses on US stock exchanges and stock returns. In addition, ESG-based investment is already very common in this market. Therefore, my study focuses on stocks listed on the New York Stock Exchange (NYSE). For this market, the CRSP database is the most commonly used (*Fama – French 2018*), but due to lack of access to it I used the second most popular and also reliable (*Mérő et al. 2019; Ince – Porter 2006*) Thomson Reuters Datastream database. In this

case, it is particularly important to carry out appropriate data cleaning, following the study of *Ince – Porter* (*2006*). The advantage of the database is the availability of the so-called 'total return index', which is the value adjusted for dividend and change in the number of shares, so their bias can be easily eliminated. In addition, the database includes stocks previously traded but already delisted from the stock exchange, which are also needed to avoid survival bias (*Shumway 1997*).

For data cleaning, I follow the procedures proposed by *Ince – Porter* (*2006*) with some additions. To filter out data errors, I delete monthly (not annualised) returns above 200 per cent, and, based on the turnover data, I also delete data on non-traded stocks (*Amihud 2002*). In their study, *Ince – Porter* (*2006*) suggest that stocks traded at low prices should be deleted, as they can cause biases. For US stock markets, this threshold is most often USD 5, so I omit from the analysis all observations where the stock price does not reach the threshold level. Omitting firms with low market capitalisation is also commonly used to reduce the likelihood that results will be largely driven by the stocks of small firms (*Mérő et al. 2019*). In the present study, based on market capitalisation, I deleted the 5 per cent smallest observations. I winsorised the variables at the 1 per cent level, not reducing the number of observations, but reducing the effect of outlier values. In order to obtain the most accurate results, I required ESG and ENV scores for at least 500 stocks (for each month separately) over the period under review. After these cleanings and filtering criteria, the database contains 87,344 pieces of data from the New York Stock Exchange for the period from 1 January 2007 to 1 December 2019. As for the robustness test, the shorter period is between 1 January 2013 and 1 December 2019. I discuss this later in more detail.

4. Results

4.1. ESG and ENV in the total market

First, I examine the profitability of the investment strategy, described in *Chapter 2*, on the basis of ESG and ENV for the total market. I apply both tercile- and decile-based sorts, assuming that the market is more sensitive to the latter with more detailed breakdown. However, this cannot be justified, as regardless of whether a tercile- or decile-based scale is used, the return for ESG is not significant; moreover, it is slightly negative (*Table 1*). Robustness is confirmed by the fact that equal or market-value weighting does not have much effect in the present case, and value weighting also does not move the results.

Table 1
ESG, tercile- and decile-based sorts (2007–2019, total market)

	Quantile	Mean ESG	Equal-weighted portfolio		Value-weighted portfolio	
			Mean return	Newey–West t	Mean return	Newey–West t
ESG	1.	22.27	0.92%	(2.30)**	0.91%	(2.29)**
	2.	41.70	0.88%	(2.17)**	0.88%	(2.19)**
	3.	69.27	0.91%	(2.63)***	0.91%	(2.66)***
	3.–1.	**–**	**–0.01%**	**–(0.09)**	**0.00%**	**–(0.05)**
	1.	15.54	0.97%	(2.48)**	0.88%	(2.86)***
	10.	79.82	0.88%	(2.87)***	0.96%	(2.46)**
	10.–1.	**–**	**–0.09%**	**–(0.75)**	**–0.08%**	**–(0.69)**

*Note: Portfolio 1 contains the stocks with the lowest ESG value, while Portfolio 3 (or 10) contains the stocks with the highest ESG value. *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

The results are similar for ENV. There are no significant returns for either the tercile- or the decile-based scale; they show slightly negative returns (*Table 2*). Similar assumptions can be made as in the previous case, i.e. that the market is more sensitive to outlier values, but this cannot be demonstrated here either. Equal or market weighting also has no effect on the result, which confirms robustness.

Table 2
ENV, tercile- and decile-based sorts (2007–2019, total market)

	Quantile	Mean ENV	Equal-weighted portfolio		Value-weighted portfolio	
			Mean return	Newey–West t	Mean return	Newey–West t
ENV	1.	9.25	0.99%	(3.07)***	0.99%	(3.09)***
	2.	37.05	1.00%	(3.11)***	1.00%	(3.13)***
	3.	72.24	0.94%	(3.49)***	0.93%	(3.52)***
	3.–1.	**–**	**–0.05%**	**–(0.64)**	**–0.05%**	**–(0.65)**
	1.	3.12	0.95%	(2.84)***	0.87%	(3.13)***
	10.	84.19	0.87%	(3.13)***	0.96%	(2.76)***
	10.–1.	**–**	**–0.08%**	**–(0.76)**	**–0.09%**	**–(0.74)**

*Note: Portfolio 1 contains the stocks with the lowest ENV value, while Portfolio 3 (or 10) contains the stocks with the highest ENV value. *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

The *Fama–Macbeth* regressions show significant negative coefficients, but their values are much lower than those of the other factors (*Table 3*). The economic significance of the impact of ESG and ENV is therefore negligible. This is basically consistent with the results of the univariate sort for both variables, where I have obtained non-significant results.

Table 3
ESG and ENV, Fama–MacBeth regression (2007–2019, total market)

Variable	1	2
ESG	**–0.0059** –(4.45)***	–
ENV	–	**–0.0037** –(4.11)***
Beta	**0.0859** (0.18)	**0.0375** (0.10)
Size	**0.1098** (4.30)***	**0.0821** (4.32)***
Btm	**–0.2412** –(6.61)***	**–0.2218** –(6.93)***
Mom	**–0.8507** –(1.59)	**–0.4613** –(1.03)

*Note: In the regressions, I explained returns by ESG or ENV as well as control variables, which are: market beta (Beta), market capitalisation (Size), book-to-market ratio (Btm) and momentum (Mom). The table shows the time-series mean of the coefficients (× 100) as well as the corresponding Newey–West t-statistics in parentheses. *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

Overall, looking at the total market, there is a weak negative relationship between the indicators examined and the stock returns. The direction of the relationship is unanimously negative, but its significance is highly questionable from both a statistical and an economic point of view. On the basis of this, the higher profits assumed from responsible and sustainable investments do not yet materialise; in fact, minor return losses may occur. Based on the above considerations, looking at the total market, I reject the hypothesis put forward.

4.2. Detailed industry breakdown

To obtain a comprehensive picture of the profitability of responsible and sustainable investments, a more detailed analysis than total market analysis is needed. Different industries have a number of characteristics, such as different environmental conditions and features. It is therefore logical to examine the industry breakdown. In this subchapter, I break down the total market into 25 main industries. My assumption is that responsible behaviour matters more within the industry, and that this may be important for direct competitors (actors in the same industry)

(*Kumar et al. 2016*). Numerous psychological and behavioural economics studies[4] have found that people tend to make decisions based on context[5] rather than deal with the given values in themselves. On this basis, my hypothesis is that if I apply the existing investment strategy within industries, I can achieve higher profits. Due to the breakdown of the data, the element number of the sample is reduced, and thus, in this case, I only examine the returns of the tercile-based strategy.

For ESG (*Table 4*), at all standard significance levels, a significant positive relationship is observed only in the apparel industry, which means a monthly return of 0.62 per cent. The transportation industry also shows some positive returns, but it is not significant even at the 10 per cent level. Of the 25 industries examined, 4 show significant negative returns, namely textiles, tobacco, miscellaneous and automotive. What they all have in common is that none of them are particularly environmentally friendly, and the mean ESG score is relatively low in each sector. Most other sectors show mainly negative but not significant returns. Market-value-weighted returns confirm the robustness of the results.

Table 4
ESG, tercile-based sort (2007–2019, industry breakdown detail)

	Equal-weighted portfolio		Value-weighted portfolio	
Industry	**Mean return**	**Newey–West t**	**Mean return**	**Newey–West t**
Apparel (16)	0.62%	(2.75)***	0.64%	(2.92)***
Automotive (19)	–0.52%	–(1.98)**	–0.52%	–(2.04)**
Textiles (73)	–1.70%	–(3.25)**	–1.71%	–(3.25)***
Tobacco (76)	–0.16%	–(1.65)*	–0.15%	–(1.46)
Transportation (79)	0.31%	(1.15)	0.30%	(1.11)
Miscellaneous (85)	–0.17%	–(1.69)*	–0.16%	–(1.57)

*Note: The table, based on ESG, shows the tercile-scaled investment strategy return, which I obtain by subtracting the bottom-tercile return from the return of the portfolio containing the top tercile. Only the major (significant or near-significant) results have been included in the table. (The full table is available on request.) *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

As for ENV (*Table 5*), a significant positive relationship is also only found in the apparel industry. The monthly return of 0.49 per cent is significant here only at the 10-per cent significance level. Results for the transportation industry are also similar to those for ESG. There are several industries, namely textiles; tobacco; automotive; electrical; oil, gas and coal; diversified; and food, which have significant negative returns, but in most industries, the obtained results are not significant here either.

[4] Several works have been written summarising behavioural studies (e.g. *Golovics 2015; Neszveda 2018*).
[5] A number of economic models have been developed on context dependence and its significance (e.g. *Kőszegi – Szeidl 2013; Bordalo et al. 2013; Bakó et al., 2018; Bakó – Neszveda 2020*).

Table 5
ENV, tercile-based sort (2007–2019, industry breakdown detail)

	Equal-weighted portfolio		Value-weighted portfolio	
Industry	**Mean return**	**Newey–West t**	**Mean return**	**Newey–West t**
Apparel (16)	0.49%	(1.81)*	0.50%	(1.83)*
Automotive (19)	–0.47%	–(2.45)**	–0.50%	–(2.67)***
Diversified (31)	–0.28%	–(2.14)**	–0.31%	–(2.35)**
Electrical	–1.44%	–(4.90)***	–1.40%	–(4.20)***
Food (46)	–0.32%	–(1.68)*	–0.33%	–(1.70)*
Oil, Gas and Coal (58)	–0.41%	–(2.21)**	–0.42%	–(2.24)**
Textiles (73)	–0.45%	–(2.56)**	–0.39%	–(2.11)**
Tobacco (76)	–0.33%	–(1.88)	–0.26%	–(1.45)
Transportation (79)	0.31%	(1.33)	0.30%	(1.29)

*Note: The table, based on ENV, shows the tercile-scaled investment strategy return, which I obtain by subtracting the bottom-tercile return from the return of the portfolio containing the top tercile. Only the major (significant or near-significant) results have been included in the table. (The full table is available on request.) *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

Overall, we obtain a rather mixed picture, which is in line with the results of *Cao et al.* (*2020*). Some industries can be distinguished where responsible and sustainable behaviour may have significance, but even in these, the negative relationship tends to dominate. Negative returns are mainly seen in the industries with lower ESG or ENV ratings. This indicates that investors do not yet necessarily value sustainability (*Kumar et al. 2016*); in fact, in more-polluting sectors, it may even be a disadvantage. Based on this analysis, I reject my hypothesis that higher profits can be achieved by applying the existing investment strategies within industries.

4.3. Tests on groups

The results so far show that the mean ESG or ENV score across industries can affect the evolution of returns. To investigate this further, I divide the 25 industries tested so far into 5 groups (each group includes 5 industries), based on whether the mean industry score is very low, low, medium, high or very high. In this chapter, I present the results of tests on the groups thus formed. My hypothesis is that if I apply the existing investment strategy within groups, I can achieve higher profits.

Contrary to expectations, the results (*Table 6*) show that ESG has no impact on the returns. The returns of none of the portfolios are significant. The results are slightly better for the decile-based scale; the portfolio return is close to significant in the very high ESG group, but still not acceptable even at the 10 per cent level. Value weighting also confirms the results; the differences are negligible.

Table 6
ESG, tercile- and decile-based sorts (2007–2019, industry grouping)

	Quantile	Mean ESG	Equal-weighted portfolio		Value-weighted portfolio	
			Mean return	Newey–West t	Mean return	Newey–West t
Very low (28, 55, 58, 73, 49)	1.	17.93	0.83%	(1.97)**	0.83%	(1.96)**
	2.	31.66	0.80%	(2.08)**	0.80%	(2.09)**
	3.	59.21	0.76%	(1.80)*	0.76%	(1.84)*
	3.–1.	**–**	**–0.07%**	**–(0.82)**	**–0.07%**	**–(0.73)**
Low (85, 43, 37, 13, 79)	1.	21.60	0.91%	(2.27)**	0.91%	(2.26)**
	2.	38.46	0.89%	(2.13)**	0.89%	(2.14)**
	3.	64.26	0.85%	(2.02)**	0.85%	(2.04)**
	3.–1.	**–**	**–0.06%**	**–(0.76)**	**–0.06%**	**–(0.72)**
Medium (19, 67, 52, 40, 61)	1.	23.56	1.03%	(2.33)**	1.03%	(2.34)**
	2.	44.51	0.82%	(1.72)*	0.82%	(1.73)*
	3.	70.43	0.92%	(2.53)**	0.93%	(2.58)***
	3.–1.	**–**	**–0.10%**	**–(0.81)**	**–0.10%**	**–(0.78)**
High (64, 25, 82, 70, 16)	1.	26.21	0.93%	(2.35)**	0.92%	(2.35)**
	2.	48.26	0.92%	(2.42)**	0.92%	(2.43)**
	3.	71.75	0.90%	(2.94)***	0.90%	(2.97)***
	3.–1.	**–**	**–0.03%**	**–(0.22)**	**–0.02%**	**–(0.18)**
Very high (34, 22, 31, 46, 76)	1.	29.54	1.06%	(3.06)***	1.06%	(3.05)***
	2.	56.18	1.05%	(3.08)***	1.05%	(3.09)***
	3.	79.14	0.96%	(3.72)***	0.96%	(3.69)***
	3.–1.	**–**	**–0.10%**	**–(0.63)**	**–0.09%**	**–(0.60)**
Very low	**10.–1.**	**–**	**–0.07%**	**–(0.54)**	**–0.08%**	**–(0.64)**
Low	**10.–1.**	**–**	**–0.13%**	**–(1.05)**	**–0.11%**	**–(0.93)**
Medium	**10.–1.**	**–**	**–0.06%**	**–(0.32)**	**–0.03%**	**–(0.14)**
High	**10.–1.**	**–**	**–0.08%**	**–(0.45)**	**–0.09%**	**–(0.46)**
Very high	**10.–1.**	**–**	**–0.28%**	**–(1.46)**	**–0.26%**	**–(1.34)**

*Note: Portfolio 1 contains the stocks with the lowest ESG value, while Portfolio 3 (or 10) contains the stocks with the highest ESG value, within the group. *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

The results are similar for ENV (*Table 7*), with the difference that here, for the tercile-based scale, the very low group shows an almost significant result. The results obtained cannot be considered significant at all. The preliminary assumption that the mean ESG or ENV score of an industry may play a decisive role is not confirmed.

Table 7
ENV, tercile- and decile-based sorts (2007–2019, industry grouping)

	Quantile	Mean ENV	Equal-weighted portfolio		Value-weighted portfolio	
			Mean return	Newey–West t	Mean return	Newey–West t
Very low (28, 55, 85, 73, 43)	1.	6.81	0.99%	(3.00)***	0.98%	(2.98)***
	2.	27.58	1.03%	(3.02)***	1.03%	(3.03)***
	3.	64.84	0.85%	(2.40)**	0.86%	(2.42)**
	3.–1.	**–**	**–0.13%**	**–(1.47)**	**–0.13%**	**–(1.37)**
Low (49, 58, 70, 13, 19)	1.	7.10	0.94%	(2.14)**	0.94%	(2.16)**
	2.	32.48	0.85%	(2.41)**	0.85%	(2.42)**
	3.	74.34	0.95%	(3.09)***	0.94%	(3.13)***
	3.–1.	**–**	**–0.13%**	**–(1.15)**	**–0.13%**	**–(1.16)**
Medium (40, 64, 52, 67, 79)	1.	10.96	0.99%	(2.67)***	0.99%	(2.68)***
	2.	39.63	0.95%	(2.71)***	0.95%	(2.74)***
	3.	71.95	1.01%	(3.31)***	1.01%	(3.37)***
	3.–1.	**–**	**0.02%**	**(0.14)**	**0.02%**	**(0.15)**
High (37, 16, 34, 82, 25)	1.	14.99	1.07%	(3.60)***	1.07%	(3.60)***
	2.	45.36	1.06%	(4.05)***	1.06%	(4.07)***
	3.	73.79	0.99%	(4.36)***	0.98%	(4.37)***
	3.–1.	**–**	**–0.10%**	**–(0.82)**	**–0.10%**	**–(0.85)**
Very high (31, 22, 61, 46, 76)	1.	19.23	0.97%	(2.54)**	0.97%	(2.56)**
	2.	50.80	1.02%	(3.51)***	1.02%	(3.55)***
	3.	77.46	0.99%	(3.84)***	0.98%	(3.78)***
	3.–1.	**–**	**0.05%**	**(0.35)**	**0.04%**	**(0.27)**
Very low	**10.–1.**	**–**	**0.03%**	**(0.17)**	**0.01%**	**(0.04)**
Low	**10.–1.**	**–**	**–0.18%**	**–(1.07)**	**–0.25%**	**–(1.29)**
Medium	**10.–1.**	**–**	**–0.12%**	**–(0.70)**	**–0.13%**	**–(0.64)**
High	**10.–1.**	**–**	**–0.05%**	**–(0.32)**	**0.00%**	**–(0.04)**
Very high	**10.–1.**	**–**	**0.06%**	**(0.27)**	**0.13%**	**(0.58)**

*Note: Portfolio 1 contains the stocks with the lowest ENV value, while Portfolio 3 (or 10) contains the stocks with the highest ENV value, within the group. *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

When using *Fama–Macbeth regression* for a total market analysis, I obtained statistically significant results, so this may also be interesting in the case of group breakdown. Using ESG as an explanatory variable (*Table 8*), we can see that the relationship is significantly negative for all but the medium group. As with the total market, the coefficient of ESG is lower than that of the control factors; its economic

significance is negligible. What can be observed is that the coefficient is higher for the extreme groups.

Using ENV as an explanatory variable (*Table 9*), we can see a significant negative coefficient in all cases, again with the exception of the medium group. It can also be observed that the effect is stronger for the extreme groups. It is strongest in the very high ENV group, but even there, its economic significance is negligible.

Table 8
ESG, Fama–MacBeth regression (2007–2019, industry grouping)

Variable	1	2	3	4	5
Very low	**–0.0060** –(2.53)**	–	–	–	–
Low	–	**–0.0058** –(3.20)***	–	–	–
Medium	–	–	**–0.0030** –(0.12)	–	–
High	–	–	–	**–0.0064** –(3.22)***	–
Very high	–	–	–	–	**–0.0088** –(3.07)***
Beta	**0.34** (0.66)	**0.17** (0.32)	**0.34** (0.64)	**–0.21** –(0.43)	**0.19** (0.44)
Size	**0.11** (2.20)**	**0.11** (4.08)***	**0.05** (1.41)	**0.11** (2.15)**	**0.06** (1.80)*
Btm	**–0.28** –(5.29)***	**–0.20** –(3.72)***	**–0.39** –(5.51)***	**–0.27** –(7.47)***	**–0.23** –(3.69)***
Mom	**0.05** (0.10)	**–0.79** –(1.41)	**–0.63** –(1.13)	**–1.71** –(2.63)***	**–1.38** –(2.30)**

*Note: In the regressions, I have explained returns by ESG as well as control variables, which are: market beta (Beta), market capitalisation (Size), book-to-market ratio (Btm) and momentum (Mom). The table shows the time-series mean of the coefficients (× 100) as well as the corresponding Newey–West t-statistics in parentheses. *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

Table 9
ENV, Fama–MacBeth regression (2007–2019, industry grouping)

Variable	1	2	3	4	5
Very low	**–0.0027** –(1.65)*	–	–	–	–
Low	–	**–0.0039** –(1.66)*	–	–	–
Medium	–	–	**–0.0018** –(0.95)	–	–
High	–	–	–	**–0.0020** –(1.81)*	–
Very high	–	–	–	–	**–0.0045** –(2.35)**
Beta	**–0.05** –(0.12)	**–0.08** –(0.18)	**0.16** (0.45)	**0.00** (0.01)	**0.23** (0.61)
Size	**0.09** (2.58)***	**0.08** (2.14)**	**0.11** (2.30)**	**0.01** (0.16)	**0.04** (0.90)
Btm	**–0.23** –(3.61)***	**–0.30** –(4.54)***	**–0.33** –(4.07)***	**–0.19** –(4.47)	**–0.13** –(1.96)**
Mom	**–0.30** –(0.47)	**0.21** (0.32)	**–0.82** –(1.34)	**–0.60** –(1.18)	**–0.78** –(1.14)

*Note: In the regressions, I have explained returns by ENV as well as control variables, which are: market beta (Beta), market capitalisation (Size), book-to-market ratio (Btm) and momentum (Mom). The table shows the time-series mean of the coefficients (× 100) as well as the corresponding Newey–West t-statistics in parentheses. *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

Overall, for groupings based on the mean ESG and ENV scores in the industries, the univariate-sort-based portfolio creation shows no significant returns, and the *Fama–Macbeth regressions* show a negative relationship, but the economic significance is negligible. Although, to the best of my knowledge, the same analysis has not yet been performed in previous studies, I have obtained results consistent with similar studies by *Auer – Schuhmacher* (*2016*); according to which a high or low ranking does not result in a significant difference in returns. Furthermore, in some cases, a negative relationship can be seen. I, therefore, reject the hypothesis proposed at the beginning of the chapter.

