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Resolving Conflicts in Measuring Banking System Competitiveness – MNB Banking System Competitiveness Index*

Péter Asztalos – Gábor Horváth – Štefan Krakovský – Tamás Tóth

The competitiveness of a national economy structurally depends on the efficiency and quality of financial intermediation, which is in a close relationship with the competitiveness of the banking system. In our opinion, banking system competitiveness can best be captured through the sustained supportive role of the banking system in economic growth, which in practice is implemented through the efficient allocation of financial resources. In the course of our research we developed an index designed to measure the competitiveness of European banking systems which, in our understanding, is the first of its kind. It models competitiveness from two different or even conflicting perspectives – from the consumer and from the investor side alike – and synthesizes the results received. Our analysis points out that the Hungarian banking system lags significantly behind its peers with respect to the price-setting of loans to households, digitalisation and operational efficiency, and presents the sources of competitive advantage in national economies with a competitive banking system in place.

Journal of Economic Literature (JEL) codes: E51, O40, E44

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1. Introduction

Our analysis is intended to provide a systematic comparison between the banking systems of European countries from the perspective of competitiveness. The competitiveness of a national economy hinges on a multitude of institutional, geographical, material and human factors, of which the financial intermediary system in general and financial intermediaries in particular play a pivotal role. The link between the financial system and economic development is a central topic in the influential book by *Gerschenkron* (*1962*), in which the author discusses the

* The views expressed in this paper are those of the author(s) and do not necessarily reflect the offical view of the Magyar Nemzeti Bank.

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models applied in different eras for the financing of industrialisation and hence, economic convergence. Financial mediation is commonly interpreted as the collection and efficient allocation of financial resources and the drawbacks arising from the imperfections of the process were pointed out early on by *Hicks* (*1935*). The adequate operation of the process benefits all stakeholders: savings increase, investment thrives and the banking system itself achieves the profitability required for performing its activity over the long run. Thus, the financial intermediary system greatly contributes to sustainable and dynamic economic growth[1] and hence, competitiveness. For a detailed analysis of this considerably simplified thought process, we need to examine two questions:

a) How can we characterise and measure the competitiveness of a country's banking system in and of itself?

b) What are the channels through which the banking system contributes to the competitiveness of the national economy as a whole?

Our analysis is focused on the first question. We hope that the proper interpretation of banking system competitiveness and an in-depth analysis of the structural features of a given banking system facilitates a better understanding not only of financial systems but of whole economies. In addition, a transparent international comparison may assist in identifying the development opportunities available to the Hungarian banking system, which endeavour is consistent with the statutory mandates of the Magyar Nemzeti Bank (MNB).

The first dilemma we faced during our investigation is the interpretation and measurability of banking system competitiveness. Banking system competitiveness is not a clearly defined or self-evident term. Our analyses started out with the premise that the goal of financial intermediation – and hence, the criterion of a well-functioning banking system – is the efficient allocation of financial resources that supports growth in a sustainable manner over the long term. The indicators used for measuring competitiveness were derived from this interpretation. This is consistent with the MNB's previously published study on the 10 measures of a well-functioning Hungarian banking system (*MNB 2014*), which identifies healthy lending, the importance of the self-financing of the banking system, supporting growth, and the potential behind efficiency improvement and innovation among the key factors at play. These dimensions need to be quantified and aggregated for the comparison of banking system competitiveness over time and across countries.

With respect to measurability – accepting the above-mentioned concept of banking system competitiveness – the selection of indicators and their optimal values

[1] The issue is discussed in detail in Chapter 4 of Competitiveness and Growth: The role of financial intermediation in growth (*Banai et al. 2016*).

pose a challenge. The criteria system required for efficient financial allocation can be examined from the perspective of numerous participants. The features of financial intermediation can be inspected from the side of the state, the regulatory body, consumers and banks alike and even conflicting aspects can be considered. Looking at the financial system under market conditions, we found that it was through the analysis of the consumer side (households and corporations) and the infrastructure provider side that we could most easily interpret and measure efficient and sustainable resource allocation – as the definition of banking system competitiveness. This approach permitted us to also take into account such environmental and demand factors that play a decisive role not only in the structural features of a national economy but also in the competitiveness of its banking system. Banks are less capable of influencing developments in these factors over the medium term than the state and regulatory authorities are.

Bearing in mind the conflicting aspects of the consumer and of the structural side of financial intermediation, in our study we approach banking system competitiveness separately from these two angles:

- *Financing corporations and households:* From the perspective of households and corporations, the key question is whether the banking system fulfils its financial intermediation role properly and supports the financial involvement of customers. In our view, therefore, demand side competitiveness can best be captured in the accessibility, quality and price setting dimensions; in other words, when financial products become broadly available in high quality and at an affordable price. Accordingly, an analysis of the consumer side can shed light on which countries rational customers would prefer in case of a hypothetical choice between banking systems.

- *Capital attractiveness:* As regards bank owners and investors, we selected five determinants that may play a leading role when these actors decide on continuing or enlarging their activity. These are: stability, profitability, operating and tax environment, prospects of financial deepening, technology and efficiency.

In constructing the corporate and finance indices, we also included a number of indicators that are not solely determined by the demand side but their value emerges from an equilibrium state between demand and supply. For example, pricing indicators reflect consumers' demand side perception on the one hand but on the other hand, they also indicate the diversification of the financial system and the intensity of the competition.

The fact that the key stakeholders – especially consumers and owners of the banking system – are driven by different, sometimes conflicting motives regarding competitiveness complicates the task even further. One of the most obvious

example is the conflict of interest in pricing: while borrowers seek loans with the lowest possible margin and interest rate, the banking system and its owners strive to achieve the highest possible margins and hence, to maximise their profitability and capital accumulation capacity. Similarly, consumers demand easy access to services but an excessively large branch network may deteriorate the banking system's efficiency through high maintenance costs. It should also be considered that investors may often prefer higher returns to optimal allocation. Finally, while consumers benefit from a more mature, deeper and more competitive banking market, it may be less attractive to investors in view of the limited growth potential it offers.

The static contradiction between consumer side and investor side competitiveness, however, shifts over time and in the long run the factors above may mutually reinforce each other. If a given country's ability to attract capital is limited and thus it cannot develop an adequate banking infrastructure, willingness to participate in the financial system will be scant and the efficiency of financial intermediation, in turn, will be lower. More expensive and lower quality service and diminishing access deteriorate the efficiency of operations, which in turn reduces the return on equity and undermines the ability to attract capital even further. Breaking out of this vicious circle is only possible through somewhat higher prices until the cost of capital associated with the developing infrastructure is recovered. In the long run, however, both perspectives (consumer and investor) must be satisfied in order to ensure that the banking system functions sustainably and supports growth in an efficient manner. With that in mind, the results of the two indices should also be considered in conjunction with one another in order to identify the countries that were most successful in reconciling these two, often conflicting perspectives in the operation of the banking system.

While competitiveness is essentially based on structural factors and is interpreted over the long term (*Porter 1998*), cyclical indicators may also have high information content (*Nafzinger 2006*). The pro-cyclicality observed in the operation of the banking system is reflected in the lending activity and in risk-based competition and may contribute significantly to the fluctuations of economic growth (*Claessens 2009*). This may damage the economy by accelerating the booming of bubbles before crises; thereby, deepening and even protracting the subsequent recession. More severe crises and protracted recovery can also affect the long-term average of economic growth; therefore, it also affects competitiveness in its sense as a long-term potential for development (*Hatzichronoglou 1996*). Since banking system competitiveness means, according to our definition, efficient financial allocation, it cannot characterise a pro-cyclical banking system – an evaluation across financial cycles would pinpoint the growth sacrifices associated with the subdued risk appetite stemming from overheated lending and ballooning risk costs.

Consequently, if a banking system proves to be competitive with respect to the two aspects mentioned above, this would also imply a reduced probability of pro-cyclical operation; in other words, the banking system would carry out the allocation of resources in a stable and prudent manner – i.e. efficiently in a broad sense – even in the long run.

In the following section we discuss the methodological issues that arose as we were constructing the indicator system for the measuring of banking system competitiveness. Next we present the indicators used for surveying the two different sides, explain the reasons for their selection and present the results received. Section five describes the combined result of the two approaches and finally, we summarise the results and identify a number of potential directions for further research.

2. Methodology

Geographically, the subject matter – setting up a banking system competitiveness ranking – covers the Member States of the European Union as the consistency and comparability of the data available are limited to EU Member States. We strived to ensure that the comparison of the areas to be covered was based on, as far as possible, objective data. Most indicators of our data sources derive from the World Bank's Global Findex Database and from the European Central Bank's Survey on the Access to Finance of Enterprises (SAFE). In addition, our sources include OECD, Eurostat, Standard & Poor's and all major general competitiveness rankings (World Economic Forum Global Competitiveness Report, World Competitiveness Yearbook, Doing Business).

For the aggregation of the data measuring banking system competitiveness and for the construction of the indicators we defined, in line with the international practice, a multi-level hierarchy:

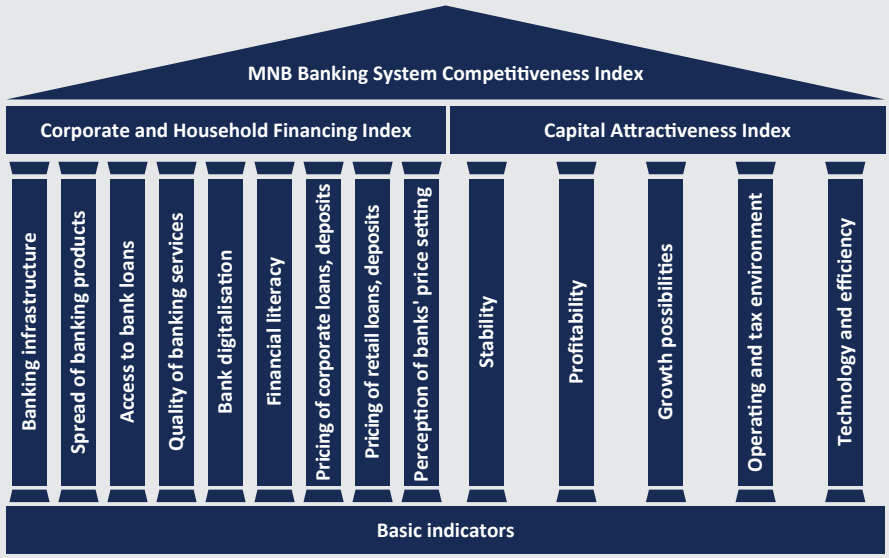
I. Basic indicator: a quantitative value describing a specific feature of the banking operation or environment, which in and of itself can consider multiple factors (e.g. I.A.1. Bank branches per 100 thousand adults).