4.4. Relative ESG and relative ENV, tests on groups

The previous tests suggest, in part, that if the market does not generally value ESG or ENV, it may still be sensitive to extreme values. In this subchapter, I examine this issue. To measure this, I use relative ESG and relative ENV, which I calculate by subtracting the industry mean from the given score. This shows the signed distance

from the industry mean. My hypothesis is that stocks with higher relative scores provide higher returns. The results so far point in the direction that responsible and sustainable investments have basically no impact on returns. I, therefore, present the relative tests directly in a group breakdown,[6] using as much additional information as possible from the scores. The total industry breakdown in this case can no longer be interpreted separately; it would give exactly the same result as a test of simple scores.

For the tercile scale of relative-ESG-based strategy (see *Table 10*), no significant returns are seen anywhere. For the decile-based scale, I obtain slightly higher returns, and the very high group shows a significant monthly return of –0.34 per cent at the 10 per cent significance level. The results are the same for both equal and value weighting, and show that in industries with inherently very high ESG scores, there is a negative relationship between ESG and returns, i.e. it is not worth investing in stocks with high ESG.

The results for ENV are somewhat different (*Table 11*), with a significant monthly return of –0.18 per cent for the tercile-based scale in the very low category (again only at the 10 per cent level). The decile-based scale amplifies this to –0.34 per cent, but this is more sensitive to market-value weighting. The result shows that in industries with inherently very low ENV scores, the relationship between ENV and returns is negative. Therefore, it is also not worth investing in stocks with a higher ENV in this group. However, it is important to note that the results are not robust for any of the indicators examined. Significant returns can only be seen at a high significance level in some places; furthermore, I perform a relatively large number of tests, so this can even be a mere random effect.

[6] I also performed the test on the total market, where it had no particular impact on the results; accordingly, for the sake of the transparency of the tables, they are not included in the study, but are available on request.

Table 10
Relative ESG, tercile- and decile-based sorts (2007–2019, industry grouping)

	Quantile	Equal-weighted portfolio		Value-weighted portfolio	
		Mean return	Newey–West t	Mean return	Newey–West t
Very low (28, 55, 58, 73, 49)	1.	0.91%	(2.18)**	0.91%	(2.17)**
	2.	0.90%	(2.32)**	0.90%	(2.34)**
	3.	0.81%	(1.93)*	0.81%	(1.97)**
	3.–1.	**–0.10%**	**–(1.08)**	**–0.10%**	**–(0.99)**
Low (85, 43, 37, 13, 79)	1.	1.00%	(2.50)**	1.00%	(2.49)**
	2.	0.98%	(2.34)**	0.98%	(2.35)**
	3.	0.93%	(2.20)**	0.93%	(2.21)**
	3.–1.	**–0.07%**	**–(0.88)**	**–0.07%**	**–(0.84)**
Medium (19, 67, 52, 40, 61)	1.	1.13%	(2.54)**	1.13%	(2.55)**
	2.	0.91%	(1.91)*	0.91%	(1.93)*
	3.	1.01%	(2.75)***	1.01%	(2.81)***
	3.–1.	**–0.12%**	**–(0.90)**	**–0.11%**	**–(0.87)**
High (64, 25, 82, 70, 16)	1.	1.02%	(2.61)***	1.02%	(2.62)***
	2.	1.01%	(2.65)***	1.01%	(2.66)***
	3.	0.99%	(3.27)***	1.00%	(3.31)***
	3.–1.	**–0.03%**	**–(0.20)**	**–0.02%**	**–(0.17)**
Very high (34, 22, 31, 46, 76)	1.	1.17%	(3.38)***	1.16%	(3.36)***
	2.	1.13%	(3.33)***	1.13%	(3.34)***
	3.	1.08%	(4.25)***	1.08%	(4.20)***
	3.–1.	**–0.09%**	**–(0.55)**	**–0.08%**	**–(0.53)**
Very low	**10.–1.**	**–0.05%**	**–(0.28)**	**–0.12%**	**–(0.77)**
Low	**10.–1.**	**–0.15%**	**–(1.13)**	**–0.17%**	**–(1.22)**
Medium	**10.–1.**	**–0.12%**	**–(0.56)**	**–0.14%**	**–(0.63)**
High	**10.–1.**	**–0.10%**	**–(0.55)**	**–0.09%**	**–(0.50)**
Very high	**10.–1.**	**–0.34%**	**–(1.80)***	**–0.36%**	**–(1.78)***

*Note: Portfolio 1 contains the stocks with the lowest relative ESG value, while Portfolio 3 (or 10) contains the stocks with the highest relative ESG value, within the group. *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

Table 11
Relative ENV, tercile- and decile-based sorts (2007–2019, industry grouping)

	Quantile	Equal-weighted portfolio		Value-weighted portfolio	
		Mean return	Newey–West t	Mean return	Newey–West t
Very low (28, 55, 85, 73, 43)	1.	0.99%	(2.98)***	0.99%	(2.97)***
	2.	1.05%	(3.06)***	1.04%	(3.07)***
	3.	0.81%	(2.28)**	0.81%	(2.31)**
	3.–1.	**–0.18%**	**–(1.79)***	**–0.18%**	**–(1.70)***
Low (49, 58, 70, 13, 19)	1.	1.04%	(2.82)***	1.04%	(2.84)***
	2.	0.93%	(2.67)***	0.93%	(2.68)***
	3.	0.93%	(3.21)***	0.92%	(3.25)***
	3.–1.	**–0.11%**	**–(0.75)**	**–0.12%**	**–(0.78)**
Medium (40, 64, 52, 67, 79)	1.	0.97%	(2.59)***	0.97%	(2.60)***
	2.	0.94%	(2.69)***	0.94%	(2.72)***
	3.	1.02%	(3.35)***	1.02%	(3.41)***
	3.–1.	**0.05%**	**(0.45)**	**0.05%**	**(0.46)**
High (37, 16, 34, 82, 25)	1.	0.99%	(3.54)***	0.99%	(3.54)***
	2.	1.11%	(4.36)***	1.10%	(4.38)***
	3.	0.94%	(4.15)***	0.93%	(4.16)***
	3.–1.	**–0.05%**	**–(0.49)**	**–0.06%**	**–(0.55)**
Very high (31, 22, 61, 46, 76)	1.	0.96%	(2.53)**	0.97%	(2.56)**
	2.	1.02%	(3.56)***	1.02%	(3.62)***
	3.	0.99%	(3.76)***	0.98%	(3.70)***
	3.–1.	**0.05%**	**(0.37)**	**0.04%**	**(0.29)**
Very low	**10.–1.**	**–0.34%**	**–(1.93)***	**–0.25%**	**–(1.56)**
Low	**10.–1.**	**–0.10%**	**–(0.60)**	**0.04%**	**(0.22)**
Medium	**10.–1.**	**–0.11%**	**–(0.49)**	**–0.07%**	**–(0.41)**
High	**10.–1.**	**0.10%**	**(0.51)**	**–0.08%**	**–(0.54)**
Very high	**10.–1.**	**–0.31%**	**–(1.27)**	**–0.09%**	**–(0.40)**

*Note: Portfolio 1 contains the stocks with the lowest relative ENV value, while Portfolio 3 (or 10) contains the stocks with the highest relative ENV value, within the group. *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

The use of relative scores does not substantially change the results of the *Fama–Macbeth* regressions (see *Tables 12 and 13*). With the exception of the medium group, there is a significant negative relationship in all cases, but their economic significance remains negligible.

Table 12
Relative ESG, Fama–MacBeth regression (2007–2019, industry grouping)

Variable	1	2	3	4	5
Very low	**–0.0066** –(2.78)***	–	–	–	–
Low	–	**–0.0063** –(3.52)***	–	–	–
Medium	–	–	**–0.0033** –(0.13)	–	–
High	–	–	–	**–0.0070** –(3.54)***	–
Very high	–	–	–	–	**–0.0096** –(3.38)***
Beta	**0.37** (0.73)	**0.18** (0.35)	**0.37** (0.70)	**–0.23** –(0.47)	**0.20** (0.48)
Size	**0.12** (2.42)**	**0.12** (4.49)***	**0.06** (1.55)	**0.12** (2.37)**	**0.07** (1.98)**
Btm	**–0.30** –(5.82)***	**–0.22** –(4.09)***	**–0.43** –(6.06)***	**–0.29** –(8.22)***	**–0.26** –(4.06)***
Mom	**0.05** (0.11)	**–0.87** –(1.55)	**–0.70** –(1.24)	**–1.88** –(2.89)***	**–1.52** –(2.53)**

*Note: In the regressions, I explained returns by relative ESG as well as control variables, which are: market beta (Beta), market capitalisation (Size), book-to-market ratio (Btm) and momentum (Mom). The table shows the time-series mean of the coefficients (× 100) as well as the corresponding Newey–West t-statistics in parentheses. *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

Table 13
Relative ENV, Fama–MacBeth regression (2007–2019, industry grouping)

Variable	1	2	3	4	5
Very low	**–0.0043** –(2.33)**	–	–	–	–
Low	–	**–0.0043** –(1.83)*	–	–	–
Medium	–	–	**–0.0020** –(1.05)	–	–
High	–	–	–	**–0.0022** –(1.99)**	–
Very high	–	–	–	–	**–0.0050** –(2.59)***
Beta	**0.01** (0.02)	**–0.08** –(0.20)	**0.18** (0.50)	**0.00** (0.01)	**0.25** (0.67)
Size	**0.07** (1.53)	**0.09** (2.35)**	**0.12** (2.53)**	**0.01** (0.18)	**0.05** (0.99)
Btm	**–0.29** –(4.95)***	**–0.33** –(4.99)***	**–0.36** –(4.48)***	**–0.21** –(4.92)***	**–0.14** –(2.16)**
Mom	**0.08** (0.13)	**0.23** (0.35)	**–0.90** –(1.47)	**–0.67** –(1.30)	**–0.86** –(1.25)

*Note: In the regressions, I explained returns by relative ENV as well as control variables, which are: market beta (Beta), market capitalisation (Size), book-to-market ratio (Btm) and momentum (Mom). The table shows the time-series mean of the coefficients (× 100) as well as the corresponding Newey–West t-statistics in parentheses. *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

Overall, the results obtained for the relative scores also do not differ from the previous. For groupings based on the industry mean, in the context of relative-ESG test, during the univariate-sort-based portfolio creation, only the very high group had significant returns. While for the relative ENV, it was the very low group that had such returns. However, most of the returns are not significant, and the few significant ones may be the result of coincidence. The *Fama–Macbeth regressions* show a weak negative relationship with a negligible economic impact. Based on these results, I reject the hypothesis that stocks with higher relative scores provide higher returns.

4.5. Robustness, temporal decomposition

Since, according to *Halbritter – Dorfleitner* (*2015*), scores can be sensitive to the time horizon, in this chapter, I intend to support the robustness of the results by breaking up the time series studied so far and performing the main parts of the previous tests in a nearer and shorter time horizon. Having become more and more widespread, ESG can have an increasing impact. Therefore, I halved the period covered so far and then focus only on the second half of it (2013–2019), thus excluding the impact of the 2008 crisis, which may also have a major influence on the results.

The tests performed for the shorter time horizon show no substantial difference between ESG and ENV, just as no major difference was observed so far. Thus, for transparency reasons, I only publish the tables for ESG.[7] In the case of the sort, the main results are not changed by the period breakdown when we examine the total market. Although there is a shift towards positive returns, this cannot be considered significant in either case (*Table 14*). Here, too, value weighting does not greatly affect the results.

Table 14
ESG, tercile- and decile-based sorts (2013–2019, total market)

	Quantile	Mean ESG	Equal-weighted portfolio		Value-weighted portfolio	
			Mean return	Newey–West t	Mean return	Newey–West t
ESG	1.	22.45	0.89%	(2.83)***	0.89%	(2.84)***
	2.	41.42	0.92%	(3.04)***	0.93%	(3.05)***
	3.	68.81	1.00%	(3.64)***	1.00%	(3.69)***
	3.–1.	**–**	**0.11%**	**(1.36)**	**0.11%**	**(1.32)**
	1.	15.96	0.85%	(2.59)***	0.86%	(2.64)***
	10.	79.70	0.96%	(3.60)***	0.96%	(3.60)***
	10.–1.	**–**	**0.11%**	**(1.07)**	**0.10%**	**(0.92)**

*Note: Portfolio 1 contains the stocks with the lowest ESG value, while Portfolio 3 (or 10) contains the stocks with the highest ESG value. *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

[7] ENV results are also available on request.

The *Fama–MacBeth* regressions show a weak but not significant relationship with a positive sign (*Table 15*). This indicates that there is indeed a noticeable difference between the longer and the newer, shorter period, but the relationship is not significant for the latter either. The results of the industry-related tests on groups are also consistent with those obtained so far, showing that the period breakdown also does not affect the main results (*Table 16*). Here, too, there is only a small shift in the positive direction. No significant returns are seen for any of the groups in either the tercile- or the decile-based sort.

Table 15
ESG and ENV, Fama–MacBeth regression (2013–2019, total market)

Variable	1	2
ESG	**0.0016** (1.21)	–
ENV	–	**0.0011** (1.37)
Beta	**0.0088** (0.05)	**–0.1160** –(0.64)
Size	**0.0928** (2.93)***	**0.0773** (2.44)**
Btm	**–0.1235** –(3.87)***	**–0.1029** –(3.23)***
Mom	**–0.8806** –(1.67)*	**–0.4815** –(1.21)

*Note: In the regressions, I explained returns by ESG or ENV as well as control variables, which are: market beta (Beta), market capitalisation (Size), book-to-market ratio (Btm) and momentum (Mom). The table shows the time-series mean of the coefficients (× 100) as well as the corresponding Newey–West t-statistics in parentheses. *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

Table 16
ESG, tercile- and decile-based sorts (2013–2019, industry grouping)

	Quantile	Mean ESG	Equal-weighted portfolio		Value-weighted portfolio	
			Mean return	Newey–West t	Mean return	Newey–West t
Very low (28, 55, 58, 73, 49)	1.	18.81	0.54%	(1.30)	0.53%	(1.29)
	2.	31.92	0.65%	(2.14)**	0.66%	(2.15)**
	3.	58.78	0.58%	(1.45)	0.57%	(1.43)
	3.–1.	**–**	**0.04%**	**(0.41)**	**0.03%**	**(0.35)**
Low (85, 43, 37, 13, 79)	1.	21.82	0.99%	(3.38)***	0.99%	(3.41)***
	2.	38.49	1.04%	(3.57)***	1.04%	(3.60)***
	3.	64.57	1.03%	(3.11)***	1.04%	(3.15)***
	3.–1.	**–**	**0.04%**	**(0.51)**	**0.05%**	**(0.55)**
Medium (19, 67, 52, 40, 61)	1.	23.37	1.01%	(2.75)***	1.01%	(2.78)***
	2.	43.90	0.88%	(2.39)**	0.88%	(2.40)**
	3.	68.96	0.90%	(2.68)***	0.90%	(2.71)***
	3.–1.	**–**	**–0.10%**	**–(0.64)**	**–0.11%**	**–(0.68)**
High (64, 25, 82, 70, 16)	1.	25.84	0.91%	(3.43)***	0.91%	(3.41)***
	2.	47.98	0.93%	(3.15)***	0.93%	(3.17)***
	3.	71.94	0.98%	(4.29)***	0.98%	(4.41)***
	3.–1.	**–**	**0.07%**	**(0.65)**	**0.08%**	**(0.70)**
Very high (34, 22, 31, 46, 76)	1.	30.22	1.04%	(3.69)***	1.03%	(3.66)***
	2.	56.66	1.08%	(5.11)***	1.08%	(5.19)***
	3.	78.80	1.08%	(5.06)***	1.08%	(5.05)***
	3.–1.	**–**	**0.04%**	**(0.24)**	**0.04%**	**(0.26)**
Very low	**10.–1.**	**–**	**0.04%**	**(0.27)**	**–0.02%**	**–(0.13)**
Low	**10.–1.**	**–**	**0.16%**	**(1.56)**	**0.16%**	**(1.48)**
Medium	**10.–1.**	**–**	**–0.08%**	**–(0.29)**	**–0.07%**	**–(0.26)**
High	**10.–1.**	**–**	**–0.04%**	**–(0.24)**	**–0.06%**	**–(0.38)**
Very high	**10.–1.**	**–**	**–0.13%**	**–(0.51)**	**–0.16%**	**–(0.58)**

*Note: Portfolio 1 contains the stocks with the lowest ESG value, while Portfolio 3 (or 10) contains the stocks with the highest ESG value, within the group. *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

The *Fama–MacBeth* regressions performed by industry grouping show a similar pattern as for the total market for the period 2013–2019 (*Table 17*). The previous significant negative relationship disappears, and a significant positive coefficient is observed for the group with a very low ESG value. However, the economic significance of this remains negligible (due to its size). Thus, there is no significant positive correlation between the ESG and the expected returns here either.

Table 17
ESG, Fama–MacBeth regression (2013–2019, industry grouping)

Variable	1	2	3	4	5
Very low	**0.0029** (2.29)**	–	–	–	–
Low	–	**–0.0090** –(0.45)	–	–	–
Medium	–	–	**–0.0090** –(0.33)	–	–
High	–	–	–	**0.0006** 0.04	–
Very high	–	–	–	–	**0.0037** (0.87)
Beta	**0.31** (0.53)	**0.15** (0.30)	**0.30** (0.58)	**–0.19** –(0.39)	**0.17** (0.40)
Size	**0.09** (1.98)**	**0.10** (3.67)***	**0.05** (1.27)	**0.10** (1.94)*	**0.06** (1.62)
Btm	**–0.25** –(4.92)***	**–0.18** –(3.35)***	**–0.35** –(4.96)***	**–0.24** –(6.72)***	**–0.21** –(3.32)***
Mom	**0.04** (0.11)	**–0.71** –(1.57)	**–0.57** –(1.25)	**–1.54** –(2.92)***	**–1.24** –(2.55)**

*Note: In the regressions, I explained returns by ESG as well as control variables, which are: market beta (Beta), market capitalisation (Size), book-to-market ratio (Btm) and momentum (Mom). The table shows the time-series mean of the coefficients (× 100) as well as the corresponding Newey–West t-statistics in parentheses. *** Significant at 1 per cent, ** at 5 per cent, * at 10 per cent.*

Overall, there is some increase in the significance of ESG in the period 2013–2019, but its impact is still not significant. It can be assumed that if I were to shorten the period further towards the present day, then this impact would become stronger, but it is not advisable to look at a very short time horizon, because no reliable conclusions can be drawn based on a few years. The analysis of the period 2013–2019 therefore confirms what has been found so far; I reject the proposed hypotheses at this time horizon as well.

5. Conclusion

To summarise the results of the tests: when we examine ESG in the total market, the returns of the portfolio creation are not significant, and the *Fama–Macbeth regression* suggests a weak negative relationship, which, however, cannot be considered economically significant. On this basis, the ESG rating for the total market does not carry additional value and is not yet priced. Similarly, when we examine ENV in the total market, the returns of the portfolio creation are clearly not significant, and the *Fama–Macbeth regression* suggests a weak negative relationship with negligible economic significance. This is consistent with what has been found so far. Thus, the environmental component does not carry investment-related abnormal return and is not priced. Based on this, I reject my hypothesis that investing in companies with responsible and sustainable management can result in higher profit than investing in companies that ignore these aspects.

Looking at ESG by industry breakdown, we see that the returns of the portfolio creation are not significant for most industries. The exceptions to this are 4 industries (textiles, tobacco, miscellaneous and automotive), where there is a significant negative relationship. None of them are environmentally friendly, and ESG is relatively low in each sector. The negative relationship may be due to the fact that in these industries, more 'irresponsible' behaviour is conducive to more profitable operations. Only in the apparel industry did I obtain significantly positive returns, which may be a very special industry characteristic or, with so many tests, a coincidence. Looking at ENV in a detailed industry breakdown, we see that the returns of the portfolio creation are not significant for most industries. The exceptions to this are 7 industries, namely textiles; tobacco; automotive; electrical; oil, gas and coal; diversified; and food, where there is a significant negative relationship. Again, the negative relationship may be due to the fact that in these industries, less environmentally-conscious behaviour is conducive to more profitable operations, an even stronger effect here than in the case of ESG. With regard to the apparel industry, the strategy also yields significant returns in this case, which is certainly an interesting result. As we have seen, *Kumar et al.* also concluded that industries could be relevant in evaluating responsible investments, so my results are consistent with those of the academic literature, but I reject the proposed hypothesis with respect to industry breakdown as well.

In the case of tests on groups, I did not obtain significant returns for either ESG or ENV, and the *Fama–Macbeth regression* indicated a weak negative relationship, which is stronger but still not significant in the extreme groups: such a grouping by score does not differ substantially from the analysis of the total market.

Based on the tests, the market may be sensitive to extreme values. To examine this, I used relative ESG and relative ENV score. The relative ESG and ENV tested by sort

in the total market (similarly to the 'simple' indicators) are not significant in any of the cases. The *Fama–Macbeth regression* shows a weak negative relationship similar to what was found so far, which is insignificant in economic terms. In the 5-group industry analysis, the return was significant for the relative ESG only in the decile-based sort, in the very high group, and only at the 10 per cent significance level. Interestingly, when examining the relative ENV, it was the very low group where I obtained significant returns with both the tercile- and decile-based scales. The *Fama–Macbeth regressions* also give some indication of this, where I found a slightly stronger relationship for the extreme groups, but these results cannot be considered robust and can only be accepted at a high significance level; in fact, with so many tests, this may be a coincidence. All of these lead me to reject my hypothesis that profit can be increased if I apply different restrictions or relative scores.

Due to the sensitivity of the analysis and to confirm the robustness of the results, I also performed the major tests for a narrower time interval (2013–2019). Here again, a mechanism similar to that of the full period analysis can be seen. The results shift somewhat towards a positive relationship but are still not significant. On this basis, it remains true also for the more recent period that neither the ESG nor the ENV factor can be considered a significant forecaster of expected returns. Thus, we cannot expect higher profits from responsible and sustainable investments for the time being. The visible shift in the positive direction raises interesting questions about the potential for responsible and sustainable management to become increasingly significant, but this is not yet evident for the longer time horizon. Nevertheless, the topic could certainly be an interesting area for further research.

The negative relationship observed in some places is presumably due to the costs of responsible and sustainable management. This may result in less profitable operations, which may explain the slightly negative relationship. In the tests, the environmental component in itself does not differ basically from the total ESG. This means that environmental considerations are not of paramount significance. My results show that responsible and sustainable investment alone cannot generate higher profits, even under special constraints. One explanation for this may be the phenomenon of 'greenwashing', which refers to polluting, unsustainable companies trying to make themselves look good and thus achieve a higher ESG score. A further line of research could be the investigation of the exact impact of greenwashing. In further studies, it is worth comparing the markets of developed and developing countries as well. My results also show that the stocks of companies with high ESG or ENV score do not perform significantly worse than those with low score. This raises the possibility of further research as to what risk is associated with these returns and whether responsible and sustainable management can reduce the risk with the same return. My study can lay the groundwork for these further lines of research by demonstrating in detail that responsible and sustainable management does not result in significantly higher returns for investors.

References

Amihud, Y. (2002): *Illiquidity and stock returns: cross-section and time-series effects*. Journal of Financial Markets, 5(1): 31–56. https://doi.org/10.1016/S1386-4181(01)00024-6

Aouadi, A. – Marsat, S. (2018): *Do ESG controversies matter for firm value? Evidence from international data*. Journal of Business Ethics, 151(4): 1027–1047. https://doi.org/10.1007/s10551-016-3213-8

Auer, B.R. – Schuhmacher, F. (2016): *Do socially (ir)responsible investments pay? New evidence from international ESG data.* The Quarterly Review of Economics and Finance, 59(February): 51–62. https://doi.org/10.1016/j.qref.2015.07.002

Bakó, B. – Neszveda, G. – Dezső, L. (2018): *When irrelevant alternatives do matter. The effect of focusing on loan decisions.* Theory and Decision, 84(1): 123–141. https://doi.org/10.1007/s11238-017-9641-9

Bakó, B. – Neszveda, G. (2020): *The Achilles' heel of Salience theory and a way to fix it.* Economics Letters, 193, 109265. https://doi.org/10.1016/j.econlet.2020.109265

Bank, D. (2018): *Implicit és explicit, valamint belső és külső CSR egy kettős függésben lévő piacgazdaságban. Különös tekintettel a munkavállalókról való gondoskodásra* (*Implicit and explicit, internal and external CSR in a double dependent market economy. Especially regarding labor provisions*). Doctoral dissertation, Budapesti Corvinus Egyetem. https://doi.org/10.14267/phd.2018009

Berlinger, E. – Walter, Gy. (1999): *Faktormodellek az értékpapírpiacon (Factor models in the securities market).* Bankszemle, 43(4): 34–43.

Bordalo, P. – Gennaioli, N. – Shleifer, A. (2013): *Salience and consumer choice.* Journal of Political Economy, 121(5): 803–843. https://doi.org/10.1086/673885

Bóta, G. (2014): *A magyarországi befektetési alapok teljesítményét meghatározó tényezők vizsgálata* (*Determinants of the performance of investment funds managed in Hungary).* Hitelintézeti Szemle, 13(2): 147–163. http://epa.oszk.hu/02700/02722/00071/pdf/EPA02722_hitelintezeti_szemle_2014_2_147-163.pdf

Buallay, A. (2019): *Is sustainability reporting (ESG) associated with performance? Evidence from the European banking sector*. Management of Environmental Quality: An International Journal, 30(1): 98–115. https://doi.org/10.1108/MEQ-12-2017-0149

Cao, J. – Titman, S. – Zhan, X. – Zhang, W.E. (2020): *ESG Preference, Institutional Trading, and Stock Return Patterns.* Working Paper, National Bureau of Economic Research. https://doi.org/10.3386/w28156

Carhart, M.M. (1997): *On persistence in mutual fund performance.* The Journal of Finance, 52(1): 57–82. https://doi.org/10.1111/j.1540-6261.1997.tb03808.x

Csillag, B. – Neszveda, G. (2020): *A gazdasági várakozások hatása a tőzsdei momentumstratégiára* (*The impact of economic expectations on the momentum trading strategy*). Közgazdasági Szemle (Economic Review), 67(11): 1093–1111. http://doi.org/10.18414/KSZ.2020.11.1093

Deák, Zs. – Hajdu Istvánné (2011): *Az élelmiszer-ipari vállalkozások környezeti teljesítménye és a pénzügyi eredmények* (*The environmental performance and financial results of food industry businesses*). Gazdálkodás: Scientific Journal on Agricultural Economics, 55(7): 662–667. https://doi.org/10.22004/ag.econ.119945

Dorfleitner, G. – Halbritter, G. – Nguyen, M. (2015): *Measuring the level and risk of corporate responsibility – An empirical comparison of different ESG rating approaches.* Journal of Asset Management, 16(7): 450–466. https://doi.org/10.1057/jam.2015.31

Fain, M. – Naffa, H. (2019): *Performance Measurement of Active Investment Strategies Using Pure Factor Portfolios.* Financial and Economic Review, 18(2): 52–86. http://doi.org/10.33893/FER.18.2.5286

Fama, E.F. – French, K.R. (1992): *The cross-section of expected stock returns.* The Journal of Finance, 47(2): 427–465. https://doi.org/10.1111/j.1540-6261.1992.tb04398.x

Fama, E.F. – French, K.R. (1996): *The CAPM is wanted, dead or alive.* The Journal of Finance, 51(5): 1947–1958. https://doi.org/10.1111/j.1540-6261.1996.tb05233.x

Fama, E.F. – French, K.R. (2018): *Choosing factors.* Journal of Financial Economics, 128(2): 234–252. https://doi.org/10.1016/j.jfineco.2018.02.012

Fama, E.F. – MacBeth, J.D. (1973): *Risk, return, and equilibrium: Empirical tests.* Journal of Political Economy, 81(3): 607–636.

Fernandez, P. (2015): *CAPM: an absurd model.* Business Valuation Review, 34(1): 4–23. https://doi.org/10.5791/0882-2875-34.1.4

Gillan, S. – Hartzell, J. – Koch, A. – Starks, L.T. (2010): *Firms' environmental, social and governance (ESG) choices, performance and managerial motivation.* Unpublished working paper, Texas Tech University and University of Texas at Austin. http://www.pitt.edu/~awkoch/ESG%20Nov%202010.pdf. Downloaded: 15 September 2020.

Gloßner, S. (2017): *ESG Risks and the Cross-Section of Stock Returns.* Finance Meeting EUROFIDAI-AFFI, Paris, December. http://dx.doi.org/10.2139/ssrn.2980917

Golovics, J. (2015): *Bounded rationality and altruism: behaviourism in economics*. Financial and Economic Review, 14(2): 158–172. https://en-hitelintezetiszemle.mnb.hu/letoltes/6-golovics-en.pdf

Halbritter, G. – Dorfleitner, G. (2015): *The wages of social responsibility – where are they? A critical review of ESG investing.* Review of Financial Economics, 26(1): 25–35. https://doi.org/10.1016/j.rfe.2015.03.004

Halldórsdóttir, T.R. (2020): *Did firms with higher ESG ranking provide better stock performance during Covid-19?* Doctoral dissertation, Reykjavik University. https://skemman.is/handle/1946/37170?locale=en

Hassel, L.G. – Semenova, N. (2013): *The Added Value of Environmental, Social and Governance Performance and Sustainable and Responsible Investment on Company and Portfolio Levels – What Can We Learn from Research?* Working paper, Sustainable Investment Research Platform. https://www.researchgate.net/profile/Natalia-Semenova-2/publication/259452763_The_Added_Value_of_Environmental_Social_and_Governance_Performance_and_Sustainable_and_Responsible_Investment_on_Company_and_Portfolio_Levels_-_What_Can_We_Learn_from_Research/links/54bac5a20cf253b50e2d0608/The-Added-Value-of-Environmental-Social-and-Governance-Performance-and-Sustainable-and-Responsible-Investment-on-Company-and-Portfolio-Levels-What-Can-We-Learn-from-Research.pdf

Henke, H.M. (2016): *The effect of social screening on bond mutual fund performance.* Journal of Banking & Finance, 67(June): 69–84. https://doi.org/10.1016/j.jbankfin.2016.01.010

Ince, O.S. – Porter, R.B. (2006): *Individual equity return data from Thomson Datastream: Handle with care!* Journal of Financial Research, 29(4): 463–479. https://doi.org/10.1111/j.1475-6803.2006.00189.x

Jain, M. – Sharma, G.D. – Srivastava, M. (2019): *Can Sustainable Investment Yield Better Financial Returns: A Comparative Study of ESG Indices and MSCI Indices.* Risks, 7(1), 15. https://doi.org/10.3390/risks7010015

Khan, M. (2019): *Corporate Governance, ESG, and Stock Returns around the World*. Financial Analysts Journal, 75(4): 103–123. https://doi.org/10.1080/0015198X.2019.1654299

Kotsantonis, S. – Pinney, C. – Serafeim, G. (2016): *ESG integration in investment management: Myths and realities*. Journal of Applied Corporate Finance, 28(2): 10–16. https://doi.org/10.1111/jacf.12169

Kotsantonis, S. – Serafeim, G. (2019): *Four Things No One Will Tell You About ESG Data*. Journal of Applied Corporate Finance, 31(2): 50–58. https://doi.org/10.1111/jacf.12346

Kőszegi, B. – Szeidl, A. (2013): *A Model of Focusing in Economic Choice*. Quarterly Journal of Economics, 128(1): 53–104. https://doi.org/10.1093/qje/qjs049

Kumar, A. – Smith, C. – Badis, L. – Wang, N. – Ambrosy, P. – Tavares, R. (2016): *ESG factors and risk-adjusted performance: a new quantitative model.* Journal of Sustainable Finance & Investment, 6(4): 292–300. https://doi.org/10.1080/20430795.2016.1234909

Kumar, R. (2019): *ESG: Alpha or Duty?* The Journal of Index Investing, 9(4): 58–66. https://doi.org/10.3905/jii.2019.1.066

Kuzmina, J. – Lindemane, M. (2017): *ESG Investing: New Challenges and New Opportunities*. Journal of Business Management, 5(14): 85–98

Lai, T.Y. – Stohs, M.H. (2015): *Yes, CAPM is dead*. International Journal of Business, 20(2): 144–158.

Landi, G. – Sciarelli, M. (2019): *Towards a more ethical market: the impact of ESG rating on corporate financial performance*. Social Responsibility Journal, 15(1): 11–27. https://doi.org/10.1108/SRJ-11-2017-0254

Li, F. – Polychronopoulos, A. (2020): *What a difference an ESG ratings provider makes!* Working Paper. https://www.researchaffiliates.com/en_us/publications/articles/what-a-difference-an-esg-ratings-provider-makes.html. Downloaded: 17 January 2021.

Maiti, M. (2020): *Is ESG the succeeding risk factor?* Journal of Sustainable Finance & Investment. https://doi.org/10.1080/20430795.2020.1723380

Mérő, B. – Nagy, O. – Neszveda, G. (2019): *Új faktorok tesztelése az empirikus eszközárazásban* (*Testing new factors in empirical asset pricing*). SZIGMA Matematikai-közgazdasági folyóirat (Journal of Mathematical Economics), 50(4): 263–281.

Németh-Durkó, E. (2019): *Környezet és pénzügyek* (*Environment and Finance*). Budapesti Corvinus Egyetem, Working Paper. http://unipub.lib.uni-corvinus.hu/4294/1/NDE_kornyezet_es_penzugyek.pdf. Downloaded: 18 August 2020.

Neszveda, G. (2018): *The Contribution of Thaler to Behavioural Economics*. Financial and Economic Review, 17(1): 153–167. http://doi.org/10.25201/FER.17.1.153167

Newey, W.K. – West, K.D. (1987): *Hypothesis Testing with Efficient Method of Moments Estimation*. International Economic Review, 28(3): 777–787. https://doi.org/10.2307/2526578

Ransburg, B. – Vágási, M. (2011): *A fenntartható fejlődés vállalati integrációja és kommunikációja – a hazai nagyvállalati gyakorlat vizsgálata* (*The Integration of Sustainable Development in the Light of Corporate Communication - The Case of Corporations in Hungary*). Vezetéstudomány – Budapest Management Review, 42(10): 2–13. https://doi.org/10.14267/VEZTUD.2011.10.01

Ribando, J.M. – Bonne, G. (2010): *A new quality factor: Finding alpha with ASSET4 ESG data*. Starmine Research Note, Thomson Reuters, 31 March. https://www.thomsonreuters.com/content/dam/openweb/documents/pdf/tr-com-financial/report/starmine-quant-research-note-on-asset4-data.pdf

Sahut, J.M. – Pasquini-Descomps, H. (2015): *ESG Impact on Market Performance of Firms: International Evidence*. Management International/International Management/Gestiòn Internacional, 19(2): 40–63. https://doi.org/10.7202/1030386ar

Shumway, T. (1997): *The Delisting Bias in CRSP data*. The Journal of Finance, 52(1): 327–340. https://doi.org/10.1111/j.1540-6261.1997.tb03818.x

Talan, G. – Sharma, G.D. (2019): *Doing Well by Doing Good: A Systematic Review and Research Agenda for Sustainable Investment*. Sustainability, 11(2), 353. https://doi.org/10.3390/su11020353

Torre, M.L. – Mango, F. – Cafaro, A. – Leo, S. (2020): *Does the ESG Index Affect Stock Return? Evidence from the Eurostoxx50*. Sustainability, 12(16), 6387. https://doi.org/10.3390/su12166387

Townsend, B. (2020): *From SRI to ESG: The Origins of Socially Responsible and Sustainable Investing*. The Journal of Impact and ESG Investing, 1(1): 10–25. https://doi.org/10.3905/jesg.2020.1.1.010

US SIF Foundation (2018): *Report on US Sustainable, Responsible and Impact Investing Trends 2018*. US SIF Foundation study. https://www.ussif.org/files/Trends/Trends%202018%20executive%20summary%20FINAL.pdf

Uyar, A. – Karaman, A.S. – Kilic, M. (2020): *Is corporate social responsibility reporting a tool of signaling or greenwashing? Evidence from the worldwide logistics sector*. Journal of Cleaner Production, 253(April), 119997. https://doi.org/10.1016/j.jclepro.2020.119997

Van Duuren, E. – Plantinga, A. – Scholtens, B. (2016): *ESG Integration and the Investment Management Process: Fundamental Investing Reinvented.* Journal of Business Ethics, 138(3): 525–533. https://doi.org/10.1007/s10551-015-2610-8

Verheyden, T. – Eccles, R.G. – Feiner, A. (2016): *ESG for all? The impact of ESG screening on return, risk, and diversification.* Journal of Applied Corporate Finance, 28(2): 47–55. https://doi.org/10.1111/jacf.12174

Wimmer, M. (2013): *ESG-persistence in Socially Responsible Mutual Funds*. Journal of Management. & Sustainability, 3(1): 9–15. http://dx.doi.org/10.5539/jms.v3n1p9

Yu, E.P.Y. – Van Luu, B. – Chen, C.H. (2020): *Greenwashing in environmental, social and governance disclosures*. Research in International Business and Finance, 52(April): 101–192. https://doi.org/10.1016/j.ribaf.2020.101192

Bosnia and Herzegovina's Economic Prospects and Historical Background*

Laura Kromják

The essay discusses the socio-political challenges for the economy of Bosnia and Herzegovina and its foreign trade in goods and services, including the Hungarian relation. The study uses descriptive tools and secondary data. Wedged in between Croatia and Serbia, Bosnia and Herzegovina's economy is inextricably linked to the dramatic events of the past and the still unresolved social and political conflicts. Within Yugoslavia, Bosnia and Herzegovina was a member state with significant export potential, but the war and ethnicisation have devastated the economy. The state administration of the Dayton system is expensive, and the foundations for capital flows, privatisation and European convergence are developing slowly. Capital flows, the Instrument for Pre-accession Assistance (IPA) and international aid play an important role in balancing the foreign exchange balance. A significant item reducing the negative current account balance is the amount of remittances, which is six times higher than FDI. Remittances have become the largest source of external financing, increasing dependency and exacerbating the vulnerability of the economy.

Journal of Economic Literature (JEL) codes: F14, F21, F24, F34

Keywords: Bosnia and Herzegovina, trade balance, foreign exchange remittance, direct capital investment, EU integration process

1. Introduction

With a developing market of nearly 18 million people, the outlook for the six Western Balkan countries (Serbia, Bosnia and Herzegovina, Montenegro, Kosovo, North Macedonia, Albania) is positive. At 2.7 per cent, 2017 GDP growth was slightly lower than the rate of 2.9 per cent from 2016, but in 2018 the expansion amounted to 4 per cent, while it was 3.3 per cent in 2019 (*WBG 2019*). Prior to the outbreak of Covid-19, most Western Balkan countries made progress, as poverty declined and household incomes increased. The pandemic, however, pushed the Western

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

Laura Kromják is an Assistant Professor at Tomori Pál College. Email: kromjak.laura@tpfk.hu

The author expresses her thanks to the two anonymous peer reviewers for their helpful suggestions.

The Hungarian manuscript was received on 8 December 2020.

DOI: http://doi.org/10.33893/FER.20.2.148169

Balkan countries into a deep recession, and the global outlook remains uncertain. The European Union's economy contracted by 8.4 per cent in 2020, with economic activity in the Western Balkan region falling by 4.8 per cent. For the EU-27, real GDP growth is forecast to be 4.5 per cent in 2021 and 3.5 per cent in the Western Balkans (*WBG 2020a*). According to the European Commission's Winter 2021 Economic Forecast[1], the EU-27 economy will grow by 3.9 per cent in 2022, while the Western Balkan economy will expand at a rate of 3.7 per cent.

In 2019, the EU-27 remained the Western Balkans' main partner for both exports (68 per cent) and imports (61 per cent), with manufactured goods accounting for 81 per cent of EU imports from the Western Balkans (*Eurostat 2020*). In its National Export Strategy for 2019–2030[2], Hungary treats the Western Balkan market as a priority area, in addition to its strong opening to the East and South and its cooperation with the Visegrád and Carpathian Basin countries. It supports the promotion of SMEs' market activity, the stimulation of Hungarian capital exports, participation in privatisation, and, with the means at its disposal, helps to accelerate EU accession.

The foreign economic relations system of the former Yugoslav successor state, Bosnia and Herzegovina (BiH), with a population of 3.3 million, can be described along four strategic axes. Bosnia and Herzegovina's most important foreign trade partner is the European Union, with around 72.3 per cent of exports. The main partner countries are Austria, Germany, the Netherlands and Italy, but Switzerland is also one of the Western European countries contributing to stabilisation. The share of the other Yugoslav successor states (especially Serbia, Slovenia and Croatia) in foreign trade also remained significant, at around 1/3. Bosnia and Herzegovina's cooperation with the Islamic world — Turkey, the United Arab Emirates, Saudi Arabia and Kuwait — is a distinct foreign economic phenomenon in the region.