II. Sub-pillar: a group of basic indicators clustered around the same theme, covering a well-defined area of the banking operation or environment (e.g. I.A. Banking infrastructure).

III. Main pillar: a group of sub-pillars clustered around the same theme, covering a comprehensive area of banking operation. It is used only in the area of household and corporate finance (e.g. I. Access).

IV. Index: an indicator that condenses into a single value the level of banking system competitiveness from a given aspect (e.g. Corporate and Household Finance Index).

Figure 1
Structure of the MNB Banking System Competitiveness Index



Source: MNB.

Before constructing the indices capturing the competitiveness of the banking system, three key questions need to be clarified:

1) What are the optimal values of the basic indicators?

2) How are the scores calculated for the basic indicators?

3) What weighting is used to construct an index from the basic indicators?

For building the indices we need to define which part of the scale should be considered optimal (maximum, minimum or average value) in the case of each basic indicator. Although in most cases the optimal value is obvious, other times the answer is less straightforward, either because it cannot be decided whether the higher or the lower level is the more favourable, or a value other than the two extreme values appears to be more optimal (non-linear scale). The former dilemma may arise in relation to price setting and infrastructure. However, we resolved these problems by examining two separate indices from the consumer side and from the investor side of the banking system and we could clearly determine which value was more favourable from the two different perspectives. The second dilemma involved certain indicators calculated by us where the linear nature of the scale was questionable. Since due to the lack of a target value it was not objectively feasible to define optimal ranges, in such cases we used the sample mean to define the optimum and the countries were scored based on their deviation from the mean.

To ensure the transparency of the evaluation, our goal was to score the results on a scale of 0–100 for each basic indicator, factoring in – besides the relative values – the deviation of the sample as well. For standardising the rough values of the basic indicators and for performing the subsequent scoring, we reviewed the methodologies used by the most major international competitiveness indices:

a) World Bank (WB) – Doing Business (DB): this ranking applies the distance to frontier methodology, where 0 represents the worst performer and 100 the best performer, while countries in between are ranked by using the following formula (*World Bank 2017*):

*([worst score] – [country score]) / ([worst score] – [best score]) *100*

b) World Economic Forum (WEF) – Global Competitiveness Report (GCR): similar to the Doing Business ranking, its methodology is based on the distance to frontier principle, but the score is indicated on a scale from 1 to 7 (*Schwab 2017*):

*6 * (([country score] – [sample minimum]) / ([sample maximum] – [sample minimum])) + 1*

c) IMD – World Competitiveness Yearbook (WCY): its main focus is on the ranking and although it standardises basic indicators, it does not generate scores from them (*IMD 2017*).

Neither of the formulas shown above could fully meet our prior expectations, primarily because, in our opinion, they failed to adequately reflect the dispersion of data. The methodology based on the distance to frontier principle (WB, WEF) exaggerates the differences in rough data by projecting the results onto the full scale (0–100) in all cases irrespective of the dispersion of the given sample. The methodology applied by the IMD, in turn, is primarily suitable for ranking without relying on comparable scores such as those we envisaged.

In order to factor in the deviation of data, we introduced the following formula for converting the basic indicators into scores:

*MAX (0; 100 – {([best score] – [country score]) / [deviation]} * [P]),*

where the value of the [P] parameter indicates the weight of "punishment" for the deviation from the best score.

Accordingly, our methodology factors in the deviation of the given sample in such a way that it deducts points in proportion to the distance from the highest score. Scores are indicated on a scale from 0 to 100, where the country with the best performance always receives the maximum 100 points; however, 0 does not emerge in the case of all indicators, a 0 score is given only when the distance from the

best score amounts to more than one standard deviations. Another advantage of this methodology is the fact that, in function of the deviation, the value of the "penalty" can be parameterised. In our calculations, we counted with a value of [P] = 25, which means that the results lying at 4 (or more) standard deviations from the best value will receive a score of 0. As mentioned before, in the case of some indicators it was not possible to define a linear scale. In such cases, distance from the mean (as optimum) equalled 1 standard deviation, with [P] = 12.5. With this approach we successfully normalised most countries evenly on a scale of 0–100.

With respect to the weighting of the basic indicators and the pillars, the international methodologies are consistent and acceptable to us (*World Bank 2017*; *Schwab 2017*; *IMD 2017*). Each ranking under review generates its final index with the application of the arithmetic mean, for the purposes of which basic indicators and pillars are assigned the same weight. The advantage of this methodology is that it is transparent and reproducible and that it adequately addresses the problems arising from potential data shortages. The final weighting of the index can be performed with various methods depending on what is considered to be the basis of the calculation (basic indicators, sub-pillars or main pillars). In our calculations, we assigned the same weights to sub-pillars, because they consist of thematically arranged basic indicators, address the problems arising from data shortages and at the same time, they are more numerous than main pillars, the analysis of which is hindered by the broadness of the areas covered by them. We also tested for robustness weighting methodologies that are based on the basic indicators and the main pillars; however, the results thus received did not differ significantly from those yielded by our selected methodology.

3. Corporate and Household Financing Index (CHFI)

We started out from the fact that, from the perspective of consumers, a banking system can be considered competitive if it offers high quality, broadly available services at an adequate and manageable price to retail and corporate customers alike; in other words, the cost of finances does not render investment projects impossible. Accordingly, in measuring the consumer side we identified three different dimensions (access, quality, pricing) with each dimension forming a main pillar. Each main pillar was broken down further to three sub-pillars, also taking into account corporate and retail oriented indicators (*Table 1*). The pricing sub-pillar includes numerous indicators whose value is not solely determined by demand side factors, but emerges from an equilibrium state between demand and supply. Notwithstanding the foregoing, the demand side receives priority in the corporate and household finance index and accordingly, in analysing the pricing of banking products the focus is on consumers' perception.

Table 1
Structure of the MNB Corporate and Household Financing Index

	Main pillars					
	I.	Access	II.	Quality	III.	Pricing
Sub-pillars	I.A	Banking infrastructure	II.A	Quality of banking services	III.A	Pricing of corporate loans and deposits
	I.B	Prevalence of banking products	II.B	Bank digitalisation	III.B	Pricing of retail loans and deposits
	I.C	Access to bank loans	II.C	Financial literacy	III.C	Perception of banks' price setting

The *access* main pillar is intended to represent access to banking services and it also involves infrastructure, the prevalence of banking products and lending activity. *Banking infrastructure* characterises the physical and digital availability and coverage of the financial system and it is measured by the branch and ATM coverage and by the scope of the credit information system. The latter provides valuable assistance to banks in that it largely determines the actual access to finance on the customer side. While these items increase banks' costs significantly, they remain principal factors in consumers' recourse to banking services. That notwithstanding, as the significance of the physical infrastructure decreases in line with the gaining ground of digitalisation, its prevalence may not be a truly reliable measure of competitiveness. Identifying the optimal level of the branch network is beyond the scope of our analysis; therefore, for the sake of simplicity we assumed that a larger branch network tends to be an advantage on the consumer side. In selecting our basic indicators, we discarded the number of commercial banks because we were unable to determine clearly the optimal number of banks.

The *prevalence of banking products* obviously plays a role in the competitiveness of the banking system as it shows what portion of potential consumers has become customers; i.e. it is a yardstick for measuring the success of financial inclusion. While the demand factor is particularly dominant in this pillar, availability also has a relevance. We quantified this based on the prevalence of bank accounts and debit cards and the features of their use (frequency of card payments, income transferred to bank account), strictly in relation to the retail segment. The number of these indicators can be increased; however, we found that the inclusion of more variables is redundant as they show a significantly positive covariance. We also considered to include the number of deposit accounts and the proportion of indebted household indicators but in their case, we did not have data available for a sufficient number of countries.

Access to bank loans, in essence, is also a measure of the prevalence of banking services, but due to its significance we included it in a separate sub-pillar that encompassed both the corporate and the retail sectors. In addition to the pricing

of loans, this sub-pillar also measures the percentage of companies who took out a new or renewed an old bank loan, the ease of access to loans and the proportion of completely approved applications. The percentage of companies who took out a new or renewed an old bank loan simply indicates financial depth and it is well complemented by the rest of the indicators which, to a certain degree, points to a harmony between banks and the private sector. A greater percentage of completely approved loan applications suggests, on the one hand, the applicants' increased financial awareness and on the other hand, the cyclical harmony between demand and supply. The ease of access to loans is a subjective indicator, but we found it appropriate regardless, as in this case it is the customer's individual perception that matters, which may vary across countries and in function of financial literacy. Moreover, the proportion of companies feels that the availability of bank loans improved. Due to inadequate geographical coverage, upon selecting the basic indicators we discarded the ECB's indicator that shows the proportion of indebted households.

The main pillar of *quality* sums up the service quality of the banking system, the degree of banking digitalisation and the financial literacy of households and market participants. Owing to the topics covered, this area is more difficult to quantify. The *quality of banking services* sub-pillar is the most difficult to measure objectively; with 3 indicators, it is designed to measure the corporate sector's satisfaction with banking services and the legal options of consumer protection. Adopted from the WEF database, the financial services meeting business needs indicator captures company managers' general perception about the extent to which financial services meet individual business needs and as such, it points to an equilibrium between demand and supply. The source of the percentage of companies who feel confident talking about financing with banks indicator is the ECB's corporate survey and it captures company managers' general confidence level towards the financial sector. Both indicators measure consumer satisfaction in all EU Member States based on customers' subjective assessment of the quality of banking services. This is complemented by the same sub-pillar's strength of legal rights index indicator (adopted from the World Bank's Doing Business Survey), which is an objective basic indicator that, based on 12 yes/no questions, factually describes the tools of available legal protection in the countries under review. Legal protection, in this case, largely signifies companies' protection against the financial sector (e.g. the existence of a financial legal framework or the enforceability of contracts at legal forums). In simplified terms, it measures companies' exposure to banks. In theory, a systematic, standardised international comparison of the quality of banking services would be conceivable; however, despite its subjective nature, the survey was deemed to fit the purpose. Although differences across the countries with respect to their expectations of the banking system may distort the international comparison, the fact that consumers were polled directly in this regard is completely consistent with our position.

In examining *bank digitalisation,* we wished to identify the percentage of individuals using the internet for internet banking, the percentage of age 15+ made or received digital payments, made payment using mobile phone and made payment using the internet. The topic of digitalisation was included in the main pillar of quality for two reasons: firstly, since we believe that digital products are largely available in the European Union, the number of actual consumers reflects rather the quality of the services rendered and banks' openness than the option of accessing such services. Secondly, although we interpreted banking digitalisation as a supplement to physical infrastructure at this time, the former may increasingly replace the latter in future in line with the growing demand. If it indeed replaces the traditional banking infrastructure in the future, its reclassification into the "access" pillar will be justified.