This essay is a descriptive research based on secondary data, examining the economic situation and prospects of Bosnia and Herzegovina for the period 2000–2020, seeking an answer to the question of whether it is able to finance its balance of payments and imports of goods and services. In order to understand the country's economic situation, it is necessary to briefly review the Yugoslav era, independence and the post-war conditions, including the still unsettled relationships between the Serbian and Croatian territories and the coexisting religions and ethnicities. Ethnicisation and clientelism are recurring concepts in the *second section* and in the essay. In Bosnia and Herzegovina, the elites organised on an ethnic basis seek to control the privatisation process and expropriate development subsidies for

[1] https://ec.europa.eu/info/business-economy-euro/economic-performance-and-forecasts/economic-forecasts/winter-2021-economic-forecast-challenging-winter-light-end-tunnel_en
[2] https://2015-2019.kormany.hu/download/e/ca/91000/Nemzeti%20Export%20Strat%C3%A9gia%202019-2030.pdf#!DocumentBrowse

foreign working capital investments. The clientistic networks and ethnicisation of politics hamper economic growth.[3]

The *third section* reviews the progress of Bosnia and Herzegovina's integration into the European Union. The *fourth section* briefly presents the introduction of the new national currency, the convertible mark and the currency board. The *fifth part* analyses the foreign trade in goods and services between Hungary and Bosnia and Herzegovina and discusses the opportunities for Hungarian exporters and importers. The *sixth section* highlights that the most serious economic problem is the international balance of payments position. The trade balance is passive, and imports cannot be reduced either for production or for consumption: therefore, expanding exports is a fundamental necessity. Capital imports must be increased, as the two sources of financing – aid and remittances from people working abroad – cannot be relied on in the long term. Aid is a political decision, and remittances are gradually declining for generational reasons. Accession to the European Union is an important consideration in the general interest of both the Union and Bosnia and Herzegovina.

2. Independence and post-Dayton Bosnia and Herzegovina: the lost decade

After some 600 years, Bosnia and Herzegovina regained its independence with the February 1992 referendum. On 6 April 1992, after the European Economic Community formally recognised the country's independence from the Federal Republic of Yugoslavia, the first diplomatic contact at ambassadorial level was established with Hungary. Following the breakup of Yugoslavia, the Dayton Peace Agreement of 21 November 1995 — formally signed in Paris on 14 December — ended the three-and-a-half-year war in Bosnia. The peace agreement ensured a post-conflict political settlement, a new constitutional status, regional stabilisation and the start of economic reconstruction.

During the first two decades of the Yugoslav era, BiH was one of the poorest constituent republics. Its agriculture, characterised by small and private enterprises, was unable to meet domestic demand, and food was mostly imported. A major transformation took place in the 1950s, when the Yugoslav federal government opted for the strategic development of heavy metal and military industry in Bosnia and Herzegovina, located in the heart of the republic. Power plants, steelworks, metal-working plants were built, and the electro-energetics sector was established. Its geostrategic position helped it to become a centre for the development of the Yugoslav military industry. During the same period, agriculture, forestry and livestock farming also boomed, and BiH became a net exporter of food, especially

[3] Papić, Z.: *Ethicka privatizacija: neogranicene mogucosti prevare* [*Ethnic Privatization: unlimited possibilities for cheating*]. Dani, Sarajevo, 6 August 1999.

meat, dairy products, fruit and vegetables (*Bakota 2019; Čaušević 2013*). Exports are currently at 30 per cent of GDP, one of the lowest in Europe, but if it were able to export as much as it did in Yugoslav times, its exports would triple (*Goldstein et al. 2019*). Yugoslavia, including Bosnia and Herzegovina, experienced its golden age between 1952 and 1965. At 4.46 per cent, GDP growth in Yugoslavia between 1950 and 1985 was so high that it was exceeded only by Taiwan (6.64 per cent), Japan (6.26 per cent) and China (5.10 per cent) (*Kovać 1995:282*). *Peštek et al.* (*2021*) point out that in the years immediately preceding the war, Bosnia and Herzegovina produced more high-value-added products than the Yugoslav average, and its trade balance showed a surplus. In the second half of the 1980s, however, signs of internal structural crisis emerged in Yugoslavia. Economic decentralisation progressed slowly, and access to foreign markets was limited. The lack of horizontal diversification in industry weakened the potential for economic development. Socialist self-management disintegrated with the rise of national and economic ethnocentrisms and then disappeared with the outbreak of the war.

After the war, the economy of Bosnia and Herzegovina was in ruins. GDP fell by 80 per cent from 1991 to 1992 and by two thirds from 1991 to 1995. By 1995, the population of 4.3 million shrank by 1 million as a result of atrocities and the exodus of refugees. An estimated 100,000 people died in the Bosnian war, 80 per cent of whom are Muslim Bosniaks. Atrocities against civilians in Bosnia were the worst politically motivated violence in Europe since the Holocaust (*Karamehic-Muratović — Kromják 2021:1*). The massacre of more than 8,000 Bosnian Muslim men and boys in Srebrenica, eastern Bosnia, was declared a war crime by the International Criminal Tribunal for the former Yugoslavia (ICTY) in 2001. With the monitoring of potential genocide crimes, several nations are on genocide watch (*Karamehic-Muratović — Kromják 2021*).

The 1990s was a lost decade for both the Yugoslav region and Bosnia and Herzegovina. The disintegration of the Federal Republic of Yugoslavia, the loss of markets, the disruption of decades-old production chains, armed conflicts, international isolation, sanctions, poor economic governance and corruption contributed to a drastic, 50 per cent drop in GDP. According to a UN survey, in 1999, two-thirds of the Yugoslav population lived in poverty, i.e. had a monthly income of less than USD 60. The war destroyed both the economy and the infrastructure: 'Because of the war, 40 per cent of the bridges and 35 per cent of the roads became unusable. The airport of Sarajevo was destroyed. The damage to the country's 1,000-kilometre rail network is estimated to have reached USD 1 billion' (*HCCI 2020:18*). Four-fifths of the power generation equipment fleet was lost. In order to recover, the country needed substantial international economic, reconstruction and humanitarian aid (including a USD 20 billion credit line from the EBRD).

The Dayton Peace Agreement is an 'effort' to make the heart of the Balkans a 'unified' country. In 1995, the current divided, federal state structure was

created. Currently, the Republic of Bosnia and Herzegovina consists of two entities, or second-level government bodies: the Federation of Bosnia and Herzegovina (*Federacija Bosne i Hercegovine*), which comprises 51 per cent of the country — and is divided into 8 Bosnian- and Croat-majority cantons and the capital Sarajevo — and the Bosnian Serb Republic (*Republika Srpska, RS*) with Banja Luka as its centre, comprising 63 local governments. The city of Brčko and its surrounding areas, which are divided between the two entities, form an autonomous administrative region of the Brčko District, with a special status, whose governance is directly exercised by the state of Bosnia and Herzegovina, in cooperation with the European Union, in addition to local authorities. The official languages of all three administrative entities are Bosnian, Serbian and Croatian. Of the 3.3 million population, 50.7 per cent are Muslim Bosniaks, 30.8 per cent are Orthodox Serbs and 15 per cent are Roman Catholic Croats. *Estrin — Uvalic* (*2014*) showed a relationship between the lower volume of direct capital investment and the negative perception of the Balkans, which can be traced back to potential investors' perceptions of the region.

The 1995 Dayton Peace Agreement established the foundations for a democratically organised state, but it did not end ethnic conflicts. Territorial entities redrew the map of Bosnia and Herzegovina and were configured according to the constituent peoples (Muslim Bosniaks, Orthodox Bosnian Serbs, Catholic Bosnian Croats). The formation of a unified economic region and public sphere within the state is paralysed by ethnicisation, clientelism and a governance structure organised along ethnic lines, the maintenance of which requires nearly half of the country's GDP. With corporate management linked to political elites, enterprises earmarked for privatisation can fall into the hands of the 'ethnic oligarchies' concerned (*Vučetić 2002*). Bosnia and Herzegovina resists modernisation, insisting on ethnic identities, political clientelism and forms of economy that are at odds with globalisation and structural transformation (*Pugh 2005*). Earlier, *Sells* (*1996:124*) pointed out the Balkanism of the advanced Western national economies, which approaches the people of Bosnia and Herzegovina as 'tribal haters outside the realm of reason and civilisation'.

The international community, urging economic reconstruction and peaceful consolidation, focuses its attention on economic corruption that threatens direct social well-being, and sets aside clientelism and the black economy that ensures economic 'survival'. The development financing of donor countries has been realised with the participation of war entrepreneurs and local brokers, through the coincidence of common interests (*Pugh 2002; 2005*).

The sustainability of the Dayton system is made uncertain by autonomy claims. In 2015, the Bosnian Serb Republic, 83 per cent of which is inhabited by Orthodox Bosnian Serbs, launched a referendum initiative on secession. In the Federation of Bosnia and Herzegovina, where 70.4 per cent of the population is Bosnian, the Catholic Bosnian Croats, representing 23 per cent, are seeking to form their own entity.

Bosniaks emphasise the transformation of Bosnia and Herzegovina into a civil state. In Bosnia and Herzegovina, economic reconstruction is part of a broader peace-building process, with an integrated strategy at its core, that takes into account long-term social and political factors (*Tzifakis — Tsardanidis 2006*). The Dayton reorganisation was adapted to the requirements and perspective of EU membership. The stability of Bosnia and Herzegovina is an important security interest of the EU-27, and therefore it supports its Euro-Atlantic integration into the NATO, the WTO and the European Union. Wedged in between Croatia and Serbia, Bosnia and Herzegovina cannot be treated as a separate region. 'The three countries function, figuratively speaking, as communicating vessels; the movements and events in Zagreb and Belgrade are manifested and reflected in Bosnia in the same way, and vice versa: any turbulence within Bosnia and Herzegovina has an impact on Croatian and Serbian domestic politics' (*Varga 2009:220*). BiH is within a 100 km radius of Hungary; Hungary, too, supports the acceleration of the European integration process as a remedy for internal ethnic divisions and structural problems (*Huszka 2015:117*).

3. Perspectives: positive and negative signs

Following the 1992–1995 war, the country embarked on a path to the EU, thanks to effective cooperation with The Hague. In 1997, it was able to enter into a trade partnership with the EU, and in 1998, a joint work group was set up to facilitate the technical assistance of the EU. In 1999, the European Commission established foreign policy, strategic, economic and legal cooperation with the country. On 24 April 2002, it became a member of the Council of Europe and then, together with other countries of the Western Balkans, was nominated as a potential candidate at the European Council summit in Thessaloniki in June 2003. As a sign of the EU integration process, negotiations with companies from EU member states on the trade part of the Stabilisation and Association Agreement (SAA Interim) that regulates conditions for the exchange of goods, started in 2005, which finally took effect on 1 July 2008. From 1 May 2007 onwards, the presence of CEFTA countries in the market of BiH also increased. As a result of the visa liberalisation process launched in 2008, the EU visa-free regime for citizens of Bosnia and Herzegovina entered into force on 15 December 2010.

As the EU made further steps towards EU integration conditional on the amendment of the constitution[4] (*ECHR 2009*), after seven years, the ratification process of the Stabilisation and Association Agreement (SAA)[5] between Brussels and Sarajevo was completed on 1 June 2015. After the SAA came into force, tariffs, quotas and duties were gradually reduced to a minimum. The SAA is a milestone in the country's economic integration with the European Union. On 9 September 2016, the

[4] With regard to ending discrimination against minorities.
[5] Stabilisation and Association Agreement.

government of Bosnia and Herzegovina adopted the Protocol on the Adaptation of the SAA (Adaptation Protocol — AP), which entered into force on 1 February 2017. In the short term, the SAA AP has caused a loss of customs revenue (the maximum loss of customs revenue for agricultural and food imports is estimated to be in the range of EUR 26–35 million per year) and may put further pressure on some sectors. However, the SAA AP affects only 8 per cent of Bosnia and Herzegovina's agricultural and food imports from the EU, as most agricultural and food imports have already been liberalised. The new AP provides the country's agricultural and food products with preferential access to the EU market by increasing quotas on EU exports of wine, sugar and fish. Access to the Bosnian market for EU farmers and food producers has been facilitated by the reduction of tariff-rate quotas (TRQs) for a number of products (*WBG 2017*). Duty-free treatment for industrial products and additional provisions for agricultural products help liberalise trade in goods between the European Union and Bosnia and Herzegovina.

Since 2010, BiH has been seeking to take further steps towards the EU. In addition to making intellectual property rights EU-compatible, it has also carried out the harmonisation of the less transparent public procurement system of 2004, due to the developments provided by EU tendering opportunities. Finally, it was the last of the countries of the former Yugoslavia (with the exception of Kosovo) to formally apply for EU membership on 15 February 2016.

In May 2019, the European Commission, in the Opinion (Avis) on the country's application for EU membership, identified 14 key priorities for the country to meet as conditions for starting EU accession negotiations, which were endorsed by the Council of the EU as a comprehensive roadmap in December 2019. After a five-year stalemate, in Sarajevo, in July 2020, parliamentary representatives agreed on the rules of procedure for the EU — Bosnia Stabilisation and Association Parliamentary Committee, with which Bosnia fulfilled one of the priorities of the European Commission.

4. In Bosnia and Herzegovina, the national currency is the convertible mark

Bosnia and Herzegovina's central bank (CBBH[6]) was established at the end of 1997. In 1998, a new national currency, the convertible mark (CM), was issued, which unified the financial spheres of the three entities. The German mark was accepted by all parties,[7] so the exchange rate of the convertible mark was pegged to the German currency. After the German mark was replaced by the euro in 2002, the convertible mark was exchanged for the new EU currency at the same fixed exchange rate as the German mark (1 CM = 0.511292 EUR). This meant that CBBH did not pursue a sovereign monetary policy, but maintains a currency board

[6] Central Bank of Bosnia and Herzegovina.
[7] Due to the devaluation of national currencies, it was de facto used even before.

arrangement. Due to the currency board, inflation was reduced and kept low, and public confidence in the national currency was restored, as indicated by the growing share of deposits in convertible mark.[8] Pegging the convertible mark to the euro boosted foreign investor confidence and improved the country's macroeconomic prospects (*Ilgün and Coskun 2009*). On 1 June 2012, a new series of 10, 20, 50 and 100 CM banknotes was issued, and these, according to a report by the *CBBH* (*2017*), contain security features of European standard.

5. Foreign trade in goods and services between Hungary and Bosnia and Herzegovina

Bosnia and Herzegovina's ratio of exports to GDP was 15 per cent in 1994, and the rate has risen to 40 per cent twenty-five years later. Growth rates are largely dependent on the share of its main trading partners – Germany (13 per cent), Italy (11.3 per cent), Croatia (10.8 per cent) and Serbia (10.6 per cent) – and the global economic activity. According to the Agency for Statistics of Bosnia and Herzegovina (July 2020), in 2018, the country's exports of goods in global trade turnover increased by 12.1 per cent to EUR 9.8 billion, while total imports amounted to EUR 6.084 billion (+10.7 per cent). In trade services, exports amounted to EUR 1.7 billion compared to imports of EUR 523 million. In 2019, exports were EUR 5.875 billion (3.4 per cent lower than in 2018), while imports were EUR 9.9 billion (1.2 per cent higher). Exports of trade services increased to EUR 1.9 billion, and imports of such to EUR 633 million. The trade balance of Bosnia and Herzegovina is structurally deficient. According to an analysis by *Lloyds Bank* (*2019*) based on data from the Foreign Investment Promotion Agency (*FIPA*) (*2020*), the trade deficit increased by 17 per cent on an annual basis in 2019. The development of foreign trade continues to be hampered by low productivity levels, limited access to financing and administrative barriers. Tariffs are relatively low for most products, but there are various non-tariff barriers. Anti-dumping and countervailing duties are sometimes imposed to protect local industry when the price of a commodity is well below the domestic market price or when it is subsidised by the state (*Lloyds Bank 2019*).

Hungary's bilateral economic relations with Bosnia and Herzegovina are dominated by trade in goods. According to the Statistical Office, in 2019, BiH was Hungary's 40th trading partner, accounting for 0.2 per cent of total Hungarian foreign trade. Hungary is the ninth most important trading partner in the total foreign trade of Bosnia, with a share of 2.58 per cent. Over the past twenty years, Hungary's bilateral foreign trade relations have been developing (*HCSO 2020*). From 2001 to the end of

[8] In addition to the convertible mark, the kuna, the euro and — in the territory of the Bosnian Serb Republic — the Serbian dinar are also present in payment practices in tourist cities; see: Milekic, Sven: *Welcome to Mostar, a Town of Many Currencies*. BalkanInsights, 16 June 2017. https://balkaninsight.com/2017/06/16/welcome-to-mostar-a-town-of-many-currencies-06-15-2017/. Downloaded: 7 November 2020.

2019, the foreign trade value of Hungary's imports at current price increased from EUR 5.96 million to EUR 142 million, while Hungarian exports rose from EUR 230 million to EUR 317 million; the latter shows a change of 164.3 per cent.

The foreign trade value of services doubled from 2008 to the end of 2019. In 2008, Bosnia and Herzegovina accounted for 3.4 per cent of total Western Balkan services exports, and 6.4 per cent in 2017. Despite the slowdown in 2018 and 2019, the doubling between 2008 and 2017 shows dynamic progress, similar to the candidate countries Albania and North Macedonia.

According to the exporter database of the Hungarian Chamber of Commerce and Industry, Hungary's most important export services to Bosnia and Herzegovina are: alternative and renewable energy (wastewater and waste treatment technologies), water management (chlorinators, chlorine dioxide dosing systems), agricultural and food-processing technology (grain storage and silo systems), ICT (IP-based complex telecommunication network solutions, client call systems), R&D knowledge-intensive services and technology transfer (liquid chromatography), engineering services and exhibition management, and medical technology (resting and stress ECG systems). Based on the data from the Foreign Trade Chamber of Bosnia and Herzegovina, the largest share in the direction of Hungary is represented by international transport.

According to the data from the HCSO (Hungarian Central Statistical Office) and the Agency for Statistics of Bosnia and Herzegovina, Hungary's economic relations grew until 2018, when the change became more and more negative. Hungary's surplus is significant. Compared to the previous two years, Hungarian exports increased by 21.6 per cent and imports by 54.1 per cent. In 2019, Hungarian exports slowed by 12 per cent and Bosnian exports by 15 per cent, while in 2020, the pandemic caused a drop of more than 80 per cent on both sides until the third quarter (*AS of BiH 2021*).

Prior to the devastating war in the 1990s, when the country was a constituent republic of Yugoslavia, priority was given to heavy and military industry, which accounted for 51 per cent of GDP. By contrast, in 1999, the weight of industry and mining was only 23 per cent (*Pap 2004:52–53*). Heavy industrial rust belts were created, and the emphasis was on private agriculture. However, the small size of estates was an obstacle to achieving significant agricultural production. Small farms ensured survival and self-sufficiency; their production contributed little to the market. Thus, in the early 2000s, Bosnia and Herzegovina's food imports were 16 times higher than the value of its food exports (*Tzifakis — Tsardanidis 2006*).

In 2017, industrial production grew at a rate of 5 per cent, with its main sectors being steel production, coal mining, iron industry, automotive industry, textile industry, tobacco production, manufacture of furniture and petroleum refining.

The country's economy was heavily dependent on non-ferrous metal exports, with a large share of investments affecting production sectors (34 per cent) and the banking sector (22 per cent) (*HCCI 2020*). According to the data from Trading Economics, the most important export products of Bosnia and Herzegovina, and also the most significant Hungarian imports, are: iron, stainless steel, wood, charcoal products, furniture, lighting signs, prefabricated buildings, machinery, boilers, electronic and mechanical equipment and footwear products. The country's primary import products, which are also the most significant Hungarian exports, are: food (grain, animal fats, cooking oil), electrical machinery, passenger cars and other motor vehicles, mineral fuels, chemicals, plastic derivatives, and cosmetic and pharmaceutical products.

The volume of Hungarian imports in 2013 reflects the economic situation of Bosnia and Herzegovina. According to HCSO data, 90 per cent of the total imports of EUR 96.7 million is made up of manufactured goods worth almost EUR 84 million. In the case of Bosnia and Herzegovina, food, beverages and tobacco account for 22 per cent of imports of EUR 308.7 million and manufactured goods for 42 per cent. Of Hungary's imports of EUR 156 million in 2017, EUR 137 million is the value of manufactured industrial goods (chemical products, inorganic chemical products, metal products, non-metallic mineral products, footwear, cork and wood products), so the ratio remained essentially unchanged. Bosnia and Herzegovina's economy is founded on extractive and manufacturing industry based on natural resources. The main areas of Hungarian imports continue to be: minerals, non-ferrous metals, corundum, iron, aluminium and steel, metal-bearing ores and scrap metal, machinery and components (e.g. car components), wood and wood products (e.g. charcoal, furniture, paper). In the 2020s, the most important product groups of Bosnia and Herzegovina's imports will be machinery and technologies for the renewal and development of infrastructure networks (roads, tunnels, bridges, heating plants, sewers and watermains), and in terms of food supply, agricultural products, small agricultural machinery and chemicals.