The *financial literacy* part is intended to gauge consumers' financial knowledge because, in our opinion, customers' level of understanding regarding their finances has an impact on banking system competitiveness. However, the two other indicators of the sub-pillar, measures the quality of higher education in economics, as it is intended to cover the skills of not only customers, but also the banking sector's human resources. Financial literacy – a sub-pillar that is linked to all factors under review – was classified into the main pillar of quality because in our opinion, this factor of the external environment plays an important role in the way in which the demand side reacts to the innovations reflected in financial products. In addition, banks – as the financial institutions nurturing the closest contact with households – have a vested interest in expanding customers' financial awareness, as indeed, they can sell more complex and potentially more profitable products to customers who are financially literate and more confident in their own financial skills. Banks' failure to contribute to improving their customers' financial awareness – mainly through the transparency of the products offered and through their staff's easy-to-understand but considerable expertise – may reduce the disbursement of high-return financial assets on the one hand and undermine market competition in the sector on the other hand. Banks' prudent and customer-friendly behaviour plays a critical role in any country where the financial literacy level is low, along with the regulations prescribing and the consumer protection measures enforcing such conduct. For this reason, the examination and continuous monitoring of this area is one of the MNB's key priorities. The quality of economics training in individual countries was captured by the quality of management schools and by the percentage of students enrolled in the field of business and administration in tertiary education. The latter is a basic indicator that also shows the extent to which economics is deemed to be an attractive field by the youth of the given country in general. In measuring the quality of the financial educational system, we contemplated the use of the number of institutions listed in institutional rankings (such as the Financial Times European Business School Ranking, *Financial Times 2017*) but eventually we dismissed it because we believe that a highly prestigious

institution itself may not necessarily capture the quality of the entire higher education sector adequately. In our comparison, it is perhaps the human side of the banking sector that received a smaller weight than it should have; its measurement therefore leaves ample room for improvement.

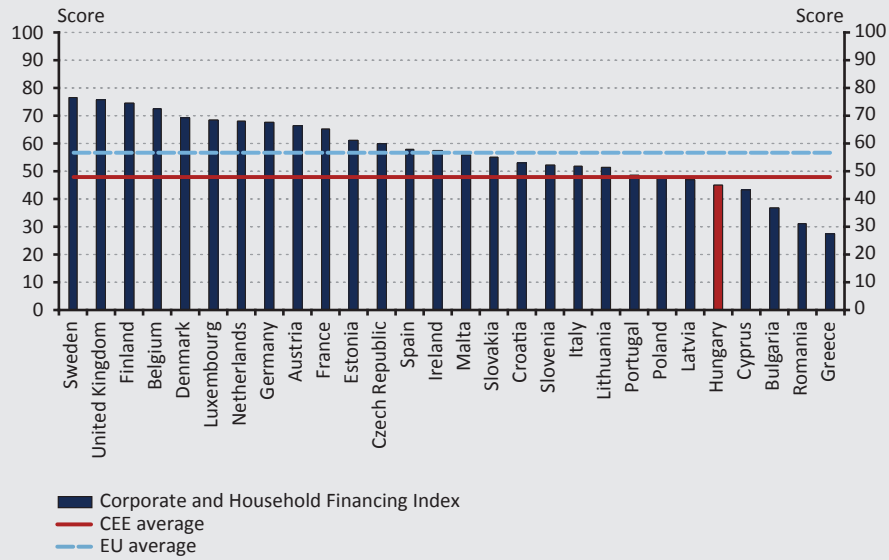
Price setting seemingly encompasses easy-to-quantify indicators; however, in practice it causes difficulties that, for the sake of international comparability, we need to eliminate the differences between the risk spreads of individual countries (which are independent of the banking system) and the different monetary policy features, which may both pass through to interest rates. In order to resolve this dilemma, instead of level-based indicators, we compared the countries' credit spreads and lending and deposit margins. Instead of the absolute level of interest rates, in our analysis we applied the 3-month average of the interest rate spreads both for the retail and corporate segments and as a result, the general risk of lending (including the sovereign CDS spreads of the individual national economies) were also reflected in the model. In addition, the *pricing of corporate loans and deposits* covers the difference between the spreads on SME's and large enterprises as we deemed lending to the SME sector – a token of inclusive and sustainable growth – equally important as lending to the large enterprise segment. The difference in price setting within the two sectors is displayed in the "interest rate spreads on loans to SMEs and to large enterprises" indicator, which reflects the different risk assessment of the two segments from the creditors' aspect. Although the interest expected of SMEs – as justified by the higher risk – should be somewhat higher, an excessive difference crowds out SMEs from the credit market, undermining their growth. There are few projects where excessively high cost of capital yields a positive net present value. If an SME still decides to go ahead, its ability to make payments will be questionable. Accordingly, lending above a certain interest rate threshold is counterproductive both in terms of banks' risk costs and for the national economy as a whole.

We measured the *pricing of retail loans and deposits* based on our own calculations and on the ECB's database. As a basic indicator, we incorporated the retail lending and deposit margin into the sub-pillar, and also examined the interest rate spread on the loans, as well as the difference between the APRC and the lending rate. Similar to the corporate margin indicator, the former's content is twofold: the interest rate spread shows the difference between the reference rate and the lending rate, whereas the difference between the APRC and the lending rate arises from a number of ad hoc cost factors. Households' debt service is proportionate to loan pricing. When this pricing is excessive, debt service will be stretched out at the outset, potentially giving rise to severe social damages and a confidence crisis in case of a stress induced by an exogenous shock. In the long run, institutional confidence can only be achieved amid the moderate prices imposed by market competition.

The *perception of banks' price setting* was included in a sub-pillar separate from the pricing of loans and deposits, because the former pillar is based on hard-to-measure and less comparable indicators, whereas the latter characterises exact interest rate and cost levels. Modelling the perception of the corporate sector, the perception of banks' price setting indicator measures the price level of service fees among the consumers. In setting up the structure of the sub-pillar, our goal was to map the relationship between the corporate sector and the banking system, which in this case indicates corporations' attitudes to banking services. The applied survey-based indicators reflect the opinion of company managers. Two of the three basic indicators applied are based on subjective and one on objective assessment. In the subjective dimension we attempt to gauge the affordability of financial services and the manageability of interest rates. Adopted from the WEF Survey, the affordability of financial services indicator shows company managers' subjective assessment of the pricing of banking services. In the indicator showing the percentage of companies for whom bank loans are not relevant because interest rates or prices are too high, company managers compare the costs of finance to their own rates of return; thereby, providing an opinion on the manageability of lending rates. The percentage of companies who feel that the cost of financing other than interest rates increased indicator, in turn, tries to be a more impartial measure of whether company managers perceive changes in price levels in the market of banking products compared to the previous year. However, this question causes a certain degree of bias as respondents can only offer an opinion on the banks and on the products with which they are connected; therefore, a general change in the price level could only be measured through proper aggregation. It is unfortunate that the data used in this sub-pillar are based, without exception, on surveys. This might be because measuring the costs – which are not standardised and are even concealed in many cases – is extremely difficult.

On the whole, the *Corporate and Household Financing Index* – which calibrates banking system competitiveness from the demand side – displays intuitive results that correlate positively with the level of development. The best performing countries in our ranking were Sweden, the United Kingdom and Finland, while Bulgaria, Romania and Greece had the least competitive banking systems from the perspective of consumers *(Figure 2).* The first half of the list was composed of Western-European and Scandinavian banking systems; their competitive advantage lay primarily in the development of the banking infrastructure and in the high degree of digitalisation. The competitive disadvantage of the banking systems bringing up the rear was apparent in all three topics; namely, lower quality services provided with limited access were combined, in their case, with a relatively high cost level. The banking systems of the stragglers typically demonstrated a low level of digitalisation; the scope of their services was less known and less utilised by their customers and their lending rates – partly because of the countries' higher sovereign risk premiums – were relatively high. The median of CCE countries surpassed the EU median in the case of two sub-pillars (banking infrastructure and service quality).

Figure 2
Results of the Corporate and Household Financing Index



Note: CEE means the average of Bulgaria, the Czech Republic, Croatia, Poland, Romania, Slovakia and Slovenia.

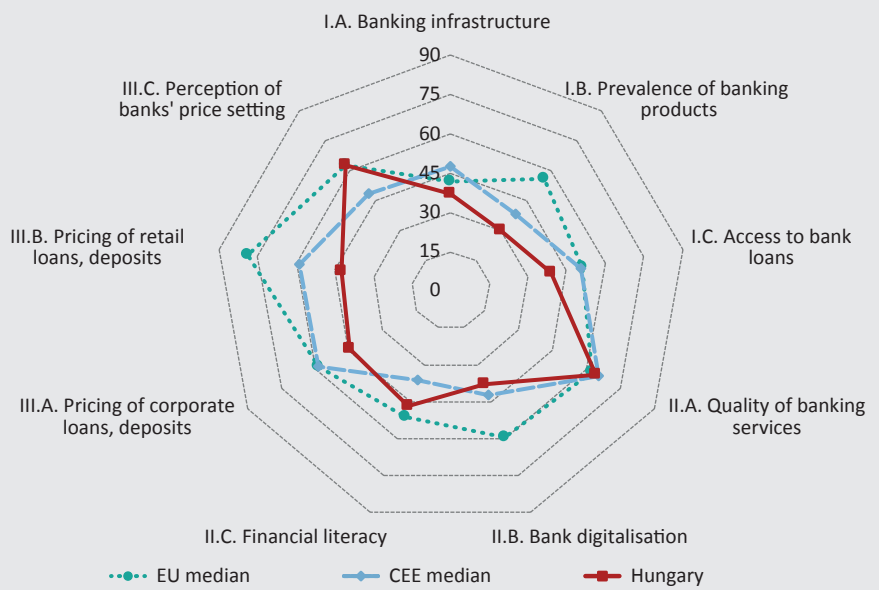
Source: Computation based on international datasets (see the Annex).

With a score of 45.0, Hungary finished 24th among the European Union Member States. Hungary's result fell behind that of the EU Member States (56.7) and CEE countries[2] (47.9) by 11.7 and 2.9 points, respectively. The primary source of Hungary's competitive disadvantage can be best identified in the high pricing of household loans, the lag in digitalisation and the low prevalence of banking products, while in terms of the quality of banking services, the perception of banks' price setting and financial literacy, the competitive position of Hungary can be considered adequate (*Figure 3*). The lag in digitalisation can be attributed to reasons associated with demand and supply alike; indeed, online banking has not gained ground in Hungary so far (even though the possibility is ensured), although the required IT developments may have been delayed by banks' significant losses during the crisis. The inadequate prevalence of banking products may be explained by the precarious balance between demand and supply and by the high demand for cash (despite the gaining ground of card payments), which could be offset by enhancing the infrastructure and by improving financial literacy.