6. Economic catching-up and international balance of payments: A deficit in self-financing?

According to the data from World Bank and the CBBH, after the war-related stagnation, GDP grew at a dynamic pace of 5 per cent per year between 2003 and 2008, right up to the global economic crisis of 2008–2009. In the first half of the 2000s, the pace of economic growth stagnated due to declining international donations and humanitarian assistance. According to the UNOCHA database,[9] while in 2000, USD 17.7 million in humanitarian aid was received — mainly from the

[9] https://fts.unocha.org/countries/28/flows/2019

governments of the United States and Germany, in a multi-sectoral distribution, but with a special focus on the health system reconstruction — in 2002, the aid amounted to only USD 9.5 million, and in 2003, to USD 4.9 million. International donations did not lead to sustainable economic growth. The decline in international assistance resulted in a slowdown in economic growth. Donor countries kept full control of their resources in order to exercise domestic political power (*Tzifakis and Tsardanidis 2006*). In the period 1996–2001, much of the international aid (USD 5 billion) was spent on basic infrastructure development projects. A major direct capital investment (EUR 1.3 billion) was made in 2007 (*Peštek et al. 2021*).

To maintain the stability of the economy, debt repayments were rescheduled after the war. The high external government-debt-to-GDP ratio (35 per cent) was gradually reduced to below 20 per cent by 2007, but with the escalation of the global economic crisis, it climbed back above 30 per cent by 2014. At the same time, the central budget balance was also in deficit, turning into surplus only in 2015, and approaching the promising pre-crisis level for the first time only in 2017. In 2019, compared to 2018, government debt decreased by 1.4 per cent to USD 6.53 billion. Total government debt as a share of GDP is expected to rise to 40.3 per cent in 2020; the World Bank projects an increase in the budget deficit (3.7 per cent) in 2020 (*WBG 2020b*). The economic damage caused by the pandemic is serious; according to the Focus Economics data as of 3 November 2020[10], in 2020, real GDP growth is –5.3 per cent, while for 2021, 3.9 per cent can be projected.

The trade balance deficit may also be a cause for concern: according to CBBH data, the 2018 deficit of BAM 4.9 billion is 25.8 per cent lower than the 2014 value of BAM 6.2 billion. From 2015 onwards, the deficit decreased steadily, but less and less, while in 2019, it increased to BAM 5.2 billion, and has stabilised at that level since then.

Until 2019, the current account balance deficit was high because trade balance deficit could not be offset by the surplus in other items of the balance of payments. In 2019, exports amounted to BAM 14.28 billion, which is barely 0.5 per cent more than in the previous year. The value of imports increased by a further 1.5 per cent to reach BAM 19.4 billion. Foreign trade deficit narrowed in the first two quarters of 2020, as imports declined more than exports due to a significant drop in transport and transportation services. Compared to the base year of 2015, the export price index fell by 2.6 per cent and the import price index by 4.3 per cent in 2016. In 2017, the export price index increased by 2.4 per cent and the import price index by 0.8 per cent, in 2018 by 6.9 per cent and 4.1 per cent, in 2019 by 7 per cent and 4.5 per cent, and in the second quarter of 2020 by 3.8 per cent and

[10] *Bosnia Economic Outlook*. FocusEconomics, 3 November 2020. https://www.focus-economics.com/countries/bosnia-and-herzegovina. Downloaded: 2 May 2021.

2.7 per cent, respectively (*AS of BiH 2020*). According to the statement of Vjekoslav Vukovic, Director of the Foreign Trade Chamber of Bosnia and Herzegovina, the 'increase in the trade deficit was mainly caused by the loss of the Kosovo market and the bankruptcy of the aluminium factory in Mostar'.[11] The question arises as to how Bosnia and Herzegovina can withstand such a large trade deficit in its current account balance, and whether this can be offset by a combination of capital inflows, the Instrument for Pre-accession Assistance (IPA), international donations and humanitarian aid.

The UNOCHA database shows that during the 2008–2009 global economic crisis, Bosnia and Herzegovina received USD 13 million in aid after years of significantly reduced international donations. The main donor countries continued to be Germany, Austria, Switzerland and the United Arab Emirates. Until 2014, aid to the country was steadily declining again. In 2012, barely USD 2.4 million was registered. In 2014, when floods in South-East Europe caused severe damage and most of northern Bosnia was flooded, a record USD 20 million in aid was received, including USD 3.3 million from the European Commission and USD 2.7 million from the USA. The aid funds were aimed at food security and mine clearance because the floods had changed the location of the minefields left over from the war, posing a serious threat to the local population. Due to the natural disaster, in 2014, the 2.4 per cent real growth, which was promising in 2013, fell to 1.1 per cent. Until 2018, the amount of aid coming into the country decreased drastically. In 2019, a financial contribution of USD 7.8 million appeared in the foreign exchange balance. To address the refugee crisis in the Balkans, the European Commission provided USD 4.3 million in humanitarian aid to the missions of the International Organisation for Migration and the UNHCR in Sarajevo. In the fight against the COVID-19 pandemic, Bosnia and Herzegovina received USD 22 million in aid to strengthen the health sector, mainly from the European Commission (USD 5 million) and the United Arab Emirates (USD 8.6 million).

The EU's pre-accession funds, i.e. the IPA,[12] also plays a key role in maintaining the foreign exchange balance, this peaked at almost EUR 108 million annually in 2011 and 2012, although these were the two years with the largest current account balance deficits: in 2011, nearly 10 per cent and in 2012, nearly 9 per cent relative to GDP. In 2013, Brussels withdrew half of its annual aid of EUR 109 million to Sarajevo because they had failed to agree on the implementation of the constitutional amendment proposed by the European Court of Human Rights in the Sejdić — Finci case[13]. As a result, funding from IPA II for the 2014–2020 EU budget

[11] Schroeder, M.: *Instrument for Pre-Accession Assistance (IPA) to Bosnia-Herzegovina*. EU Delegation to Bosnia and Herzegovina, 2013. http://europa.ba/wp-content/uploads/2015/05/delegacija-EU_2013121012030960eng.pdf. Downloaded: 30 October 2020.
[12] Instrument for Pre-Accession Assistance (IPA).
[13] See more e.g.: https://www.vajma.info/cikk/tukor/5297/Bosznia-a-Sejdic-Finci-ugy-arnyekaban.html. Downloaded: 28 April 2021.

period was also put at risk. 39 per cent of IPA I contracts had been concluded with entrepreneurs from Bosnia and Herzegovina, and political instability led to the bankruptcy of several agricultural development projects under the Instrument for Pre-accession Assistance for Rural Development (IPARD).[14]

In the absence of EU reform expectations, a coordination mechanism, political coherence and social justice, the IMF was also forced to suspend its Stand-By Arrangement in 2014. It was only in May 2016 that a new agreement was reached, according to which the IMF would disburse the EUR 550 million over three years without interest — but with a servicing fee calculated depending on how much of the allocated IMF quota the country draws on — with loan maturity of 13 years, including a grace period of 4.5 years.[15] Instead of EUR 200 million from the IMF, Bosnia and Herzegovina received only EUR 100 million in 2016, while the World Bank support of USD 50 million — which was already calculated in the 2016 budget — slipped into 2017.[16] After more than a year of political deadlock, when Bosnian politicians failed to form a coalition for 14 months following the October 2018 general elections, negotiations with the IMF resumed in December 2019 and the IPA II indicative allocation of EUR 314.9 million in the 2018–2020 period (out of the total funding allocation of EUR 552.1 million granted for the 2014–2020 budget period) also continued to be used. To tackle the COVID-19 pandemic and support economic rehabilitation, the IMF approved an emergency loan of EUR 330 million in April 2020, while the European Commission allocated an additional EUR 250 million for Bosnia and Herzegovina.[17] In its strategy for 2019–2021, the Federation of Bosnia and Herzegovina estimates that debt management will require external funding equal to USD 1.06 billion for the three-year budget period, which it tries to borrow from multilateral financial institutions to provide 62.2 per cent of all necessary funds. The 2019–2021 debt management strategy of the Bosnian Serb Republic sets the focus on issuing longer-term securities. Its strategy is to diversify its sources of financing, instruments and investors, but the share of external financing should decrease in favour of internal funding.[18]

The level of direct capital investments is lower than that of net financial remittances. Apart from the damage caused by the war, the main reasons for this are late economic development, stagnating domestic consumption, the overburdened budget, the complexity of the bureaucracy and legal system, party-political conflicts, low wages, high unemployment and slow progress in privatisation. While the privatisation of

[14] See footnote 8.
[15] Latal, S.: *Bosnia Clinches New €550m Deal With IMF*. BalkanInsight, 20 May 2016. https://balkaninsight.com/2016/05/25/bosnia-to-get-new-550-million-program-from-imf-05-25-2016/. Downloaded: 11 November 2020.
[16] Ibid.
[17] Dervisbegovic, N.: *Budget Delays Force Bosnia to Postpone Local Elections*. BalkanInsight, 23 May 2020. https://balkaninsight.com/2020/05/23/budget-delays-force-bosnia-to-postpone-local-elections/. Downloaded: 11 November 2020.
[18] *Outlook 2020 Bosnia & Herzegovina*. bneIntellinews.com, 7 January 2020 https://www.intellinews.com/outlook-2020-bosnia-and-herzegovina-174066/. Downloaded: 11 November 2020.

major state-owned enterprises in the Bosnian Serb Republic was completed by 2009, in the Federation of Bosnia and Herzegovina, the process in the telecommunications and energy sectors is still ongoing. The Federation can expect larger FDI inflows (*Peštek et al. 2021*). According to the 2020 financial Work Plan of the Federal Privatisation Agency of the Federation of Bosnia and Herzegovina, 43 per cent of the capital has been privatised, the privatisation of 1,088 enterprises has been completed, and a total of 2,604 enterprises have been sold under the conditions of small-scale privatisation.[19] Proximity to EU markets, the skilled labour force and low labour costs have motivated investment (*Peštek et al. 2021*). Privatisation is a key opportunity but also a risk for the three entities in the country. Based on IMF data, *Santrucek* points out[20] that the total debt of typically less productive state-owned enterprises is about 26 per cent of GDP, due to structural problems such as clientelism, corruption (non-transparent public procurements) and ethnicisation. According to *Susic et al.* (*2017*), the economic development of Bosnia and Herzegovina is not hindered by the inability of the economy to produce, but by the fact that capital falls into the hands of those who do not use it productively.[21]

Foreign direct capital investment has been registered since 2001. The inflow of FDI was significantly reduced by the global economic crisis. The increase in net investment was shown in 2014 (EUR 414.7 million), which is almost double the 2013 figure. In 2015 and 2016, FDI inflows did not show a positive trend. In 2017, the previous declining FDI trend came to a halt, with foreign direct investment amounting to EUR 436.4 million in 2017. In 2018, the FDI increased by 11.5 per cent compared to 2017, with EUR 487 million being the highest annual FDI since 2009. Foreign direct investments in 2019 amounted to EUR 357 million, a decrease of 26.6 per cent. According to the *FIPA* (*2020*) announcement, lower investment inflows were caused by, among other things, increased dividend payments in the last quarter of 2019 and acquisitions of foreign-owned corporations by local companies.

Due to Bosnia and Herzegovina's industrial tradition, the largest share of FDI was registered in the manufacturing sector (35 per cent) — with a particular focus on the production of coke, refined petroleum and chemical products — and in the banking sector (25 per cent), but the infocommunications sector also stands out with 12 per cent. A small amount of capital investment was allocated to export-oriented

[19] *Federation of Bosnia-Herzegovina Entity privatized 1,088 Enterprises*. Sarajevo Times, 21 February 2020 https://www.sarajevotimes.com/federation-of-bosnia-herzegovina-entity-privatized-1088-enterprises/. Downloaded: 30 October 2020

[20] Santrucek, S.: *Failed Privatisation is to Blame for Bosnians' Exodus*. BalkanInsight, 16 May 1999. https://balkaninsight.com/2019/05/16/failed-privatization-is-to-blame-for-bosnians-exodus/. Downloaded: 11 November 2020.

[21] Santrucek cites the closure of Aluminij Mostar, the largest state-owned company in the Herzegovina-Neretva canton, in July 2020, as an example of the dangers of the privatisation process becoming ethnicised. The privatisation of the once largest aluminium exporting company officially failed in 2010. The members of the previously announced winning consortium, Glencore-Feal and Dalekovod Zagreb, were exclusively Croatian investors connected to the HDZ BiH (Croatian Democratic Union of Bosnia and Herzegovina) party. (See footnote 17 for the source.)

production, despite its importance for increasing the country's competitiveness (*Čaušević 2015*). In 2020 H1, foreign direct capital investment fell by 46.7 per cent compared to the same period of the previous year. Owing to the COVID-19 pandemic, FDI worldwide is expected to decline by 30 to 40 per cent, putting severe pressure on Bosnia and Herzegovina as well.

According to the *CBBH* (*2020*) data, the main countries of origin, from which some EUR 7.7 billion of foreign capital flowed into the country between 1994 and the end of 2019, are: Austria (EUR 1.4 billion), Croatia (EUR 1.2 billion), Serbia (EUR 1.0 billion) and Slovenia (EUR 554 million). In 2019, remarkable capital investments were also received from the United Kingdom (EUR 43.5 million), Luxembourg (EUR 14.3 million), and Saudi Arabia (EUR 11.2 million). In 2020, most investment came from the EU-27. Among the CEFTA member states, Serbia is the most important economic partner, mainly for the Bosnian Serb Republic. 40 per cent of the country's total foreign direct capital investment in 2018 was directed here (compared to the 13 per cent in 2016). Russian capital continues to play a major role in privatisation within the entity.[22] The largest Russian investments are in the capitalisation of oil refineries in Modrica, Bosanski Brod and Banja Luka (*Čaušević 2015*). The companies are part of the Optima Group majority-owned by NefteGazInkor, a subsidiary of Russia's Zarubezhneft.

While Russian investors play an important role in the Bosnian Serb Republic, the Federation of Bosnia and Herzegovina, populated mainly by Bosniaks, attracts Turkey and the Gulf Arab countries. The 2005 privatisation of the paper and pulp mill (Natron) located in Maglaj is the largest Turkish investment to date. With the support of the SDA (Party of Democratic Action) and its growing presence in the banking sector, Turkey's positions have been consolidated.[23] Investors from Dubai, Qatar, Kuwait and Saudi Arabia are becoming increasingly active in the Federation's real estate market.[24] Real estate agencies representing Arab investors also appeared in the relatively predominantly Bosnian region of central-western Herzegovina. A study by *Richet* (*2019*) points to rising Chinese capital in infrastructure and energy projects. The 300-MW Stanari thermal power plant is financed by the China Development Bank. Increasing Russian, Turkish, Arab and Chinese investment could weaken the presence of the European Union. The increasingly spectacular imprint of the economies of the Islamic world is weakening the perspectives for EU integration, as can be seen in the Turkish example. Strong religious standards run counter to the values of pluralism and

[22] Đorđević, N.: *FDI in Bosnia's Republika Srpska is increasing, but there's plenty of room for more*. Emerging Europe, 16 July 2020. https://emerging-europe.com/news/fdi-in-bosnias-republika-srpska-is-increasing-but-theres-plenty-of-room-for-more/. Downloaded: 11 November 2020.

[23] Source: Santrucek, see footnote 17.

[24] The 'Hotel Bristol', the EUR 50 million 'BBI' shopping centre in Sarajevo, the residential complex 'Poljine Hills' in Ilidža were realised as Arab projects. In Ilidža, a Saudi holding is building Buroj Ozone, the biggest tourism investment of EUR 2 billion in South-East Europe. (Brunwasser, M.: *Bosnia's biggest foreign investment: Bonanza or threat?* BBC News, 22 September 2016) https://www.bbc.com/news/business-37429682. Downloaded: 11 November 2020.

tolerance enshrined in Article 2 TEU[25]. From the perspective of the national integrity of Bosnia and Herzegovina, the Arab Muslim presence creates social, economic and security policy tensions not only for Bosnian Serbs and Bosnian Croats, but also for Bosniaks with a distinct European tradition and a more liberal outlook.

A significant item reducing the negative current account balance is the amount of remittances. According to the *CBBH* (*2020*) data, in 2019, Bosnia and Herzegovina received USD 2.3 billion in remittances, which is about 11 per cent of its annual GDP. Although this still does not offset the trade deficit, it reduces it. According to the 2019 data from TheGlobalEconomy.com[26] BiH ranks twentieth in the world in terms of the rate of remittances relative to GDP, and second in Europe after Moldova (16 per cent). The growth rate of its remittances was one of the most dynamic between 2000 and 2008 (payments of USD 2.7 billion were received in 2008), reflecting the remittances of first-generation emigrants. According to the reports from the Ministry of Human Rights and Refugees of Bosnia and Herzegovina, at least 2 million people from Bosnia and Herzegovina are currently living abroad, which is 56 per cent of the country's population. Little analysis is available on the use of remittances, but sporadic evidence suggests that remittances are mainly used for basic consumption and household expenditure, and thus they have a minor impact on investments (*Oruč 2011; Jakobsen — Strabac 2015*). According to the 2007 data and projections from the International Organisation for Migration, in the medium and long term, remittance growth declines as second- and third-generation emigrants reduce or stop sending remittances.

Overall, remittances have become the largest source of external financing, not only for Bosnia and Herzegovina, but also for developing countries in general. In 2018, at the global level, remittances to developing countries (USD 462 billion) were already substantially larger than foreign direct investments (USD 344 billion) (*WBG 2019*). Thus, for peripheral national economies such as Bosnia and Herzegovina — where the dynamism of remittances as a percentage of GDP is 9 per cent higher than that of direct capital investments — remittances have become the largest source of foreign exchange revenue.

The revitalisation of the country that is typically agro-industrial in character is under way, but its overall condition is still difficult to assess because statistical data for the whole state or the entities are influenced by several factors. For one thing, official statistics do not always take into account grey and black economies, which are widespread throughout the country and very rampant at all levels of the society. According to the data from the Agency for Statistics of Bosnia and Herzegovina, although the official unemployment rate was around 40 per cent

[25] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:12012E/TXT&from=EN
[26] *Remittances, per cent of GDP in Europe*. The Global Economy, 31 December 2019. https://www.theglobaleconomy.com/rankings/remittances_percent_GDP/Europe/. Downloaded: 2 May 2021.

in 2013–2014, it was 21 per cent in 2017, and the latest 2019 data shows 16 per cent. Within this, however, youth unemployment rate (15–24-year-olds) stands out at 48 per cent. Grey and black economies provide a living for many, and thus the actual unemployment rate could be about 10 percentage points lower. The COVID-19 pandemic could cause increasing redundancies in 2020–2021, mainly in the services sector. The *Eurostat* (*2019*) data confirm that the social safety-net and self-sufficiency are further threatened by the level of emigration that is exceptionally high in relation to the Western Balkans (–6.4 per cent net migration rate between 2015 and 2020), a low reproduction rate of 1.3 and the accelerating ageing of society (the average age is 43). Compared to the neighbouring Serbia, North Macedonia and Kosovo, depopulation has reached a 20-year high. From 1991 onwards, by 2050, the population could shrink by nearly 29 per cent, and by 2060, the projected average age will be 53 (*UN DESA 2019*). A major challenge for both the productive and the knowledge-based services sectors is that Bosnia and Herzegovina — after Haiti and Venezuela — ranks third among the world's countries as a loser when it comes to brain drain (*WEF 2018*). Pension funds are not significant, and there is no 3-pillar pension system. The insurance sector also does not play a role in financial intermediation; although the adoption of the Insurance Act is under way, non-life insurance still dominates insurers' portfolios. On the economic front, the divergent economic visions of the entities and their uneven economic development are also a problem. In addition to the central government, cantonal and local government levels retain powers that make it difficult for the state to guarantee and borrow. Although the non-performing loan ratio has been steadily declining (in 2019, it was below 9 per cent), it is almost three times the pre-crisis level of 3 per cent, which is weighing on lending activity and banking sector profitability.[27]

7. Summary and conclusions

The essay analyses the foreign economic potential of Bosnia and Herzegovina in the period 2000–2020, including the Hungarian relation. The current EU foreign policy and foreign economic development programmes also include a comprehensive assessment of the relations between the countries applying for EU membership. Currently, the macroeconomic development of the Western Balkans needs to be discussed in the context of the post-2020 cohesion policy and the economic challenges of the COVID-19 pandemic.

The Balkan war, the 1990s, also known as 'the lost decade', cannot be ignored. GDP fell by 80 per cent from 1991 to 1992, by two-thirds from 1991 to 1995, and the population of 4.3 million had decreased by 1 million by 1995 as a result of atrocities and the exodus of refugees. The state administration of the Dayton system is very

[27] Source: Outlook 2020 Bosnia & Herzegovina, see footnote 15.

expensive, and the foundations of market economy, capital flows, privatisation and European catching-up are only slowly unfolding. Twenty-five years after the end of the war, BiH is struggling with the divergence of political and governmental control. Ethnicisation, clientelism, the black economy, the international community's Balkanism and divergent domestic policy interests in Bosnia and Herzegovina are barriers to sustainable economic development.

Following the international aid of USD 5 billion for economic reconstruction and reconciliation, the economy started to grow. In 1998, a new national currency, the convertible mark, was issued, which unified the financial spheres of the three entities. With the introduction of the convertible mark, the different monetary systems of the three constituent nations were abolished. The exchange rate of the convertible mark was pegged to the German currency. After the German mark was replaced by the euro, the convertible mark was exchanged for the new EU currency at the same exchange rate as the German mark. Due to the currency board, inflation was reduced and kept low, and investor and public confidence in the national currency was restored.

Under the Interim Stabilisation and Association Agreement, which took effect in the mid-2008 and became operational in 2015, the free-trade system contributes to the development of Bosnia and Herzegovina's foreign economic potential. The potentials of this small open economy are enhanced by its proximity to the EU, a well-trained labour force and the export opportunities in the wood-processing, metal-working, automotive, energy, international transport and tourism sectors. Large-scale production also improves the export potential of agriculture. The economic relations between Bosnia and Herzegovina and Hungary are dominated by trade in goods, with 90 per cent of the Hungarian import volume being made up of manufactured goods. The foreign trade value of services doubled from 2008 to the end of 2019. Hungary's economic relations grew until 2018, when the change became more and more negative. Hungary's surplus is significant.

In the post-war decade, import dependence increased, leading to borrowing. Slowing privatisation makes the transition to an export-oriented economy more difficult. The development of privatisation processes and the intensified involvement of the private sector are key points for international competitiveness. Privatisation and FDI inflows took off in different periods in the different entities of the country. Up until 2008, the Federation of Bosnia and Herzegovina recorded higher FDI inflows than the Bosnian Serb Republic, but since 2009, the trend has been reversed. In 2020, most of the investment came from the EU-27. Investments from the neighbouring countries are remarkable, with Croatia being the most important economic partner mainly for the Federation, while Serbia plays the same role for the Bosnian Serb Republic. Russian investment is important in the Bosnian Serb Republic, while the Federation, populated mainly by Bosniaks, attracts Turkey and

the Gulf Arab countries. In Bosnia and Herzegovina, the inflow of Chinese FDI is on the rise; it is reasonable to expect that capital investments polarising the Western Balkan region will have an impact on the political and economic dynamics of the country and the EU. The increase in foreign direct capital investment after 2020 may also be tempered by the global recession caused by the Covid-19 pandemic.

Bosnia and Herzegovina's foreign economic mobility is also weakened by the divergence of the internal economic space and the Serb-Croatian-Bosnian national fault line. Intra-country divergence is reflected in the performance and social welfare of the economy, the growth potential of which is also threatened by mass emigration and the ageing of society. Remittances from economic emigrants are an important source of income for the country's population. Remittances are six times higher than FDI and three times higher than the GDP-based percentage of development assistance. In the short run, remittances have played a useful and indispensable role in complementing institutional social assistance and mitigating the negative impact of low foreign direct investment. The continuous emigration of citizens helps to maintain the current high level of remittances, and thus emigration is not necessarily a negative thing in this respect, but this is true only for the short-term prospects of the country. In the longer term, remittances exacerbate the dependency of Bosnia and Herzegovina, and increase the vulnerability of the economy if the rate of transfers dwindles with generational change. In addition, their inflows may slow down the necessary economic reforms, as they stimulate consumption rather than investment, thus reducing the competitiveness of domestic economy and the activity of labour force as long as they are a substitute for income earned in households through domestic labour. Although remittances balance the foreign exchange balance, the goal can only be for the country to move away from the dependence on international financial contributions towards a balanced trade balance, on the foundation of increased export activity.

It is in the interest of both the Balkans and Europe to achieve and maintain political and economic stability in Bosnia and Herzegovina. Political support and economic assistance from the European Union are essential for this.

References

AS of BiH (2020): *Unit value indices of export and import of BiH,* Agency for Statistics of Bosnia and Herzegovina, *Q3 2020*. Sarajevo. http://www.bhas.ba/data/Publikacije/Saopstenja/2020/ETR_02_2020_Q3_0_HR.pdf. Downloaded: 28 November 2020.

AS of BiH (2021): *BiH International Trade in Goods Statistics, January 2021*. Agency for Statistics of Bosnia and Herzegovina, Sarajevo. http://www.bhas.ba/data/Publikacije/Saopstenja/2021/ETR_01_2021_01_0_HR.pdf. Downloaded: 2 May 2021.

Bakota, I. (2019): *Bosnia-Herzegovina economy briefing: Industry in BIH and contribution to growth, exports and employment – overview*. China-CEE Institute, 19(2): 1–5.

Čaušević, F. (2013): *Bosanska Ekonomska Enigma. O Tranziciji od 1996. do 2013. godine*. Forum Bosnae, 63–64 (13). Međunarodni Forum, Sarajevo.

Čaušević, F. (2015): *The political economy of economic liberalisation and competitiveness in Bosnia and Herzegovina*. In: Thomas, M. – Bojicic-Dzelilovic, V. (eds.): Public policy making in the Western Balkans. Springer, Dordrecht, pp. 91–111.

CBBH (2017): *20 Years of Stability 1997-2017*. Central Bank of Bosnia and Herzegovina, Sarajevo. https://www.cbbh.ba/Home/GetTableAttachment?contentId=7b05d55d-ab21-454b-b63a-ebd597adb6ef&lang=en . Downloaded: 2 May 2021.

CBBH (2020): *Monthly Economic Survey, November 2020*. Central Bank of Bosnia and Herzegovina, Sarajevo. https://www.cbbh.ba/content/DownloadAttachment/?id=fe8e2dc0-ecf9-4986-ad79-786506db538b&langTag=en. Downloaded: 2 May 2021.

ECHR (2009): *Grand Chamber judgment: Sejdic and Finci v. Bosnia and Herzegovina*. European Court of Human Rights, Strasbourg. https://hudoc.echr.coe.int/eng-press#{%22itemid%22:[%22003-2974573-3281658%22]}. Downloaded: 11 November 2020

EC (2019): European Commission: *Neighbourhood Policy and Enlargement Negotiations*. https://ec.europa.eu/neighbourhood-enlargement/countries/detailed-country-information/bosnia-herzegovina_en. Downloaded: 11 November 2020.

Estrin, S. – Uvalic, M. (2014): *FDI into transition economies: Are the Balkans different?* Economics of Transition, 22(2): 281–312. https://doi.org/10.1111/ecot.12040

Eurostat (2020): *Western Balkans-EU - international trade in goods statistics*. European Commission, Luxembourg. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Western_Balkans-EU_-_international_trade_in_goods_statistics&oldid=480316. Downloaded: 7 November 2020.

FIPA (2020): *Bosnia and Herzegovina Investment Opportunities*. Foreign Investment Promotion Agency of Bosnia and Herzegovina, Sarajevo. http://www.fipa.gov.ba/publikacije_materijali/brosure/INVESTMENT%20OPPORTUNITIES%2028.07.2020.pdf. Downloaded: 2 May 2021.

Goldstein, E. – Davies, S. – Fengler, W. (2015): *Three reasons why the economy of Bosnia and Herzegovina is off balance*. Brookings.edu, 5 November. https://www.brookings.edu/blog/future-development/2015/11/05/three-reasons-why-the-economy-of-bosnia-and-herzegovina-is-off-balance/. Downloaded: 22 November 2020.

HCCI (2020): *Piaci útmutató Bosznia-Hercegovináról* (*Market guide for Bosnia and Herzegovina*). Hungarian Chamber of Commerce and Industry, Budapest. https://mkik.hu/download/207/bosznia-hercegovina. Downloaded: 2 May 2021.

HCSO (2020): *A külkereskedelmi termékforgalom forintban, országok szerint* (*External trade in goods in HUF by groups of countries*) (*2001–2019*). Hungarian Central Statistical Office, Budapest. http://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_qkt009a.html. Downloaded: 11 November 2020.

Huszka, B. (2015): *Hungary*. In: Balfour, R. – Stratulat, C. (eds.): *EU member states and enlargement towards the Balkans*. European Policy Centre, Brussels, pp. 115–128.

Ilgün, E. – Coskun, A. (2009): *Foreign Direct Investments in Bosnia and Herzegovina: Banking Sector Example*. Alatoo Academic Studies, 4(2): 49–67.

Jakobsen, J. – Strabac, Z. (2015): *Remittances, Institutions and Development in Bosnia-Herzegovina*. In: Kostic, R. – Cosic, E. – Babic, B. (eds.): Migration in the Function of Development. Ministry of Human Rights and Refugees of Bosnia-Herzegovina, Sarajevo, pp. 11–21.

Karamehic-Muratović, A. – Kromják, L. (2021): *Remembrance and Forgiveness: Global and Interdisciplinary Perspectives on Genocide and Mass Violence*. Routledge, London and New York.

Kovać, O. (1995): *Foreign Economic Relations*. In: Adamovich, L.S. – Ramet, S.P. (eds.): Beyond Yugoslavia: Politics, Economics, and Culture in a Shattered Community, Westview Press, pp. 281–300. https://doi.org/10.4324/9780429044670

Lloyds Bank (2019): *Foreign trade figures of Bosnia and Herzegovina,* Bosnia and Herzegovina: Economic and Political Overview. https://www.lloydsbanktrade.com/en/market-potential/bosnia-and-herzegovina/trade-profile. Downloaded: 11 November 2020.

Oruč, N. (2011): *Do Social Transfers "Crowd-Out" Remittances: Evidence from Bosnia*. The wiiw Balkan Observatory: Working Papers 92. https://wiiw.ac.at/do-social-transfers-crowd-out-remittances-evidence-from-bosnia-dlp-3201.pdf. Downloaded: 7 November 2020.

Pap, N. (2004*): Bosznia-Hercegovina külgazdasága* (*Foreign economy of Bosnia and Herzegovina*). In: M. Császár, Zs. (ed.): Bosznia-Hercegovina a harmadik Balkán-háború után (Bosnia and Herzegovina after the third Balkan war). Balkán füzetek (Balkan Papers), 2004(2): 51–58. http://epa.oszk.hu/02100/02108/00002/pdf/EPA02108_Balkan_Fuzetek_2004.pdf. Downloaded: 11 November 2020.

Peštek, A. – Lazović-Pita, L. – Abdić, A. (2021): *FDI in Bosnia & Herzegovina*. In: Deichmann, J.I. (ed.): Foreign Direct Investment in the Successor States of Yugoslavia: A Comparative Economic Geography 25 Years Later. Springer, Dordrecht, pp. 109–166.

Pugh, M. (2002): *Postwar political economy in Bosnia and Herzegovina: The spoils of peace*. Global Governance, 8(4): 467–482. https://doi.org/10.1163/19426720-00804006

Pugh, M. (2005): *Transformation in the political economy of Bosnia since Dayton*. International Peacekeeping, 12(3): 448–462. https://doi.org/10.1080/13533310500074564

Richet, X. (2019): *Geographical and Strategic Factors in Chinese Foreign Direct Investment in Europe*. Asian Econ Papers, 18(2): 102–119. https://doi.org/10.1162/asep_a_00700

Sells, M. (1996): *The Bridge Betrayed: Religion and Genocide in Bosnia*. University of California Press, London.

Susic, I. – Stojanovic-Trivanovic, M. – Susic, M. (2017): *Foreign direct investments and their impact on the economic development of Bosnia and Herzegovina.* IOP Conference Series Materials Science and Engineering 200(1): 1–16. https://doi.org/10.1088/1757-899X/200/1/012019

Tzifakis, N. – Tsardanidis, C. (2006): *Economic reconstruction of Bosnia and Herzegovina: The lost decade*. Ethnopolitics, 5(1): 67–84. https://doi.org/10.1080/17449050600576316

UN DESA (2019): UN Department of Economic and Social Affairs: *World Population Prospects 2019*. United Nations, New York. https://population.un.org/wpp/Publications/Files/WPP2019_Volume-I_Comprehensive-Tables.pdf. Downloaded: 30 October 2020.

Varga, I. (2009): *Magyarország és Bosznia-Hercegovina kapcsolatai* (*Relations between Hungary and Bosnia and Herzegovina*). Balkán füzetek (*Balkan Papers*), 2009(2): 217–221. http://epa.oszk.hu/02100/02108/00011/pdf/EPA02108_Balkan_Fuzetek_2009_2_217-221.pdf

Vučetić, S. (2002): *Peacebuilding and political corruption: the Bosnia case*. South-East Europe Review, 5(3): 65–80.

WBG (2017): *The Stabilization and Association Agreement (SAA) between Bosnia and Herzegovina (BiH) and the European Union: Impacts of the Adaptation Protocol (AP) on the Agriculture and Food Sector*. World Bank Group, Washington, DC. https://openknowledge.worldbank.org/handle/10986/28222?show=full. Downloaded: 7 November 2020.

WBG (2019): *Western Balkans Regular Economic Report No. 15, Spring 2019: Reform Momentum Needed.* World Bank Group, Washington, DC. https://openknowledge.worldbank.org/handle/10986/31506. Downloaded: 7 November 2020.

WBG (2020a): *Western Balkans Regular Economic Report No.18, Fall 2020: An Uncertain Recovery.* World Bank Group, Washington, DC. https://openknowledge.worldbank.org/bitstream/handle/10986/34644/153774.pdf. Downloaded: 7 November 2020.

WBG (2020b): *Bosnia and Herzegovina: Outlook*. World Bank Group, Washington, DC. http://pubdocs.worldbank.org/en/130501492011101536/mpo-bih.pdf. Downloaded: 28 November 2020.

WEF (2018): World Economic Forum: *The Global Competitiveness Report*. Geneva, Switzerland. http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf. Downloaded: 7 November 2020.

Information Sphere and International Relations in the Era of Big Data*

István Szilágyi

Amaël Cattaruzza:
Géopolitique des données numériques: Pouvoir et conflits à l'heure du Big Data
Le Cavalier Bleu. Paris, 2019, p. 176.
ISBN: 979-1031803487
Hungarian translation:
A digitális adatok geopolitikája. Hatalom és konfliktusok a big data korában
(*The geopolitics of digital data. Power and conflicts in the era of big data*)
Pallas Athéné Könyvkiadó, Budapest, 2020, p. 130.
ISBN: 978-615-5884-95-5

Published in 2019, Amaël Cattaruzza's book analyses the geopolitical and power-related implications of the mass production and use of digital data. In his work, Cattaruzza, a member of the Saint-Cyr Military Academy in Paris and the research group on connections between geopolitics and the information sphere, examines the place of networking and new technologies (big data, artificial intelligence) in the system of international relations and their role in its alteration and change. Special thanks are due to Pallas Athéné Könyvkiadó, which – by publishing Cattaruzza's work almost 'the day after' its publication in French – made it possible for Hungarian readers to become acquainted with this thought-provoking volume that explores new connections.

Amaël Cattaruzza's work is divided into three chapters. Chapter 1: "What is exactly "data"?"; Chapter 2: "Towards the territorialisation of data"; and Chapter 3: "Can geopolitics stand the test of data?" The questions and findings in all three chapters touch on the foundations of the science and nature of geopolitics. The combination of the information sphere and geopolitical thinking, and Cattaruzza's linking of them, means outlining of a new paradigm, as a new framework for thought. The basis and defining content of this is to answer the question of what we mean by the concept of geopolitics.

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

István Szilágyi is a Doctor of the MTA (Hungarian Academy of Sciences), retired University Professor. Email: szortega@freemail.hu

"*Geopolitics* is first and foremost concerned with the study of the interactive power struggles and network of relationships between actors of different types, levels and degrees of organisation in a geographic space with changing content, which play a role in and shape the system of international relations. In geopolitical analysis, the changing interpretation of space, location, situation, actors, boundaries, identities, civilisations, geopolitical patterns and codes, world system models, globalisation processes and the geopolitical scale is particularly important. *Geopolitics, as a multidisciplinary social science studying the spatial and partly geographical aspects of the international relations theory, is a part of political science.* It is closely related to political geography, historical geography, social geography, cultural geography, regional science, history, economics and other social sciences of a political nature.

A characteristic feature of geopolitical doctrines is *their linkage to (great) power interests and their historical nature.* Geopolitics, like other sciences, is a product of its own time. Thus, its definition and content, while retaining its basic essence, *varies from historical period to historical period,* in line with changes in the system of international relations and in the world economy. The category system and conceptual domain of *classical geopolitics* is therefore nowadays reinterpreted not only by *critical* but also by *post-modern geopolitical thinking.*"[1] Classical geopolitical analysis examined international political relations in terms of an interactive power network and in the context of a three-dimensional spatial structure that consisted of *land, sea and air.* From the last third of the 20th century onwards, however, the dominant view in geopolitical thinking has used as its analytical framework the coordinates of the concept of five-dimensional space.

The traditional three-pronged approach *has been expanded to include the phenomenon of outer space, or aerospace,* as well as *cyberspace belonging to the* broadly defined *information sphere* based on data volumes that have grown to vast proportions.

The existence, use and utilisation of data has always been an integral part of the life of society and had a significant impact on the system of international relations. Over the past two decades, however, digital data production has seen unprecedented growth. 'This growth occurs in accordance with three laws,' as Cattaruzza writes. These are: 1) Moore's Law, which says that the complexity of integrated circuits doubles every 18 months or so; 2) Kryder's Law, according to which the storage capacity of magnetic disks doubles every 13 months; and 3) Nielsen's Law, which states that the capacity of public networks doubles every 21 years. However, the constant expansion of data processing and storage capabilities is hardly enough to keep up with data explosion: In 2015, around 10^{22} bytes of new data were generated, and this number will in all likelihood increase fivefold by 2020. Terminology also

[1] István Szilágyi: *Geopolitika* (*Geopolitics*). Second, expanded edition. PAIGEO, Budapest, 2018, p. 28.

needs to catch up to describe these new quantities. “In the last decade,” the author says, “we have moved from the era of exabytes (10^{18} bytes) to the era of zettabytes (10^{21} bytes), not to mention the era of yottabytes, which means 10^{24} bytes... The total amount of data on the planet in 2018 is estimated at 33 zettabytes, and it is expected that by 2025 this number will jump to 175.”[2]

All these quantified data and facts have had a profound impact on the life of societies and the characteristics of power conflicts. In the world of geopolitics, the information sphere with its three-layered cyberspace (material infrastructure, software network, cognitive-semantic elements) has become increasingly important. The impact of this on power relations, military strategy and warfare was seen, for example, in the 1991 *Desert Storm* operation to defend Kuwait and in the war launched against Iraq in 2003.[3]

As for the actors shaping and structuring the international system, their composition and ability to exert influence have also changed. In addition to the great powers and states, intergovernmental and supranational organisations, transnational forces (NGOs, multinational companies, international media and the general public) and subnational actors (regions, local authorities, non-governmental civil organisations and individuals), the five largest US technology and IT giants, Google, Apple, Facebook, Amazon and Microsoft, collectively known as GAFAM, have also emerged, as well as their Russian, Chinese and German rivals, which have monopolised and continue to monopolise digital data storage and information flows. In many cases, they are not only the victims but also the influencers and organisers of piracy attacks on international data networks. In addition to hard power based on economic and military force, these representatives of soft power, which mediate cultural and political models, value systems and worlds of life, are playing an increasingly important role.

Due to the territorial connectivity and territorialisation of data, there is a worldwide struggle between states and powers to gain control over the flow of data and data storage centres and systems. Data centres are data storage and processing centres consisting of thousands of servers and data transfer switches connected in a hierarchical order. These are at the heart of big-data systems and service types such as cloud computing services that have spread very rapidly. Control over the system of routers connecting different networks on surface, terrestrial and submarine data cables is a key issue for the states that provide them with territory. As Cattaruzza writes” “At international level, governments seeking to break free from the imperialist domination of the digital great powers (the United States, Russia, China) are increasingly talking about the concept of *“digital sovereignty”,*

[2] Cattaruzza*:* Op. cit., p. 7.
[3] See details: István Szilágyi: Op. cit., pp. 174–188.

which refers to the sovereign control of data (keeping it on national territory), but more generally also to cyberspace, to its physical (national infrastructures), logical (national digital sector) and semantic (national content) layers. More and more states are sharing this view with the result that the real geopolitics of data centres is emerging."[4]

However, bringing the information sphere under national influence is not just about fighting against the dominance of digital great powers and GAFAM companies. It is also manifested in the relationship between the great powers. Under a law adopted in June 2014 which entered into force in 2016, Russia obliges Internet sites, regardless of their nationality, to store all data relating to Russian citizens on Russian territory. At the same time, the centralised Internet infrastructure of Russia allows the government to disconnect its own system from the World Wide Web and to obtain information by monitoring cable systems across Siberia and 'tapping' the track of the Transit Europe–Asia (TEA) backbone very close to Siberia.