[2] *CEE region means the average of Bulgaria, the Czech Republic, Croatia, Poland, Romania, Slovakia and Slovenia.*

For a variety of reasons, certain sub-pillars of the financing index Hungary performed extremely well and the results received can be considered consistent overall. In the banking services sub-pillar the Hungarian result, the CEE median and the EU median are located extremely close to one another, which can be attributed to the low deviation of the applied indicators. Apart from a few outliers, the deviation of the national economies under review was relatively low in the calculation of the sub-pillar, and the Hungarian value was around the medians shown. In practice, this means that the quality of banking services in the area of the EU represents a relatively consistent (medium high) level; the difference in competitiveness can be mainly captured in the quantity (e.g. pricing) dimension. As regards the sub-pillar of banks' price setting, exceeding the CEE median, Hungary's value is close to the EU median. This relatively good result reflects the fact that company managers have experienced a positive trend in banks' price setting behaviour in recent years; consequently, Hungary achieved an impressive ranking in the indicator that captures dynamics. With respect to the perception of pricing, we may conclude, overall, that the Hungarian company managers responding to the survey perceive a decline in the interest rates – owing to the growth stimulating central bank policy since 2013, Hungary's continuously improving risk perception and the favourable external market environment –, but even this level is deemed to be high and hardly manageable relative to the company's profits.

Figure 3
Hungarian results of the Corporate and Household Financing Index by sub-pillars



Note: The median values are more suitable than the average in pointing out relevant drawbacks in particular dimensions.

Source: Computation based on international datasets (see the Annex).

4. Capital Attractiveness Index (CAI)

Another important aspect of banking system competitiveness is the perception of the sector on the investor side, which we attempted to measure by way of the Capital Attractiveness Index. Whatever the sector, a potential project will not be implemented unless it offers the expected rate of return to investors. Based on this logic, the banking sector can only develop and contribute meaningfully to economic growth if it is an attractive investment for its owners over the long term. The banking system's stability and sustainable risk assumption is a relevant issue for investors even beyond compliance with macroprudential requirements, as a low capital adequacy level and a substantial non-performing portfolio jeopardises long-term profitable operation. In a conducive and stable environment, we deem profitability to be the main driver of capital attraction. We attempted to assess this factor by weighting together various scaled indicators.

Achieving the expected return on capital may be influenced by numerous other factors; thus, the prevailing structure and the operating and tax environment are fundamental upon expansion or entry into a new market. In addition to easily comparable indicators (e.g. corporate income tax rate), we captured these differences by the (mainly discrete or binary) quantification and summation of several qualitative factors. Since growth prospects define a banking system's expansion potential, they carry important information about the sustainability of the observed income which, to a large degree, is supported by cost-efficient operations. Therefore, we also examined the technological advancement of the services and the efficiency of banks and their employees.

Similar to the composite index of finances, based on their information content, we integrated the indicators involved in capital attractiveness into sub-pillars (which are not necessarily independent of each other, but exhibit low correlation) (*Table 2*). The study of *Čihák et al.* (*2012*) was a large-scale attempt to assess and compare the quality of banking systems and capital markets through the introduction of a new database. The authors defined four main, distinct aspects: size (depth) of the financial system; access to financial services; the efficiency of the financial system and its stability. We were also inspired by their approach in many regards; their classification provided a basis for our own. Since access to financing is adequately covered by the Corporate and Household Financing Index, retaining the depth, efficiency and stability aspects and adding profitability and selected aspects of the operating environment; thus, allowed us to capture the ability to attract capital via mutually independent dimensions. As opposed to Čihák et al., our approach clearly separates the competitiveness lags associated with the demand side from problems arising on the supply side, as the banking system – including the regulator – has various options to modify the latter.

Table 2
Structure of the Capital Attractiveness Index

	Main indicators
1) Stability	Texas-ratio (ratio of net non-performing loans to regulatory capital)
2) Profitability	Return on equity, cost-to-income ratio, fee and interest income per total assets adjusted for impairment
3) Operating and tax environment	Concentration, environment indicator (strength of legal rights, adoption of bank levy and duty), corporate income tax
4) Growth possibilities	Long-term trend of private loans as a percentage of GDP, domestic credit to private sector to GDP, households' indebtedness, ratio of bank loans in corporate finances
5) Technology and efficiency	Online banking, ratio of fee and interest income to the number of employees, operating expenses per total assets

Our analysis of capital attraction ability was driven by theoretical and practical principles alike. With regard to stability, we selected a dense indicator that condenses solvency and country-specific efficient resource allocation decisions; that is, access to funding is truly limited to customers that are able and willing to repay their debt and if not, the banking system allocates prudent reserves to cover the losses. The Texas ratio serves this purpose. Similarly, we strived to provide a broad interpretation of profitability: we considered not only the existence of profitability, but also its cost implications both on the operating side and on the risk side. As regards the operating environment, our index is open to additional indicators both in relation to the independence and efficiency of the supervisory authority and to the simplicity of data supplies and regulatory compliance – EU countries exhibit a significant cross-country variability in this respect. A partial solution is provided, for example, by the corporate income tax rate, which not only reduces banks' profitability directly but, due to easy comparability, it also captures the diversity in the degree of government redistribution. We also tried to capture the concentration of market power in the operating environment; however, the direction of the effect, in the case of this indicator, is far from being straightforward. Greater concentration can be linked to an oligopolistic market (SCP paradigm and the "quiet life" hypothesis, see *Hicks 1935*), which may put participants with a smaller market share at a disadvantage, while lower concentration may ease market entry as the acquisition of smaller institutions requires less capital. The integration of numerous smaller participants into a larger institution may also require substantial expenditures. If the market is controlled by a number of large institutions, relatively less capital will suffice for the entry without the need for further integration. At the same time, the seemingly clear negative correlation between concentration and the intensity of competition is not necessarily inevitable even according to the literature, see, for example, the results of *Berger* (*1995*), *Claessens – Laeven* (*2004*) and *van Leuvensteijn et al.* (*2013*). As determining optimal concentration on this

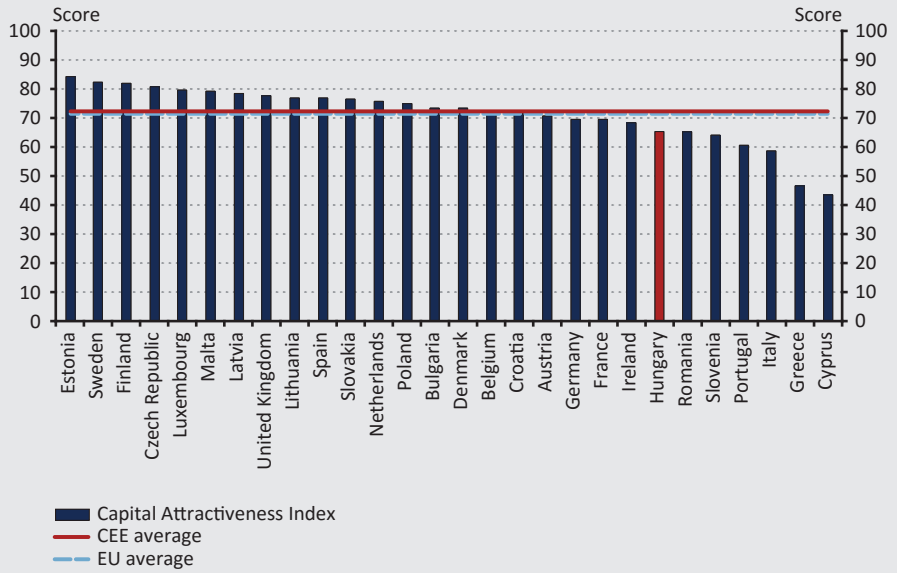
basis is not necessarily possible, we defined the average concentration observed in the banking systems as the ideal level, and the scores of individual countries were calculated based on their distance from the average. We selected the Herfindahl–Hirschman Index (HHI) from the indicators applied in the literature, because, unlike the CR3 and CR5 indicators (market share of the largest banks), it carries information about smaller participants as well. We deemed it more important to capture growth prospects than financial depth, because the latter, in our view, is even more driven by demand. Besides overheated, investors may also be easily deterred by the lack of activity, especially when the subdued demand for credit sets back lending and undermines the profitable operation of the institution. In defining the optimal value of each indicator (minimum or average), we strived to ensure that both effects take hold sufficiently. Although demand is an influential factor in technology as well, in this case the banking system has more room for orientation. Since we identified this facet of competitiveness with the capital attraction ability of already existing banks, efficiency was clearly interpreted as a positive factor; indeed, the acquisition of inefficient institutions – notwithstanding the benefits gained from cost rationalisation – necessitates further investment and organisational realignment.

After carefully deliberating the potential aspects and indicators (see in more detail in *Annex 2*), with the application of 14 basic indicators we defined the five sub-pillars included in the table, which we evaluated on a scale of 0–100. As discussed in the methodology section, the sub-pillars are included with equal weight in the composite index that represents the ability to attract capital. For the sake of comparability, the indicators comprising the sub-pillars were also defined by using a uniform scale. In order to avoid multicollinearity, we applied correlation analysis to dismiss the indicators that carried no additional information, which allowed us to rule out any (even moderate) correlation between the sub-pillars; consequently, they can be considered independent. It should be noted that our analysis does not distinguish between domestic and foreign owned banks in the countries under review, and in this context, we relied on consolidated data throughout the analysis.

Based on the Capital Attractiveness Index (*Figure 4*), we found that the stragglers are made up of countries where stability considerations represent the biggest bottleneck: Greece, Cyprus, Italy and Portugal. The leaders are Baltic and Scandinavian banking systems (all Baltic states were included in the first ten), which can be attributed to their well-balanced, prudent, cost-efficient and sufficiently digitalised operation. These national economies were far less involved in overheated, predatory lending before the crisis; therefore the growth sacrifice they faced during the period of crisis management was less severe. Spain and the United Kingdom were also ranked among the first ten countries with regard to capital attraction ability. Their privileged position can be partly attributed to the prominent, central role they played in the banking of Latin America and Europe (cross-border financing) before the crisis. All of these countries had taken considerable efforts to

rejuvenate their less efficiently working banks through digital innovation and the positive effects of this changeover have become tangible by now.