The security of data flows requires international action and agreement, as laws blocking the free flow of data have proliferated around the world in recent years. Territorialisation through law is also being implemented by the United States, and other countries are taking similar steps.

In the final part of his book, Cattaruzza deals with personal codes representing digital identity, which can be considered a specific data area, and its further developed and extended version, the organisation of control technologies into a smart border.

The book analyses the issue of cyberwar and cybercrime, their different manifestations and variants, the digitalisation of the battlefield and the issue of new territory, new actors and new threats. However, in the context of a review with a limited scope, it is not possible to elaborate on the many important points made in the book and the thoughts and comments that emerged from reading it.

In conclusion, we can say that Cattaruzza's book deals with issues of great theoretical and practical importance, which may be of interest to all our compatriots using the Internet, computers and smartphones, and it affects us directly and personally.

The structure, language and style of the work are excellent. Its quality and content are greatly enhanced, supported and strengthened by the three tables in the text, the two charts and the rich bibliography.

The book provides new insights for readers, historians and economists interested in big data issues in the era of *geopolitics* and *mass production of digital data,* and is

[4] Cattaruzza: Op. cit., p. 60.

useful for university education. Cattaruzza's work refutes conventional approaches often found in the academic literature. The book 'The geopolitics of digital data' is an important contribution to a better understanding of contemporary developments and conflicts of power in the international arena. Therefore, I sincerely recommend it to all readers interested in the topic.

Deepening Economic Integration in the European Union*

Balázs Ferkelt

Péter Halmai:
Mélyintegráció. A Gazdasági és Monetáris Unió ökonómiája
(*Deepintegration. Economics of the Economic and Monetary Union*)
Akadémiai Kiadó, 2020, p. 540
ISBN: 978-963-4545-55-2

As regards the scale and depth of cooperation, the European Union is a unique economic integration in the world. Following the establishment of the single (internal) market, 19 out of the 27 Member States also entered the third stage of the economic and monetary union (EMU when referring to the integration within the EU) and introduced the common currency, the euro. Bulgaria and Croatia would also like to join the euro area soon. The evolution of the European Union can be regarded as a history of deepening and expansion (and also contraction and disintegration since Brexit in 2020). European integration is peculiar in that deepening and expansion were able to occur in parallel as it progressed. Analysing the EMU is key from the perspective of the entire European Union's future. The currency area that was established quite soon based on a political decision already had to be reformed after the first decade of its existence. The heterogeneity of the euro area and the system-wide issues were clearly reflected in the spillover of the global financial and economic crisis of 2008–2009 and the sovereign debt crisis in certain euro area members. However, the experiences from the first two decades showed that the EMU could not be reversed, the costs of leaving the euro area were incalculable, and moreover, all the members save Denmark had committed themselves to work for accession, even if no specific date was set and recently not even the European Union institutions are pressing forward with expansion of the EMU.

Péter Halmai's latest book analyses the EMU and the integration processes in the European Union in general from the perspective of the system of correlations in trade and growth theory. The author introduces the concept of *deepintegration* (one word in this context) in a new form to the economic literature on European integration. In trade theory, deep integration (in its general usage), is one of the

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

Balázs Ferkelt is an Associate Professor and Head of Department at the Faculty of International Management and Business of the Budapest Business School. Email: Ferkelt.Balazs@uni-bge.hu

characteristics of modern, next-generation trade agreements, illustrating that the cooperation goes beyond the elimination of trade barriers in a traditional sense. In this meaning, European integration has been operating as a deep (trade) integration for many decades, as the customs union was established in 1968. In fact, this has been typical of the economic and trade agreements between the European Union and third countries in recent years. Yet deepintegration in the sense used by Halmai is much more than that: it is a deep regional integration implemented in the European Union's practice, including both core integration and differentiated integration (periphery integration). A central element in deepintegration is core integration, comprising the most advanced achievements of integration. This deepintegration is fundamentally economic, but it cannot be realised without political will. Along this logic, the internal market and the EMU clearly belong to the system of deepintegration in the development of European integration, but the customs union can also be partly classified here (and partly to deep trade integration). Deepintegration has widespread economic effects, including a positive impact on growth,[1] mainly in the form of the accumulation of physical, human and knowledge capital. At the same time, this deepintegration forced Member States to relinquish an increasing portion of their sovereignty.

The book focuses on the comprehensive analysis of the most advanced form of deepintegration, the EMU, with a special emphasis on exploring the deeper correlations, as suggested by the title. The theoretical roots of the monetary union go back to optimum currency areas (OCAs), a concept which was coined by Nobel laureate *Robert A. Mundell*, who passed away just recently. As pointed out by the author, the EMU fulfils only some of the requirements of an optimum currency area, with high(er) labour mobility and fiscal transfers missing, but the advantages of monetary integration (which also boost trade) may be able to help raise the level of optimality. These requirements were completely disregarded in 1991 during the establishment, when the regulations in the Maastricht Treaty to be signed on 7 February 1992 were negotiated. The implementation of monetary integration was clearly the result of a political decision in Europe.

The analysis of the EMU makes it evident that the original scheme of monetary integration adopted in Maastricht contained system-wide issues right from the outset. This was highlighted by the 2008–2009 global crisis with particularly dire consequences, followed by the sovereign debt crisis that affected several members of the euro area. The structural problems became evident, just like the institutional peculiarities, the nominal and real rigidities, the frictions, in other words the heterogeneity of the currency area. Besides *convergence* (the aspects of which continuously expand, and the book presents its nominal, real, social, cyclical and structural dimensions),[2] the analysis of *resilience*, the economy's ability to respond

[1] See: *Halmai* (*2014; 2015a, b; 2018a*), *Elekes – Halmai* (*2013*; *2019*), *Halmai – Vásáry* (*2010*, *2011*)
[2] For more on the topic of convergence, see *Halmai* (*2019a; b*), *Halmai – Vásáry* (*2012*)

and withstand shocks, has to gain increasing prominence. This is not only important in a static dimension (such as maintaining the functions of a system in a crisis) but also includes an adaptive dimension, i.e. the necessity to adapt to the conditions of a changed environment. This is also a fundamental feature of deepintegration. The experiences from the first more than two decades of the EMU also suggest that the impact of the interactions and synergies in the system of deepintegration is determined by the intertwined effects of convergence and resilience (their synchronicity and homogeneity). Since in its original form the EMU proved to be unsustainable, a large-scale, multi-stage reform process began to achieve 'real', or to employ the phrase used in the book 'deep', monetary integration, which also includes the goal of ensuring the convergence of members towards resilient economic and social structures and increasing homogeneity. The implementation of the reforms is now under way, with two of the three pillars of the banking union having been created. Nonetheless, the author believes that further reforms are necessary to improve convergence and resilience. It is argued that a central aspect of the continued reforms should be the implementation of solidarity and responsibility through a new synthesis aimed at further deepening.[3]

The book seeks to provide additional material to the comprehensive theory on European economic integration by analysing differentiated integration and disintegration. The schemes and opportunities of differentiated (unequal) integration have received special attention in the international literature in recent years. The author explains the different versions of differentiated integration (and differentiated disintegration) based on the various constellations of interdependence and the politicised nature of the process, using political economics for the analysis.

One of the most interesting and topical parts of the book examines the relationship between the United Kingdom and the European Union in the above system of correlations, first by illustrating the advantages of EU membership (basically deepintegration), and then at the end of the book Brexit is explored as the first large example of disintegration.[4] Although no deal had been struck on the post-Brexit economic and trade relations by the time the manuscript was finished, the author leaves no doubt that Brexit has negative consequences for both parties. Nevertheless, the United Kingdom has to expect relatively larger losses in the long run, even if it has already started to establish deep (trade) integrations with Asian countries, and a plan to join certain megaregional trade agreements has also been considered. However, these are hardly examples of deepintegration. (History seems to repeat itself: the United Kingdom failed to sign the Treaty of Paris establishing the European Coal and Steel Community and the Treaty of Rome founding the EEC precisely to avoid deep trade integration.) The book draws a striking parallel between the establishment of the EMU and Brexit: both were the result of a political decision.

[3] For the EMU reform, see Halmai (*2013; 2017; 2018c; 2020c; 2021*)
[4] The author has analysed the issue of Brexit in several works, see *Halmai* (*2018b; 2020a; b; d*).

The closing chapter includes a summary of the conclusions in integration theory in a broader sense, expanding the narrower scope of the analysis. The book ends by outlining a new analytical framework or deepintegration paradigm by revisiting integration theory.

By the end, readers might wonder *what the road ahead for European integration may look like*. Deepintegration can be considered irreversible, and complete disintegration would entail exorbitant costs and have unpredictable consequences, while the system has its own pace of development. Accordingly, increasingly deepening core integration can be expected, however, the group of countries affected by periphery integration may remain unchanged for a while. In other words, within the euro area an increasingly close supranational cooperation is projected, but the expansion of the currency area may slow down considerably compared to 1999–2015, when eight countries joined the 11 founding members.

Péter Halmai's latest book presenting the conceptual framework and analysis of deepintegration is a must-have for teachers and researchers of European economic integration, and it can definitely be part of the set or recommended reading in the classes of master's or doctoral courses that deal with the European Union and the EMU.

References

Elekes, A. – Halmai, P. (2013): *Growth model of the new member states: Challenges and Prospects*. Intereconomics: Review of European Economic Policy, 48(2): 124–130. https://doi.org/10.1007/s10272-013-0453-z

Elekes, A. – Halmai, P. (2019): *How to overcome the crisis of the European growth potential? The role of the government*. European Journal of Comparative Economics, 16(2): 313–334. https://doi.org/10.25428/1824-2979/201902-313-334

Halmai, P. (2013): *Európai integráció és szuverenitás. A gazdasági kormányzás új dimenziói* (*European Integrity and Sovereignty. New Dimensions of Economic Governance*). Magyar Tudomány (Hungarian Science), 174(4): 411–421.

Halmai, P. (2014): *Krízis és növekedés az Európai Unióban. Európai modell, strukturális reformok* (*Crisis and growth in the European Union. European model, structural reforms*). Akadémiai Kiadó, Budapest.

Halmai, P. (2015a): *Az európai növekedési potenciál eróziója és válsága* (*Erosion and Crisis of the European Growth Potential*). Közgazdasági Szemle (Economic Review), 62(4): 379–414.

Halmai, P. (2015b): *Structural Reforms and Growth Potential in the European Union*. Public Finance Quarterly, 2015(4): 510–525.

Halmai, P. (2017): *Új geometria: 'teljes' gazdasági és monetáris unió? A gazdasági kormányzás új dimenziói az Európai Unióban* (*New Geometry – 'Complete' Economic and Monetary Union? New Dimensions of Economic Governance in the European Union*). Magyar Tudomány (Hungarian Science), 178(1): 6-17.

Halmai, P. (2018a): *Az európai növekedési modell kifulladása* (*The exhaustion of the European growth model*). Közgazdasági Szemle (Economic Review), 65(2): 122–160. https://doi.org/10.18414/KSZ.2018.2.122

Halmai P. (2018b): *A Brexit lehetséges gazdasági hatásai. Gazdaságtani alapok, módszertani lehetőségek* (*The Possible Economic Effects of Brexit. Economic Foundations and Methodological Possibilities*). Európai Tükör (European Mirror), 21(2): 7–32.

Halmai, P. (2018c): *Európai reformok: Többsebességű Európa? Differenciált gazdasági integráció versus átfogó reform* (*European Reforms A Multi-Speed Europe? Differentiated Economic Integration vs. Overall Reform*). Európai Tükör (European Mirror), 21(3): 21–44.

Halmai, P. (2019a): *Konvergencia és felzárkózás az euróövezetben* (*Convergence and catching up in the Euro zone*). Közgazdasági Szemle (Economic Review), 66(6): 687–712. https://doi.org/10.18414/KSZ.2019.6.687

Halmai, P. (2019b): *Felzárkózás és konvergencia az európai integráció rendszerében* (*Catching up and convergence in the System of European Integration*). In: Kovács, L.P. (ed.): Közel Európa távol (Nearby Europe far away), Budapest, Éghajlat Könyvkiadó, pp. 189–230.

Halmai, P. (2020a): *A brexit gazdaságtana* (*The Economics of Brexit*). In: Halmai, P. (ed.): A brexit forgatókönyvei és hatásai (The impact and scenarios of Brexit). Budapest, Nordex Nonprofit Kft. – Dialóg Campus Kiadó, pp. 85–212.

Halmai, P. (2020b): *A dezintegráció gazdaságtana. A brexit esete* (*The economics of disintegration. The case of Brexit*). Közgazdasági Szemle (Economic Review), 67(9): 837–877. https://doi.org/10.18414/KSZ.2020.9.837

Halmai, P. (2020c): *GMU 2.0: felelősség versus szolidaritás?* (*EMU 2.0*: *Responsibility versus Solidarity?*). Külgazdaság (Journal of International Economics), 64(September–October): 3–34.

Halmai, P. (2020d): *A populizmus ára: a Brexit-adó* (*Price of Populism: The Brexit Tax*). Magyar Tudomány (Hungarian Science), 181(12): 1621–1635. https://doi.org/10.1556/2065.181.2020.12.6

Halmai, P. (2021): *Resilience in Focus. Certain Mechanisms of the Deepening of the Economic and Monetary Union*. Public Finance Quarterly, 66(1): 7–31. https://doi.org/10.35551/PFQ_2021_1_1

Halmai, P. – Vásáry, V. (2010): *Growth crisis in the EU – challenges and prospects*. Intereconomics: Review of European Economic Policy, 45(5): 329–336. https://doi.org/10.1007/s10272-010-0353-4

Halmai, P. – Vásáry, V. (2011): *Crisis and economic growth in the EU: Medium and long-term trends*. Acta Oeconomica, 61(4): 465–485. https://doi.org/10.1556/AOecon.61.2011.4.4

Halmai P. – Vásáry V. (2012): *Convergence crisis: economic crisis and convergence in the European Union*. International Economics and Economic Policy, 9(3): 297–322. https://doi.org/10.1007/s10368-012-0218-3

Thoughts in 2020 on the Commemorative Book "Ten Years of the Vienna Initiative"*

Judit Burucs

Ten Years of the Vienna Initiative
European Investment Bank, Luxembourg, 2019, p. 387.
ISBN: 978-92-861-4393-9

Introduction

At the Forum of the Vienna Initiative in June 2020, the Chairman of the Supervisory Board of European Central Bank (ECB) highlighted the much stronger position of banks in the Central and Eastern-South-Eastern European countries (CESEE), both in terms of capital and liquidity, relative to the previous global financial crisis. The commemorative book "Ten years of the Vienna Initiative" gives a detailed answer from the authors' point of view to readers regarding what happened to the banks in the region and how they became resilient between 2009 and 2019.

After the countries in Central and Eastern Europe opened their economy in 1989, they provided a profitable market for West European banking groups. This resulted in the share of the foreign-owned bank became 70 per cent of total banks in 2008. Thanks to cross-border banking, a channel into the region was established to facilitate the flow of capital, the technological development, the stream of know-how, financial literacy as well as market and liquidity risk. Due to the U.S. sub-prime crisis, European banks were affected by the sharp reduction in interbank liquidity in 2007. Every country in the CESEE region was worried about whether multinational banks would keep funding customers in the region through their local subsidiaries.

In 2009, the European Banking Coordination Initiative, a popular name is Vienna Initiative (VI) was launched to help the CESEE countries[1] to preserve liquidity in the banking system and to overcome the effects of the global financial crisis. The VI's participants are EU-based banking groups with subsidiaries in the region,

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

Judit Burucs is a Master Lecturer at the Corvinus University of Budapest. Email: judit.burucs@uni-corvinus.hu

[1] Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kosovo, Latvia, Lithuania, Montenegro, North Macedonia, Poland, Romania, Serbia, Slovak Republic and Slovenia

international financial institutions (hereunder IFIs), the European Commission (EC), the ECB, as well as the financial authorities of the countries concerned. The VI, operating successfully between 2009 and 2019, was an informal co-ordinational forum, a unique platform that gave a possibility to the participants to meet regularly to exchange views on financial trends in the CESEE region. On the 10th anniversary of VI, its Steering Committee prepared a commemorative book with essays from the key actors. The authors of the book are chief economists, scholars, experts of IFIs, senior managers of national and international authorities and top executives of EU-based banking groups with subsidiaries in the region who worked for participating organizations at that time. The special feature of the book is, that the reader can see the operation of the VI through the eyes of the members.

The book, containing 19 essays, is organized into 5 main parts: Historical perspectives; The effectiveness of the Vienna Initiative during the 2009–2011 crisis; the Vienna Initiative 2.0: Post-Crisis stresses on cross-border banking; The future of cross-border banking; Conclusions on the achievement of the Vienna Initiative. Reading these essays, written in different styles, we can get a picture of the role of the main participants finally. The Annex of the volume contains a summary of the Conference held in Vienna on 27 March 2019.

Overview of the Vienna Initiative

The book starts with a detailed, factual historical overview of the Vienna Initiative, written by Mark Allen (pp. 13–52). The first phase of VI (Vienna Initiative 1.0) focused on financial support, giving a signal to the international financial market and restoring market confidence. The first phase of the VI was very well received by scholars. Pistor, who was cited several times in this volume, highlighted the impressive, immediate results. "Not a single subsidiary of a transnational bank group in the CEE market has collapsed as transnational groups agreed not to withdraw from Central and Eastern Europe in an uncoordinated fashion and some instead recapitalized subsidiaries located in these countries."[2]. *De Haas et al.* (*2012*)[3] highlighted that VI became a public-private partnership that combined macro-financial support by the IMF and the EU (a 'bail-out') with funding by IFIs and a coordinated 'bail in' of private lenders. Based on their previous researches De Haas and Tabak summarized some empirical evidence on VI effectiveness in the second part of the volume (pp. 145–159). They answered 3 questions here: whether there were observable differences in the lending behaviour of banks that were part of the VI versus those that were not, keeping all else equal; whether

[2] Pistor, K. (2012): *Governing Interdependent Financial Systems: Lessons from the Vienna Initiative*. Colombia Law and Economics Working Paper No. 396, 21 March. http://dx.doi.org/10.2139/ssrn.1792071, p. 8.
[3] De Haas, R. – Korniyenko, J. – Loukoianova, E. – Pivovarsky, A. (2012): *Foreign Banks and the Vienna Initiative: Turning Sinners into Saints?* IMF Working Paper, WP/12/117, International Monetary Fund. https://www.imf.org/external/pubs/ft/wp/2012/wp12117.pdf

for those multinational banks that were part of the VI, their lending differed in countries where they signed commitment letters; whether signing commitment letters led to negative spill-overs to other countries. They found that on average, subsidiaries of VI parent banks were growing faster than the subsidiaries of non-participant banks. Subsidiaries of parent banks that signed commitment letters were significantly more stable sources of credit than subsidiaries of banks that did not sign such letters in the same country. Moreover, they did not find evidence that VI banks withdrew from non-VI countries in order to maintain exposures to countries where they signed commitment letters.

In 2012, due to the euro crisis and the new regulatory requirements, the VI was relaunched as Vienna Initiative 2.0. The second phase of VI focused on avoiding disorderly deleveraging, stimulating credit growth, ensuring a framework to safeguard the financial stability of the region and providing advisory support to develop the financial system. The VI recognized the need to remove obstacles to the extension of bank credit. This led to two lines of activities: tackling non-performing loans (NPL) and the use of guarantee schemes to support SME's access to finance. The VI also offered the participants the possibility of discussing various regulatory issues and setting up several working groups related to the EU's new measures to assist the region. The most important working groups were: The Basel III Implementation in Emerging Market, Non-Performing Loan in CESEE, the European Banking Union and Emerging Europe, SME Guarantee Schemes, Capital Market Union, as well as Financing Innovation and IFI financial products supporting investments in CESEE. The VI issued some publications semi-annually to monitor the lending activities of the banking sector in the region, such as NPL Monitor for the CESEE region produced by the European Bank for Reconstruction and Development (EBRD), CESEE Bank Lending Survey taken by European Investment Bank (EIB) as well as Deleveraging and Credit Monitor. In 2012, the VI structure became more formal. Now, the main informal decision-making body is the Full Forum; however, between the meetings of the Full Forum, a Steering Committee conducts the work of the Initiative and the Chairman of the Steering Committee coordinates all public statements. Operational support for the VI's work is provided principally by the EBRD.

"The overall risk level in the part of the European financial system addressed by the VI has undoubtedly decreased… More local savings have been mobilized and cross-border flows have been cut back to safer levels, but the net effect is most likely that financial access and opportunities for risk diversification have both become more limited in most countries in Central and Eastern Europe." (p. 65)

The role of the "honest brokers"

The main part of the volume reflects the opinion of the IFIs. The representatives of IFIs emphasized that their role was very important in the Vienna Initiative because they were seen as "honest brokers", able to use their reputation, convening power and to bring all relevant parties around the table. Being "non-interested parties" they were able to play a neutral and constructive role as well as collectively provide sizeable countercyclical funding. "It was the technical convening power of the IFIs that gave impetus to the process. This was the first time the IFIs worked together as a system, as indeed they should." (p. 371).