Figure 4
MNB Capital Attractiveness Index

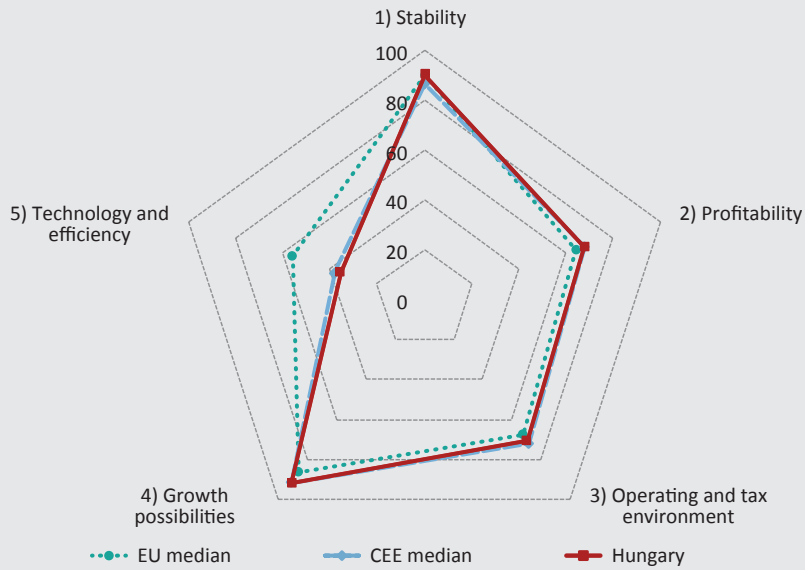


Note: CEE means the average of Bulgaria, the Czech Republic, Croatia, Poland, Romania, Slovakia and Slovenia.

Source: Computation based on international datasets (see the Annex).

Similar to the Corporate and Household Financing Index, in the ranking of the Capital Attractiveness Index Hungary can be found in the last third of the sample and scored below the CEE average, preceding only Romania and Slovenia. An analysis of the five sub-pillars of capital attractiveness (*Figure 5*) reveals that Hungary actually exceeds the CEE average in respect of stability. This can be mainly attributed to post-crisis parent bank capital injections, recent central bank stabilisation measures and the profitable operation of a few larger participants. As regards the profitability pillar, Hungary brings up the rear: while it ranked first in net fee and interest income per total assets, its final score was strongly deteriorated by its high risk cost and cost-to-income ratio. Looking at the operating and tax environment, Hungary is in the first half thanks to its corporate income tax rate and market concentration, but the environment index pushes the score of the Hungarian banking system towards the middle of the ranking. Owing to the subdued trend in lending and the opportunities presented in household lending, the growth dimension shows a positive potential for Hungary. Finally, only Romania and Bulgaria scored worse than Hungary in technology and efficiency, with the negative contribution of all indicators considered. This is the area where Hungary exhibited the most pronounced lag.

Figure 5
Hungarian results of MNB Capital Attractiveness Index by sub-pillars



Note: The median values are more suitable than the average in pointing out relevant drawbacks in particular dimensions.

Source: Computation based on international datasets (see the Annex).

5. MNB Banking System Competitiveness Index (BSCI)

The static contradiction between the consumer and the investor side competitiveness shifts over time, and in the long run they may become mutually reinforcing factors. In our opinion, a competitive banking system provides broadly available, high quality services at prices that adapt to investors' return expectations while also being affordable for the consumer side. By contrast, if a given country's ability to attract capital is limited and thus it cannot develop an adequate banking infrastructure, financial deepening will falter and in the absence of economies of scale, the efficiency of financial intermediation will decline. More expensive and lower quality service and diminishing access deteriorate the efficiency of operations, which in turn reduces the return on equity and undermines the ability to attract capital even further. Therefore, in the long run bank supply should adapt to the aspects of demand not only in view of the lessons of the past but also recognising the accelerating technological changes of the future, which will slowly reach the financial intermediary system as well.

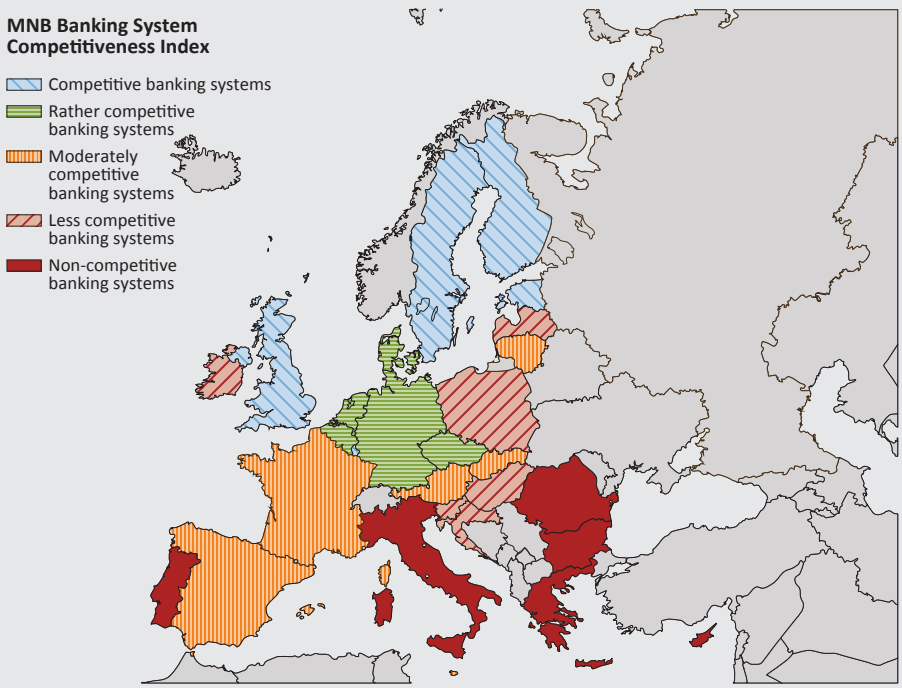
In the previous sections we attempted to assess the competitiveness of the banking system from the perspective of clients on one side and bank capital on the other. However, each approach is insufficient and lopsided in and of itself: a truly competitive banking system satisfies both, resolving the contradictions between the two sides as much as possible. In the MNB's final Banking System Competitiveness Index both sub-indices were considered in order to measure which countries are most successful in reconciling consumer and investor interests in the operation of the banking system.[3]

According to our survey and in consideration of both sides under review, Northern countries and some of the core EU Member States exhibited the strongest banking system competitiveness. Despite the struggling big banks of Germany's Deutsche Bank and Commerzbank, Germany's banking system is rather competitive, probably due to the less procyclical Savings Banks. The score of most Central and Eastern European Member States – including Hungary – was below average overall. The banking systems of South-East European and Mediterranean countries – Portugal, Italy and Greece – proved to be the weakest in terms of competitiveness.

Hungary is in the league of Latvia, Ireland and Poland as well as two North-Western Balkan states (Slovenia and Croatia). Hungary has room for improvement both on the demand and the supply side, but the two aspects coincide especially in the need for improvement in digitalisation and operational efficiency. Moreover, an opportunity to progress presents itself in the efficiency improvements that can be achieved by a more competitive banking system through the reduction of credit spreads and lending costs, which may ensure the Hungarian banking system's contribution to economic growth and its socially accepted role in the allocation of resources over the long run.

[3] The two sub-indices were weighted together in various ways, but the results proved to be robust. Below we present the result received from the arithmetic mean.

Figure 6
The 28 countries of the EU based on the MNB Banking System Competitiveness Index



Note: Based on the ranking calculated by averaging the MNB Corporate and Household Financing and the MNB Capital Attractiveness indices.

Source: MNB.

It is worth cross-checking our results against those found by other international surveys available in this subject. As we indicated in the introduction, such a comprehensive comparison is not available in the area of the banking system, but the competitiveness rankings partially include an analysis of some aspects of financial intermediation. For the purposes of the comparison, we relied on the "Doing Business" (*World Bank 2017*), "Global Competitiveness Report" (*Schwab 2017*) and the "World Competitiveness Yearbook" (*IMD 2017*) surveys, with each survey containing 4–9 indicators of the banking system. Correlations between the average scores and rankings received with regard to the questions dedicated to financial intermediation exhibited a fairly similar pattern in the surveys (*Table 3*). The results of the WEF and IMD rankings strongly correlated with ours ($r > 0.79$ in each case), while the correlation with the rankings of the Doing Business survey was weaker ($r = 0.48$ for the scores and $r = 0.51$ for the rankings). However, it is important to note that the Doing Business survey does not correlate more positively with the other two competitiveness rankings either, because it explicitly focuses on the business environment of SMEs, while the other rankings examine

the operation and profitability of the banking system based on a somewhat broader criteria system.

Table 3
Cross-checking of the MNB's Banking System Competitiveness Index

Correlation coefficients	World Bank – Doing Business	World Economic Forum – Global Competitiveness Report	IMD – World Competitiveness Yearbook
MNB BSCI	0.47	0.89	0.86
MNB CHFI	0.47	0.79	0.87
MNB CAI	0.30	0.70	0.48

Source: MNB.

6. Summary

The goal of our analysis was to propose an interpretation of banking system competitiveness and more importantly, to provide a quantifiable international comparison across European Union Member States. Since we were unable to locate any other international survey commensurate with the depth and comprehensiveness of our study, we faced new dilemmas both during the selection and the classification of our indicators. In order to resolve the fundamental conflicts, in our survey we examined the subject from two different perspectives (consumer and investor). Based on this, we constructed a financing index and a capital attractiveness index before combining the two indices into a single composite competitiveness index. Since the most favourable solution in the long run is to satisfy the two systems of preferences simultaneously, the MNB's Banking System Competitiveness Index reflects a combination of these two indices. In order to prevent the comparison from reflecting the cyclical position of the economy, we focused primarily on structural indicators; therefore, the analysis should be updated at two-year intervals.

We hope that our findings can be used for purposes other than ranking, perhaps providing a basis for the identification of neuralgic points and areas for future improvement. Our research may be carried forward in two dimensions: firstly, by enhancing the index and by expanding – and regularly updating – the indicator system. In this context, in the dimensions of the sub-pillars presented in our study a broad-based and consolidated data collection system and the introduction of comprehensive international polls may prove to be useful. Secondly, the link between the banking system and the competitiveness of the national economy merits a more thorough analysis; in particular, the channels through which the banking system may contribute to the competitiveness of a given country. The latter research, we hope, may draw from the initial results presented in this study.

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Annex

Annex 1: Basic indicators of the Corporate and Household Finances Index

Main pillar	Sub-pillar	ID	Description of basic indicator	Source	Type	Year	Coverage	Optimum
I. Access	A. Banking infrastructure	I.A.1	Branches per 100 thousand adults	IMF – Financial Access Survey	objective	2014	mixed	max
		I.A.2	ATMs per 100 thousand adults	IMF – Financial Access Survey	objective	2014	mixed	max
		I.A.3	Credit bureau coverage	WB – Doing Business	objective	2016	mixed	max
	B. Prevalence of banking products	I.B.1	Financial cards in circulation (Number of cards per capita)	IMD – WCR	objective	2015	retail	max
		I.B.2	Financial card transactions in proportion to consumption per capita	IMD – WCR + Eurostat	objective	2015	retail	max
		I.B.3	Percentage of age 15+ made payment using a debit card	WB – Global Findex Database	objective	2014	retail	max
		I.B.4	Percentage of age 15+ have account	WB – Global Findex Database	objective	2014	retail	max
		I.B.5	Percentage of age 15+ received wages or government transfers into an account	WB – Global Findex Database	objective	2014	retail	max
	C. Access to bank loans	I.C.1	Percentage of age 15+ borrowed from a financial institution in the past year	WB – Global Findex Database	objective	2014	retail	max
		I.C.2	Ease of access to loans	WEF – GCI	subjective	2016	corporate	max
		I.C.3	Percentage of companies who took out a new or renewed an old bank loan	ECB – SAFE	objective	2016	corporate	max
		I.C.4	Percentage of companies who applied for bank loan and received everything	ECB – SAFE	objective	2016	corporate	max
		I.C.5	Percentage of companies who say that the availability of bank loans improved	ECB – SAFE	subjective	2016	corporate	min
II. Quality	A. Quality of banking services	II.A.1	Financial services meeting business needs	WEF – GCI	subjective	2016	corporate	max
		II.A.2	Strength of legal rights index	WB – Doing Business	objective	2016	corporate	max
		II.A.3	Percentage of companies who feel confident talking about financing with banks	ECB – SAFE	subjective	2016	corporate	max
	B. Banking digitalisation	II.B.1	Individuals using the internet for internet banking	Eurostat	objective	2016	retail	max
		II.B.2	Percentage of age 15+ made or received digital payments	WB – Global Findex Database	objective	2014	retail	max
		II.B.3	Percentage of age 15+ made payment using a mobile phone	WB – Global Findex Database	objective	2014	retail	max
		II.B.4	Percentage of age 15+ made payment using the internet	WB – Global Findex Database	objective	2014	retail	max
	C. Financial literacy	II.C.1	Percentage of adults who are financially competent	S&P Global Financial Literacy Survey	objective	2014	mixed	max
		II.C.2	Adult Financial Literacy	OECD – Adult Financial Literacy	subjective	2016	mixed	max
		II.C.3	Quality of management schools	WEF – GCI	subjective	2016	mixed	max
		II.C.4	Percentage of students enrolled in the field of business and administration in tertiary education	Eurostat	objective	2015	mixed	max
III. Pricing	A. Pricing of corporate loans and deposits	III.A.1	Average interest rate spread on loans to enterprises	MNB	objective	2016	corporate	min
		III.A.2	Interest rate spreads between loans to SMEs and to large enterprises	OECD	objective	2014	corporate	min
		III.A.3	Bank lending and deposit margin – Enterprise	ECB – SDW	objective	2016	corporate	min
	B. Pricing of retail loans and deposits	III.B.1	Average interest rate spread on retail loans	ECB – SDW	objective	2016	retail	min
		III.B.2	Difference between the APRC and the lending rate – Retail	ECB – SDW	objective	2016	retail	min
		III.B.3	Bank lending and deposit margin – Retail	ECB – SDW	objective	2016	retail	min
	C. Perception of banks' price setting	III.C.1	Affordability of financial services	WEF – GCI	subjective	2016	corporate	max
		III.C.2	Percentage of companies for whom bank loans are not relevant because interest rates or price too high	ECB – SAFE	subjective	2016	corporate	min
		III.C.3	Percentage of companies who feel that the cost of financing other than interest rates increased	ECB – SAFE	subjective	2016	corporate	min

Annex 2: Basic indicators of capital attractiveness

Sub-pillar	ID	Description of basic indicator	Source	Type	Year	Optimum
1) Stability	1.1	Adjusted Texas ratio	-	objective	-	min
	1.1.a	Equity	ECB – Macroprudential database	objective	2015	-
	1.1.b	Gross non-performing loans and advances [per gross total loans and advances]	ECB – Macroprudential database	objective	2015	-
	1.1.c	Accumulated impairment [per total gross non-performing portfolio]	ECB – Macroprudential database	objective	2015	-
	1.1.d	Total loans outstanding [% of total assets]	ECB – Consolidated Banking Data	objective	2015	-
	1.1.e	Total bank assets	ECB – Macroprudential database	objective	2015	-
	1.1.f	Texas ratio	MNB calculation based on ECB data, and IMF FSI	objective	2015	-
2) Profitability	2.1	Return on equity [%]	ECB – Consolidated Banking Data	objective	2010–2015	max
	2.2	Cost-to-income ratio [%]	ECB – Consolidated Banking Data	objective	2010–2015	min
	2.3	Net fee and commission income [% of total assets]	-	objective		max
	2.3.a	Net interest income	ECB – Macroprudential database	objective	2010–2015	-
	2.3.b	Net fee and commission income	ECB – Macroprudential database	objective	2010–2015	-
	2.3.c	Total bank assets	ECB – Macroprudential database	objective	2010–2015	-
3) Operating and tax environment	3.1	Environment index	-	mixed	-	max
	3.1.a	Bank levy (yes/no)	Authors' collection based on literature	objective	2015	0
	3.1.b	Strength of legal rights index (0=weak to 12=strong)	WB – World Development Indicators	subjective	2015	12
	3.1.c	Supporter of EU Financial Transaction Tax dummy	Based on the European Commission's proposal	objective	2014	0
	3.2	Herfindahl–Hirschmann Index	ECB – Macroprudential database	objective	2015	avg
	3.3	Corporate tax rate	KPMG	objective	2016	min
4) Growth prospect	4.1	Credit to private sector as a percentage of GDP, long-term trend	BIS	objective	2016	min
	4.2	Domestic credit to private sector by banks (% of GDP)	WB – World Development Indicators	objective	2015	avg
	4.3	Ratio of bank loans in corporate finances	Eurostat – Financial balance sheets	objective	-	avg
	4.4	Households' debt-to-gross disposable income ratio	ECB – Macroprudential database	objective	2015	min
5) Technology and efficiency	5.1	Prevalence of online banking	Based on authors' collection	objective	2016	max
	5.2	Number of bank employees in proportion to income	WB – Global Findex Database	objective	-	min
	5.2.a	Number of bank employees	ECB – Banking Structural Financial Indicators	objective	2015	-
	5.2.b	Net interest income	ECB – Macroprudential database	objective	2015	-
	5.2.c	Net fee and commission income	ECB – Macroprudential database	objective	2015	-
	5.3	Operating expenses per total assets	ECB – Macroprudential database	objective	2015	min

The Impact of the Fintech Phenomenon – Radical Change Occurs in the Financial Sector?*

Ádám Kerényi – Júlia Molnár

As a result of technological progress, the spread of the Internet and digitalisation, several sectors of the economy have undergone a major transformation. This study focuses on the changes in the financial sector. It presents the new players that emerge, i.e. the increasing prominence of the so-called fintech solutions, which is supported by the demand from consumers and the supply side as well, and it also describes the new solutions and introduce some successful examples of fintech services in payment and lending. Although the new players and solutions have introduced several innovations to the market, often making the use of financial products and services easier, more efficient or providing a more widespread access to them, they entail many potential dangers. We believe that fintech firms are not yet likely to trigger radical changes in financial intermediation.

Journal of Economic Literature (JEL) codes: G21, G24, O31, O33

Keywords: fintech, financial technology, innovation, financial service, competition

1. Introduction

In recent years, substantial changes have occurred in several sectors of the economy, primarily due to the lower barriers to entry thanks to the Internet and digital technologies, the reduction in the costs of starting and operating a business with digital business models and the transformation of consumer habits. From booking accommodation through the advertisement market to the music industry a paradigm shift could be observed, and earlier business models were often replaced by new, digital models. One might ask whether the financial sector is also experiencing such a shift.

One of the most remarkable phenomena in the financial sector is undoubtedly the increasing prominence of the so-called fintech players that emerge in drastic numbers and that marketise technological solutions. The term "fintech" was first

* The views expressed in this paper are those of the author(s) and do not necessarily reflect the offical view of the Magyar Nemzeti Bank.

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used in the name of one of Citigroup's projects – a predecessor to today's Citigroup – attempted to improve its image by initiating a technological cooperation with players outside the industry. In 1993, company leaders said that "times have changed, cooperation is necessary for common industry standards".

In the more than 20 years since then, the number of the new fintech players has increased drastically. This is attributable to technological innovations, and on the other hand to the low interest rate environment following the 2008 financial crisis, the tightened banking regulation and the new services that appeared due to the dented confidence in the banking sector. Fintech solutions are a blend of financial products and services (finance) and technology, i.e. they include the various digital services that emerged on the financial market and the business models based on technological development. The increased focus on the fintech sector is a global phenomenon: the mass emergence of new, non-bank players and start-ups can be observed on both developed and developing markets. Services offering fintech solutions have appeared in several banking segments, and especially frequently in payment and lending.

The question inevitably arises as to what changes the new players bring to the market. As Jamie Dimon, the CEO of J.P. Morgan, one of the largest investment banks of the world, wrote in his annual letter to shareholders in 2015, *"Silicon Valley is coming. There are hundreds of startups with a lot of brains and money working on various alternatives to traditional banking"* (*Dimon 2015*). Others are more sceptical about the developments introduced by the new players. *"There has been little financial innovation since grain futures contracts were struck several thousand years ago in the Indus Valley. Most of what passes for innovation is just a new way of doing the very old thing of adding more debt and less down payment, reserve or equity to traditional borrowing or lending contracts,"* claims *Avinash Persaud* (*2015*), a professor at Gresham College and an expert at the Peterson Institute.

This study seeks to ascertain what innovations and fintech solutions resulted from the changes in the different areas of the financial sector and whether these innovations are merely supplementary players in the financial sector at their present state of development or whether they will fundamentally overhaul it. After reviewing the changes in the individual areas of the financial market in the recent period, we argue that although several new solutions and players have appeared, *technological progress does not automatically lead to a decline in banks' significance or loss of market share*. Even though banks keep their branches on the market for financial services, they increasingly adapt to the opportunities offered by digital technology: they strive to provide user experience services, boost their competitiveness and in parallel with that they spend huge amounts on IT developments to provide digital services and mobile banking to their clients and to satisfy other special needs.