The volume did not highlight that VI was a good possibility for IFIs to come back to the Central-Eastern Europe region. They were planning to leave the region before the crisis, since these countries reached the "category of the advanced country" from their point of view and banks in the region were able to get funds at favorable market prices. They launched two Joint IFI Action Plans (JIFIAPs) in 2009 and in 2013 respectively. They invested EUR 75.7 billion in the region. JIFIAPs was beneficial for both parties as IFIs had the chance to invest into this region with relatively small risk and they also were able to sell their advisory services.

The EIB invested EUR 43.8 billion into the region. Their lending fulfilled the dual function of supporting both final beneficiaries – small to medium-sized enterprises (SMEs) or small infrastructure projects – and the region's banks. The World Bank Group (WBG) invested EUR 17 billion, the representatives of the World Bank emphasized that the unique way of cooperation within the WBG in the framework of the VI has been beneficial. Joint activities conducted by International Finance Cooperation and Multilateral Investment Guarantee Agency (MIGA) led to some jointly developed new products, including MIGA's bestselling "Capital Optimization Product", which creates synthetic capital for international banks having subsidiaries in sub-investment-grade emerging markets. The EBRD role in the VI is dominant; it manages the "co-ordinational organization", it also invested EUR 15.1 billion. IMF participated in macro-financial support, it invested EUR 31.2 billion in five countries.

One of the main obstacles to the extension of bank credit is the high level of NPL; for example, in the case of Albania it exceeded 20 per cent in 2014. The representatives of EBRD highlighted that there is a robust relation between high NPLs, weaker credit and GDP growth, with two-way causality. High NPLs can depress credit growth and ultimately job creation, which has a strong negative influence on the private sector. This causes a further increase in NPLs, potentially leading to a downward spiral. IFIs made a lot of effort to assist the region in NPL management. In line with the objectives of enhancing the transparency of restructuring frameworks and

disseminating knowledge, the website[4] of VI has become an industry reference. They also provided capacity buildings, technical assistance in the region. They also offered policy recommendations across three areas: enhancing prudential oversight, reforming debt enforcement regimes and insolvency frameworks and developing distressed debt markets. The published monitoring reports helped credibly inform markets at critical times. The website of the VI managed by EBRD contains the most important information now, more detailed information can be found on the website of EBRD and EIB.

The representatives of EIB emphasized that in this environment, the role of the VI is no longer crisis management; rather, establishing the link between the financial sector and the areas that are crucial for the region's economic development, such as financing innovation, the transition towards a green economy, digitalization, etc., are of the essence (p. 97).

The Vienna Initiative from the Authorities' Point of View

The representatives of the EC highlighted the challenges of the supervisory and regulatory changes since the crisis. The VI became a platform for formulating and sharing with key EU decision-makers the observations on supervision and resolution from the perspective of host countries while taking account of the specific situation of the banks operating in the region. These discussions led to the signature of a Memorandum of Understanding between the European Banking Authority and the Southeastern European countries. It was also a question, how banks in the region could fulfill their minimum requirement of own funds and eligible liabilities targets, given the small size of their capital markets.

As economies develop, the services provided by financial markets become comparatively more important than those provided by banks[5]. Consequently, the VI focused on supporting the development of the capital market in the CESEE region because they have a high catch-up potential given, especially after the Capital Market Union (CMU) Action Plan, adopted by the EC in 2015. CMU aims to mobilize capital in Europe and channel it to companies, including small and medium enterprises and infrastructure projects. The VI set up the Working Group on Capital Market Union, chaired by the EC, which reported that the Capital Markets in CESEE lag behind their EU peers in terms of liquidity and depth, as well as listed

[4] http://npl.vienna-initiative.com
[5] Demirgüc-Kunt, A. – Feyen, E. – Levine, R. (2012): *The Evolving Importance of Banks and Securities Markets*. NBER Working Paper No. 18004. http://doi.org/10.3386/w18004

policy actions on national, regional and EU level that should be taken to support the development of CESEE markets[6].

The Chairman of the VI is the Governor of the Croatian National Bank, who emphasized the important historical role of the VI and its current and future relevance. The representatives of Hungarian, Macedonian and Albanian National Authorities gave a detailed explanation of the situation of their financial system at that time and of the impact of the VI on the banking sector in their countries. It was highlighted that the liquidity crisis hit Hungary, Romania, Serbia, Ukraine and Latvia hard, so they turned to the IMF and the EU for standby credit in 2008.

The subsidiaries of banking groups constituted a large share of the Albanian banking sector, however, at the consolidated level, these subsidiaries had very small shares on the balance sheets of the banking groups. The Governor of the Bank of Albania highlighted that the gradual deleveraging, and the ongoing process of EU banks selling, merging and acquiring, had resulted in a continuous shrinking of their market share against other foreign-owned banks and domestic banks. The authors from the Narodowy Bank Polski analyzed the structure of the financial sector. They argued that the small financial system does not foster economic growth because it does not provide sufficient resources for the economy. On the other hand, if financial development is too large, the positive effects on economic growth decline, while economic and financial volatility rises. It leads to a decrease in efficiency of investment, as it does not allocate financial resources to the most productive activities.

The Vienna Initiative from the point of view of EU-based banking groups

There were three EU-based banking groups with several subsidiaries in the region (Raiffeisen International, Société Générale and the UniCredit) that shared their experience on the VI in this volume. The representatives of these banking groups highlighted that the money market started to dry up in 2009. They realized that no official platform existed where regulators of Western and Eastern European countries could informally exchange their views, let alone talk about coordinating or jointly designing important measures. The representative of Société Générale analyzed the role of the FX denominated loans in CESEE. Swiss franc loans were very risky, as was illustrated in 2015 when the Swiss unpegged the franc from the euro. The representatives of Raiffeisen International summarized the doubts of some observers related to the success of the VI. The VI was "international institutional pressure on private sector banks that helped resolve the apparent collective action

[6] EBCI WG (2018): *Report by the Working Group on Capital Markets Union*. http://vienna-initiative.com/resources/themes/vienna/wp-content/uploads/2018/03/VI-CMU-Working-Group-Final-Report-March-2018.pdf. Downloaded: 15 December 2020.

problem by compelling the largest banks to stay – with commitment letters by banks, IMF stabilization and open communication among stakeholders." (p. 349)

Maintaining exposure in the CESEE market was a good decision of the banking group, because the net interest margin is still higher in these countries. In the case of the Erste Group, 70 per cent[7] of the net interest income of the Group was from this region in 2018. There is a continuous shrinking of EU based banking group's market share against other foreign-owned banks and domestic banks, because the banking groups with a small market share were not economies of scale. The Volksbank sold their subsidiaries to the Russian Sberbank in 2012, and the Société Générale Group sold their subsidiaries to the Hungarian OTP group in 2019.

The Success of the Vienna Initiative Mechanism

The representatives of the EC outlined the success of the VI mechanism, which was based on the mixture of the cooperative approach, bilateral and general commitment letters by EU parent banks, involvement of European institutions and the institutional/governance setting of a banking group creating a strong link between parent banks and their subsidiaries. They compared VI and Nordic Baltic cooperation, on which the Vienna Initiative was modeled. They highlighted that the financial integration in the Nordic-Baltic region had been more advanced. Six financial groups dominated the markets of Denmark, Sweden, Norway, Finland, Estonia, Latvia and Lithuania. These banking groups' foreign exposure to the countries in the region played a major role in their balance sheets, but the EU based banking group's market share was not relevant in the CESEE countries. The legal status of the Nordic-Baltic is semi-formal and the VI is informal. In the case of VI, the informal organisation is open, and everybody can be invited[8].

This unique cooperative approach is one reason that the VI mechanism could not work properly in other circumstances. Nagy-Mohácsi emphasized at the anniversary conference that in the case of Ukraine, an attempt to use VI mechanisms foundered because, in the absence of a strong host country adjustment program, it was impossible to get bank commitment. In the case of Greece, the approach was not that of the VI – there was no collective treatment of the banks, nor was peer pressure applied[9].

[7] Erste Group Annual Report 2018
[8] pp. 313–328.
[9] p. 372.

Conclusion

The commemorative volume brings together experiences from the key actors and institutions involved. The strength of this volume is giving an overview of VI's activity, history and its impact on the economy of the countries in the region from expert's point of view. At the same time, this is also one of the weakest points of it, because it contains a lot of redundancy. The essays were written by different authors without knowing each other's work, so some events, e.g. the starting points in 2008, were described several times. This volume did not present the dissenting, opposite opinions on the VI. Some other researches, academic papers related to the development of the financial sector in the region could have completed the book.

The book is recommended to experts, scholars and students who are interested in the challenges, solutions and open questions in the financial sector of the CESEE region from 2009 to 2019 and would like to get first-hand information on the subject. This book is also useful for students who would like to know more about the activities of International Financial Institutions in the CESEE region as well as the operation of an informal cooperation directed by the IFIs.

Report on the 11th Financial Market Liquidity Conference*

Katalin Dobránszky-Bartus – Fanni Dudás – Zsolt Lakatos – Fanni Tóth

The *11th Financial Market Liquidity Conference* was held on 26–27 November 2020, due to the coronavirus pandemic – for the first time in its history – in online form. Similar to previous years, the conference was organised jointly by the Financial Research Centre operating within the Department of Finance of the Institute of Finance, Accounting and Business Law of Corvinus University of Budapest (CUB) and the Momentum Game Theory Research Group of the Institute of Economics Centre for Economic and Regional Studies. In addition to the Foundation of the Department of Finance, as a gold sponsor, CFA Society Hungary, KELER CCP, MSCI, Morgan Stanley and OTP Bank acted as key sponsors. Almost 300 persons registered for the conference, including roughly 100 university students. Actors from domestic and international academia as well as corporate partners were among the conference participants. As in previous years, the two-day conference ran in parallel sessions, except for the presentations by the four guest speakers. 22 universities were represented at the conference through the speakers, joined by banking experts and research analysts, with half of the participants from Hungary and half from abroad. A total of 40 presentations were delivered.

The conference was opened by *Gyula Vastag,* CUB's Vice-Rector for Research. This was followed by the keynote presentation of the first plenary session, delivered by *Jonathan A. Batten*, Professor of Finance, RMIT University, Melbourne, who explored the potential impacts of climate change on the financial markets after the coronavirus crisis. The presentation was structured along three main lines: (1) it presented the price dynamics necessary for successful emission trading; (2) how we should treat the pricing and portfolio management of green and alternative investments, with special regard to socially responsible investment portfolios; and (3) how we should take into consideration the broader social consequences of the transition from carbon-intensive industries. According to the speaker, the past year demonstrated that investors are able to realise significant profits on investments in securities of companies with a strong environmental or strategic CSR focus. Through the change in investors' risk preferences, climate

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

Katalin Dobránszky-Bartus is a PhD Student at the Corvinus University of Budapest. Email: katalin.bartus@uni-corvinus.hu
Fanni Dudás is a PhD Student at the Corvinus University of Budapest. Email: fanni.dudas@uni-corvinus.hu
Zsolt Lakatos is a PhD Student at the Corvinus University of Budapest. Email: zsolt.lakatos@uni-corvinus.hu
Fanni Tóth is a PhD Student at the Corvinus University of Budapest. Email: toth.fanni@uni-corvinus.hu

change has an effect on governments, corporations and private individuals. Investments tend to shift toward safe-haven assets (foreign currencies, commodities and other financial instruments). Risk management becomes increasingly expensive, as volatility increases the costs of managing financial risk, particularly in the case of products of an insurance nature, such as financial options and related derivatives. On the other hand, Batten believes that these costs can be offset by taking strategic positions, and he outlined several objectives, such as: developing long-term strategies to overcome short-term volatility; cooperation and development of partnerships to mitigate the regional impacts of de-globalisation and climate change; improving the insurance and risk markets, particularly in terms of trading in climate risks; and elaboration of plans for corporate and personal transformation.

The plenary was followed by the presentations of parallel sessions. The Thursday morning sessions dealt with macroeconomic, asset pricing and corporate finance issues as well as with presentations describing the relation between trading on financial markets and information. The *Information and Trading* session commenced with a noteworthy presentation by *James M. Steeley*, Professor at Brunel University, London, on market microstructure analysis. The analysis by Steeley et al. showed that investors with partial information behaved differently on the market compared to fully informed investors. In the research, they created "laboratory" markets and analysed 9,859 limit orders and 3,474 transactions. They supplied the six informed and two liquidity traders with continuously updated market information during the three-minute trading sessions, repeated several times. No short selling was permitted, trading took place anonymously and bids could be changed free of charge. Informed traders were divided into three types, each of which – depending on their type – received a price signal. The price of the instrument was modified with the sum of the three types of price signals. Liquidity traders were penalised if they failed to achieve the trading target. The speaker highlighted the fact that those orders are more rewarding that allow investors to adopt a „hiding" strategy, i.e. to make decisions by hiding the (partial) information they know. This explains why an investor makes a bid contrary to the price signal, and also confirms the conclusions of market analyses, according to which the bid types correlate with each other, i.e. the type of the previous bid has an effect on the type of the current bid.

The Information and Trading session was closed by the chair of the session, *Zsuzsa R. Huszár*, Visiting Professor at CEU and at the Business School at the National University of Singapore (NUS). In her interesting and very enlightening presentation, Huszár demonstrated the role of transaction costs and market compensation in the behaviour of short sellers, i.e. the relatively well-informed traders. Together with her co-authors, she examined whether the market maker compensation schemes and trading cost have any influence on surveying market prices. They examined four BATS trading platforms: BZX Equities, EDGX Equities, as quote-driven markets and

BYX Equities and EDGA Equities, as inverted markets. They used daily transaction and trading data between 2010 and 2015, and in order to measure short selling they examined the ratio of short sales compared to the total volume of trades. The speaker explained that the trend of chasing short trades in low-cost markets is a clear indicator of return, and that measuring liquidity in new emerging trading platforms is a challenge, and thus relying on traditional data suppliers may prove to be misleading.

In the early afternoon parallel sessions, the presentations concerned the problems of interconnectedness in the financial markets, social innovation and questions of financial liquidity. On Thursday, four presentations were delivered during each of the morning and afternoon sessions.

The plenary closing the first day of the conference featured a presentation by *Thomas Walker*, Professor of Finance at Concordia University, Montreal. Working with his fellow researchers, Walker examined whether natural disasters have any effect on banks solvency via the regulatory capital ratio, the accounting capital ratio and individual bank characteristics. Their analysis covers the data of 9,928 banks located in 149 countries, in the period of 2000–2017. There are three channels through which the effect of natural disasters may filter through to banks: 1) through mortgage loans, the collateral of which – customers' real estate – may be destroyed, and thus the debt becomes non-performing; 2) through indirect effects, representing direct damages to the buildings of financial institutions; and 3) through the higher minimum reserve requirement, which may hinder banks in lending and thus curb economic growth. According to the results, the volume of damages incurred as a percentage of GDP has significant negative relation to bank solvency. Based on individual characteristics, the impact is the largest at those banks where the damage caused is relatively large compared to GDP and for those with low market capitalisation. The results are of major importance for banks' risk management departments.

Friday was opened by the presentations of parallel sessions. Three presentations were delivered in each of the two parallel sessions both in the morning and early afternoon. In the morning sessions, the speakers discussed green finance and bond markets. These sessions were followed by one of the most awaited presentations of the 2020 conference, delivered by this year's second keynote speaker, *Mariassunta Gianetti*, Professor at the Stockholm School of Economics. In her exciting and instructive presentation, she presented whether market discipline may help to achieve a more environmentally and socially sustainable economy, and she also discussed to what extent such market discipline works. In the research presented, 6,919 enterprises were analysed in the period 2007–2016. Results show that the environmental and social (E&S) risk of corporations increased when the ownership share of institutional investors with strong E&S preferences decreased,

and sales declined in countries with strong E&S preferences. As a summary of the presentation, Gianetti emphasised that market discipline works, but is conditional upon E&S-conscious investor behaviour, and she stressed that during the assessment the impact of negative news on the environmental and social governance of companies is amplified by investor boycotts and selloffs.

The presentations in the afternoon sessions focused on the banking sector and economic theories. The Friday afternoon session on banking was opened by one of the conference's guest speakers, *Rafael Schiozer*, Professor of Finance at the Brazilian FGV-EAESP, researcher at the Brazilian National Research Council and a regular speaker at the Liquidity Conference. His main area is the examination of financial stability and banking sectors. This year's presentation was about the developments in the cost of bilateral currency hedge transactions between Brazilian firms and banks in the light of the creditor relationship between them. The key driver of the research was that apart from intermediation banks provide a wide range of services. These include hedge transactions, enabling exporters and importers to protect themselves against fluctuations in foreign currency exchange rate; however, the cost of this is extremely high in developing countries. According to the Brazilian results, the existence of a creditor relationship alone has no effect on the cost of hedging, but it reduces the spread, if the loan is provided in USD. Firms are more likely to transact in derivatives with banks that they have a loan relationship with, and a stronger relationship between the bank and the firm further increases the likelihood of this. He also highlighted a regulatory change, as a result of which it has become more costly for banks to provide importers with foreign exchange transactions. Under an existing intense relationship between the bank and the firm, a lower spread can be negotiated during the cost shock.

In the closing plenary session of the 2020 Liquidity Conference, the final keynote address was given by *Paul Shrivastava*, Professor and Chief Sustainability Officer and Director of the Sustainability Institute at the Pennsylvania State University. In the presentation, Shrivastava analysed the relationship between the wellbeing economy and finance in the Anthropocene. He first outlined the socio-economic trends of the past decades and stressed the importance of a long-term and global perspective. The speaker also presented the new role of wellbeing economy policies in balancing sustainability and profitability in an era where the impact of human activity on the Earth's ecosystems is significant and global. Shrivastava concluded his presentation with a characterisation of „wellbeing" universities, explaining that such universities focus on four main areas: research, education, community knowledge transfer and student life. In his opinion, universities must implement fundamental changes, as now, for example in the field of research, a model operates in which researchers produce outputs rather than actual solutions to world problems. He

believes that in the future university research will be integrated research, proposing solutions for real problems.

The conference was closed by *Barbara Dömötör,* Associate Professor of the Department of Finance at the Corvinus University of Budapest and Chair of the Conference Organisation Committee, who expressed the hope that next year it will be possible to organise the conference already similar to previous years. She also thanked the speakers for their work and the audience for their online participation, and she announced that the 12th Financial Market Liquidity Conference will be held on 11–12 November 2021 and that registration for the conference has been opened (http://afml.uni-corvinus.hu).

INSTRUCTION FOR AUTHORS

Manuscripts should be submitted in accordance with the following rules:

- The length of the manuscripts should be limited to 40,000 characters (including spaces) but a ± 25–50 per cent deviation is accepted. Manuscripts should be written in Hungarian and/or English.
- The unnumbered footnote of the author's name contains his/her position, the institution the author works at, his/her email address and any other relevant information and acknowledgment regarding the article.
- Papers always begin with an abstract which should not exceed 800–1,000 characters. In the abstract a brief summary is to be given in which the main hypotheses and points are highlighted.
- Journal of Economic Literature (JEL) classification numbers and keywords should be given (three at least).
- Manuscripts should be written in clear, concise and grammatically correct Hungarian and/or English. Chapters and subchapters should be bold.
- Manuscripts should contain the list of references with the first and surname of the authors (in case of non-Hungarians the initials of the first name is required), the year of publication, the exact title of the book, the publisher, the place of publication. In case of papers, the exact title of the journal, the year, the volume, and the pages should be indicated. References in the text should contain the surname and the year. When citing the exact page should be indicated.
- Tables and figures are to be numbered continuously (chapters and subchapters should not contain restarted the numbering). Every table and figure should have a title and the units of quantitative values are to be indicated. Tables are to be made in Word, while figures must be edited in Excel. Notes and sources are to be put directly at the bottom of the tables, figures.
- Equations should be aligned to the right and should be numbered continuously in parenthesis. (Chapters and subchapters should not contain restarted the numbering.)
- Manuscripts are to be sent to the Editorial Office of the FER only. Papers are peer-reviewed by two independent and anonymous reviewers.
- Manuscripts should be sent as attachment by e-mail in MS Word file. Figures should be sent in MS Excel file both in Hungarian and English.
- In case of further questions related to the manuscript visit the following website:

http://english.hitelintezetiszemle.hu/letoltes/authors-guide-en-1.pdf

Thank you!

The Editorial Office of the Financial and Economic Review
H-1054 Budapest, Szabadság tér 9.
Phone: +36-1-428-2600
E-mail: szemle@hitelintezetiszemle.hu

Financial and Economic Review