2. The increasing prominence of the fintech sector

Only the future will decide whether the spread of fintech aided by the waves of radical technological progress will be successful; however, we should also analyse the past data about this phenomenon. Perhaps one of the main indicators of the spread of the fintech sector[1] is the amount of investments in the segment, in which we can observe a radical jump: while in 2008 a total of USD 1.2 billion was invested in fintech innovations globally, by 2015 this had risen to 22.3 billion (*Table 1*). Another indicator is the number of players. It is difficult to estimate the number of non-bank fintech players, but according to the CrunchBase start-up database, more than 20,000 non-bank start-ups operate in the financial and payment sector globally (*Crunchbase 2016*).

Table 1
Venture capital invested in fintech companies in 2008–2015
(USD billion)

	2008	2009	2010	2011	2012	2013	2014	2015
Investment (USD billion)	1.2	1.7	1.8	2.5	3.2	4.6	12.7	22.3

Source: Based on data from KPMG (2016).

What caused the spread of fintech companies and solutions, and the substantial growth of the sector in the recent period? The emergence of new, non-bank players and ideas and the increasing interest of investors were influenced by several factors from both the demand and the supply side. Such factors include the changing consumer habits, revolutionary innovations, the continuous technological progress and the macroeconomic and regulatory environment. This list could be expanded; however, below we will briefly explain why we considered precisely these important.

2.1. Changing consumer habits

With the development of information technology and the increasing penetration of the Internet and mobile phones, the consumer habits of the population and companies have been substantially transformed, not only in everyday life but also in how banking is conducted. Generations with a different socialisation have emerged as consumers of financial services. They are often referred to as the mobile-only or digitally literate generation or Generation Y. Today this age group is the largest consumer segment in the US economy. According to a survey, 88 per cent of

[1] The study does not cover the geographical distribution of fintechs. The analysis of the initiatives and practices of certain megapolises (New York, London, Tel Aviv) and city states (Singapore) in this field calls for a separate essay. Unfortunately, the presentation of the Hungarian fintech culture is also beyond the scope of this work, despite the fact that interesting developments could and can be observed in Hungary, too. For those interested in Hungarian fintechs, the articles by Ádám Turzó on the portfolio.hu specialised website, "HunFintech25" published by T-System Magyarország Zrt. in 2016 and the analyses by Corvinus Fintech Center may prove useful reading.

Generation Y use the Internet for banking, and almost three-quarters of them (73 per cent) are more interested in the new financial services of technology companies than the financial services of their own banks (*Scratch 2014*).[2]

In parallel with this, confidence in financial institutions was seriously undermined all over the world in the wake of the 2008 financial crisis. Several studies have pointed out that in parallel with the loss of confidence in financial institutions on the part of European and American consumers, confidence in the financial services of technological institutions has increased substantially (*Crabtree 2013*; *Fujitsu 2016*). Discontent with traditional service providers bolsters the acceptance of fintech innovations. This attitude is especially strong among the young.

2.2. Technological progress

Moore's law describes the increasing pace of technological progress with an exponential growth path. The dynamic nature of the changes is clearly shown by the development of computing capacities. If we compare the first mainframe computer[3] with a modern smartphone, as János Kornai did, we can see a huge difference. The "ancient" machine filled a whole room, while the smartphone fits in our pocket. The old computer had an exorbitant price tag, at USD 11 million at 2003 prices, while today's smartphones sell for around USD 400 at 2003 prices, i.e. at less than 0.004 per cent of the old price. Meanwhile performance has soared remarkably: processor speed has increased 73,000-fold, while memory capacity has grown 120,000-fold (*Kornai 2015*; *Kornai 2016*).

According to the managing director of the Monetary Authority of Singapore, "the smartphone is becoming our bank. People can consume financial services on the go" (*Menon 2016*). According to the data from the International Telecommunication Union, a specialised agency of the United Nations, over 7 billion mobile subscriptions and more than 3 billion private Internet users were recorded globally in 2015. In the ten years between 2005 and 2015, the number of mobile subscriptions per 100 people increased almost 3-fold, while the number of Internet users grew more than 2.5-fold (*ITU 2016*).

Banking on the mobile phone is much more widespread among the young, which may also be interesting from a demand perspective. Based on a survey conducted annually, more than two-thirds of 18–29-year-olds used their mobile phone for managing their finances in 2015, while this proportion was only 45 per cent in 2011. The relevant detailed data from the survey can be found in *Table 2*.

[2] Another interesting result of the survey is that 71 per cent of the respondents would turn to their dentist, rather than their bank, for financial advice (*Scratch 2014*).
[3] IBM 7094, used in 1967.

Table 2
Share of those using mobile banking and the number of respondents for the given year within the indicated age group
(%, 2011–2015)

Age group	2011	2012	2013	2014	2015
18–29	45	54	63	60	67
30–44	29	37	43	54	58
45–59	12	21	25	32	34
60+	5	10	9	13	18
Total	22	29	33	39	43
Number of respondents	1,859	2,180	2,187	2,437	2,151

Source: Fed (2016:8).

According to the *IMF* (*2016*), there are substantial differences between the countries that recently joined the European Union: in the Czech Republic, those aged over 15 used their mobile phone for paying bills 9 times in a year. This number was below 1 in Bulgaria, while the members of this age group in Hungary and Poland paid bills through their mobile devices 2 times on average, and those in Slovakia paid 3.5 times on average.

The spread of digital payments is promoted by the technological development of digital identification (biometric sensors). Perhaps we should briefly mention the technological progress in machine learning, artificial intelligence and big data, which all open up new horizons for the development of fintechs. Technological progress may not only be software-based, it is also determined by hardware and the devices. Due to its economies of scale and simplicity, cloud-based technology has accelerated the spread of new solutions.

2.3. Revolutionary innovation

Revolutionary (radical) innovation differs from technological progress in that it is able to disrupt market conditions to the core and to an unprecedented extent. In the case of financial technology, something that is called distributed ledger technology (DLT) can lead to an explosion of fintechs. The distributed ledger technology enables real-time transactions and control without involving a central ledger or an authority. The distributed ledger technology is able to execute a large number of transactions rapidly, therefore it has become an obvious area of use for payment clearing and settlement. This technology has a vast potential, offering opportunities through the reduction of the transaction and operating costs of payments and especially cross-border money transfers. According to the estimate published by the European Parliament, it may potentially reduce aggregate transaction costs globally by as much as EUR 20 billion (*EP 2016*).

The blockchain is a distributed, decentralised database, which may be conceived as a huge global spreadsheet that is shared on millions of computers at the same time. It is open-source, i.e. anyone can change the background codes, and anyone can see the exact processes that take place. This is completely interpersonal, and there is no need for intermediaries who would authorise and execute the transactions (*Tapscott – Tapscott 2016*). In essence, all users store and access the continuously growing database of transactions, while there is no need for a central unit or records. However, interbank transactions – whether concerning money, securities or syndicated loans – are typically executed by a third party, i.e. for example clearing houses, central authorities, transfer systems or depositories.

The blockchain technology was first used for recording transactions in the so-called bitcoin virtual currency.[4] Although the blockchain can be considered the main technological innovation of bitcoin, since it is intended for the verification of financial transactions in the network, it can be used for other purposes as well. This model represents a radical shift from the currently functioning technology, in which participants send the transaction data to clearing houses and companies that then compare them. These clearing centres have several disadvantages: first, they charge money for their work and second, they are slow compared to the distributed ledger technology. Furthermore, the new method is safer, as it is not enough to take action in the system at one special target for modifying the ledger, all ledgers have to be changed at the same time. This is because due to its decentralised nature, this accounting technology enables the creation of payment systems that are reliable from a systemic risk perspective and resilient to the potential problems and defaults in the network.

One analyst of the European Central Bank (*Löber 2016*) describes three possible scenarios: (1) clusters will form among the current players, (2) the structure stays the same; however, the place of some players will be uncertain or (3) the role of several intermediaries (e.g. clearing houses) becomes superfluous. The so-called "smart contracts" are also based on blockchain and they enter into force when the conditions of the contract are satisfied, for example a purchase transaction happens immediately if the buyer transfers the money to the seller.

2.4. Macroeconomic and regulatory environment

In addition to keeping an eye on their inflation targets, central banks support the growth and employment of national economies and maintain financial stability. As a result of the international financial crisis, monetary policy has become increasingly active, as interest rates were cut and quantitative easing measures were introduced. It is worth briefly touching upon the extent of the changes in European regulations on lending. The question arises whether non-bank players will be more

[4] For more details on the role of virtual currencies in the circulation of money, see *Chapter 3.1*.

reliable lenders than banks, merely due to the better application of the big data phenomenon. Do banks' special position (their regulated and supervised nature) provide protection against their challengers from outside the sector (i.e. does it actually inhibit entry to the market) or is it merely a disadvantage entailing costs?

Banks are asset-transforming institutions: they perform denomination, maturity, currency and interest rate transformation, all while being the debtors to all depositors and the lenders to all debtors. However, this "central counterparty" position entails fairly considerable risk costs and it is highly capital intensive. Banks need to comply with strict quantitative and qualitative liquidity and prudential (Basel III), consumer protection and solvency (Solvency II in the case of insurers) requirements. The aim of these rules is to protect the financial intermediary system from systemic meltdowns and to shield consumers from potential idiosyncratic defaults and consumer protection risks. Although the strict and risk-averse regulation has resulted in a more stable financial system, in several countries, especially in the European financial sector, it has become difficult to finance and support (often risky) innovations and initiatives (*Zilgalvis 2014*). This has contributed to the fact that the innovations influencing the sector increasingly come from market participants not subject to the regulation, i.e. from start-ups and large enterprises engaged in other industries. However, this does not only pose a challenge to banks but also to the people creating the rules, who need to keep up with new technologies and continuously expand the rules to cover the new players.

We also have to mention that these developments are typical not only in the banking sector but also in the insurance sector: some fintech solutions have appeared there that can be monitored and referred to as insurtech.

3. The radical nature of the innovations brought about by the fintech sector

The emergence of digital solutions and fintech players had different effects on the financial intermediary sector. Most new players first appeared in the areas of less knowledge-intensive and standardised services with lower barriers to entry. Among these, the field of payment and lending deserves a special mention. In this area, non-bank players have appeared in large numbers in both developed and developing countries. In this chapter, we will present the changes in these two fields. Our analysis is not constrained to individual geographical locations, since that is a less and less fundamental factor owing to the digital nature of the services.

3.1. Fintechs in the payment sector

The factors described in the previous chapter have contributed enormously to the emergence and spread of fintech companies in many fields of finance. This is especially true of the payment sector, where we have seen the emergence of several

new players and solutions with respect to the means of payment, retail payment solutions and payment systems in recent years.

The most prominent innovations in the field of the means of payment in recent years are the virtual currencies (e.g. the bitcoin virtual currency based on the blockchain technology presented in *Subchapter 2.3*), the common characteristic of which is that they handle payments without the intervention of any intermediaries. Opinions on the significance of virtual currencies have varied, both the market and regulation regard it as a double-edged sword. Yet one recent Bank of England study points out the positive impact of the digital means of payment. According to the analysis by the central bank, a virtual currency issued by the central bank[5] would not only have a beneficial effect on the country's GDP by reducing monetary transaction costs and the distorting impact of taxes, the currency could also serve as an important monetary policy instrument due to its countercyclical nature (*Barrdear – Kumhof 2016*). Nevertheless, we should not forget that the virtual currency outlined by the Bank of England and issued by the central bank is currently not available in practice. Until now, only private virtual currencies have come into circulation such as the above-mentioned bitcoin. Several regulatory bodies, including the Magyar Nemzeti Bank, have warned (*MNB 2015*) that bitcoin and the similar virtual instruments usable for payment entail many risks, since they do not have an official issuer and they are not subject to the supervision of the authorities or central bank of any country. Hence there are no appropriate responsibility, guarantee and liability rules, which would protect consumers' interests for example in the case of an abuse or account theft. "*We have to be aware of the fact that in the case of any dispute or the suspicion of abuse, consumers have nowhere to turn to have their complaints investigated or the potential damages determined. For example in the case of a bank card payment, the parties do not have to trust each other, only their own banks. If a problem arises, the two banks get in contact with each other through the card company, investigate the case, and pay damages to the client if the complaint is justified. With respect to bitcoin, central banks primarily have consumer protection tasks: they have to raise the attention of consumers to the area and extent of the risks that may affect bitcoin users*" (*Kajdi et al. 2017:6*).

Even if the virtual currency is not expected to be widespread, the underlying technology, i.e. the blockchain, has huge untapped potential for the payment system. Although the testing of the use of the blockchain in traditional payment fields is only in its early stages (*Buitenhek 2016*), today several fintech players offer services based on this technology, circumventing the intermediary system of banks. Among these, we should mention Ripple, which executes foreign transactions for

[5] In the scenario outlined based on the article, the central bank issues virtual currency to the tune of 30 per cent of GDP, against government securities. The 30 per cent assumption equals the extent of the quantitative easing measures performed by central banks in the past year (*Barrdear – Kumhof 2016*).

companies and the custody operations of corporate clients through a blockchain-based clearing system instead of the SWIFT network used by banks.

The emergence of the technology and the new, non-bank players brought about substantial changes in the field of alternative retail payment solutions as well. The hotbed of alternative payment solutions is emerging markets. In these countries, the spread of mobile usage and the large number of those without access to financial services were great catalysts in the spread of the various mobile-based payments and online remittances. One of the most successful examples is the M-Pesa mobile payment system launched in Kenya in 2007 (see the Box). M-Pesa is used by 17.6 million people, almost 40 per cent of the population, and the service executed transactions to the tune of USD 31 billion in 2016, which approximately equals half of Kenya's GDP (*Safaricom 2016*). In China, AliPay, the payment system of the Alibaba Holding, conducts 75 per cent of the total transaction volume of Chinese retail trade with 270 million active monthly users (*AGHL 2015*). The rapid technological adaptation of emerging markets provides a tremendous opportunity for fintech companies, since these countries transfer from using cash directly to mobile payment, leapfrogging payments by debit and credit cards. These solutions not only provide an opportunity to those forced out of the financial system for accessing basic financial services, but also mean a cheaper and swifter alternative alongside existing banking services. For example according to a World Bank estimate, the average cost of international payments executed by banks is 11.2 per cent of the amount sent, whereas online players offer this service to clients at an average cost of 5.57 per cent (*World Bank 2015*). Although alternative payment solutions produce several benefits to the population, this is, of course, not without risks. As the European Central Bank warned as early as in 2007, the greatest concern regarding players offering non-bank payment solutions is linked to information security and the protection of consumer data (*Weiner et al. 2007).* These cross-border payment innovations pose a challenge to authorities from a regulatory perspective as well, since it is not always obvious who is responsible for the prudential supervision of the fintechs providing non-bank payment solutions, and for enforcing clients' right to security and the obligations of the service provider (e.g. rules on indemnification and the provision of information to clients).

M-Pesa – A successful example in mobile payment

The M-Pesa mobile payment system was launched by Safaricom, Kenya's largest telephone company, in 2007. The payment system was originally set up for the repayment of microloans, but later, due to the success of the system, it was transformed into a general mobile payment system: today it can be used for, inter alia, depositing and withdrawing cash, transferring money to private individuals and companies, and paying utility bills, taxi fares or tuition fees. No interest is paid for the accounts held by M-Pesa. One of the keys to the service's success is the simple, cheap and user-friendly registration and usage. The use of the mobile payment system is subject to having a SIM card, therefore there is no need for the rigorous client identification required by banking regulation.

The most frequent regulatory concern in connection with mobile payment systems is the lack of consumer and deposit protection. Many solutions have been devised to address this. For example in the M-Pesa system, the accounts are not managed by Safaricom but a trust operated by Vodafone. The trust is completely independent from Safaricom, which cannot make any claim for the client accounts if it goes bankrupt. The funds on the client accounts managed by the trust are deposited on bank accounts; therefore, the accounts enjoy the protection of deposit insurance. The interest earned on the bank accounts is transferred to a charity fund, which is used to support local education, healthcare and environmental protection initiatives.

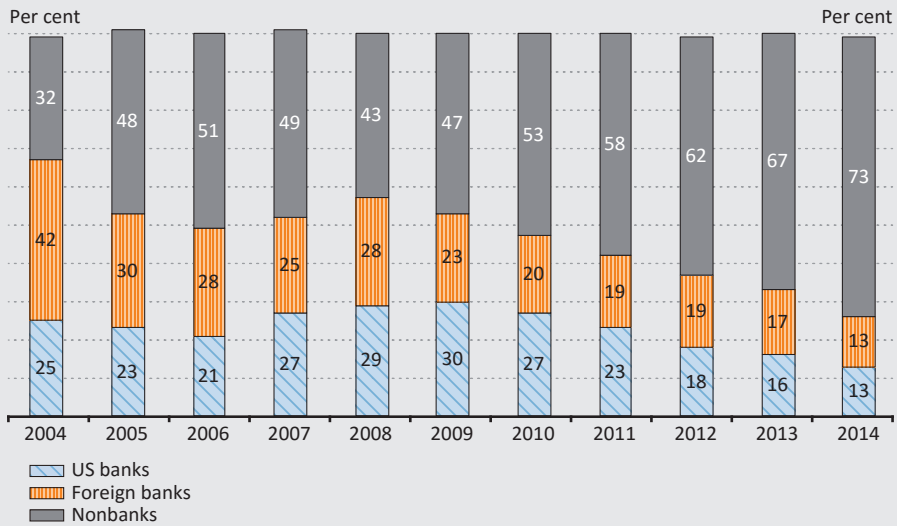
Owing to its cheap and user-friendly operation, the M-Pesa mobile payment system spreads fast in the world. In March 2014, it was introduced in Romania as well; therefore, now it can be used in Europe, as well.

3.2. Fintechs in lending

The technological advancements presented in *Subchapter 2.2* played a central role in the development of credit institution models. The reduction of costs due to digital operation and the use of online marketing provide an opportunity to alternative credit institutions for acquiring a growing market share in the lending business. Since the 2008 financial crisis, banks have had to substantially increase their Tier 1 capital adequacy ratio on account of the tightened rules,[6] so that the market can avoid the systemic meltdowns like the previous one.[7] As a result of the tightened rules, credit supply constraints have emerged on several markets and sectors (*Mills–McCarthy 2014*, *Spinassou 2013*). Taking advantage of the credit crunch, the alternative credit providers entered the market for riskier loans, extending personal, small business and student loans to clients who did not obtain funds from banks. *Figure 1* shows the share of non-banks in one market segment of the United States between 2004 and 2014.

[6] The Basel Committee issued the Basel III Accord in September 2010, which strengthened the system of banks' capital requirements with setting strict quantitative and qualitative requirements.
[7] According to European Central Bank data, European banks increased their Tier 1 capital adequacy ratios from 8.3 per cent to 14.6 per cent between 2008 and 2015 (*ECB 2016*).

Figure 1
Share of various market participants in risky loan instruments in the United States
(loans with a substandard, doubtful or at-loss rating)



Source: Nash-Beardsley (2015:40).

New entrants entered the competition with several new business models. Among these, online marketplace platform lending and crowdfunding have become the most widespread. Online marketplace lenders act as intermediaries between the party providing the loan and the one obtaining it. The segment has grown from peer-to-peer lending, where lenders provided an opportunity to private investors for extending funding to private borrowers and companies in exchange for a predetermined interest. With the development of the market and owing to the low interest rate environment, institutional investors also increasingly turned towards this market (*Kirby–Worner 2014*). With the appearance of institutional investors, the market has gradually lost its peer-to-peer character. Today most online marketplace lenders "slice up" the funding provided by investors, lending to borrowers with various risk ratings.

Lending Club, a marketplace lender

Nowadays, the largest online marketplace lender is Lending Club operating in the United States, which has granted loans of over USD 22 billion since its launch in 2011. Online marketplace lenders operate using various business models, one of the most widespread of which is the note-based model employed by Lending Club, in which credit applicants can register their credit needs and personal information on the Lending Club website. After this, Lending Club assesses the credit applicant's creditworthiness and determines the applicant's risk rating using its own credit rating system. Credit applicants are classified to groups from A to G based on the expected repayment risk, and the interest rate imposed is determined based on this. Then investors can choose which loan they wish to invest in, based on the information provided by the clients, and the size and risk rating of the loans. The interest payable by the credit applicant cannot be influenced by the investors; however, they can decide what portion of the loan they wish to finance (the minimum amount to be invested is USD 25). If the full amount of the loan is collected, a designated bank grants the loan and sells an external note to Lending Club at the amount of the loan. Then Lending Club sells on this note to the investor. The obligor of the note is the borrower, i.e. Lending Club does not take responsibility for repaying the loan. In the case of a potential default, the risk is borne by the investor, although Lending Club helps in the collection.

Lending Club and other similar online marketplace lenders compete with traditional banks in costs. Thanks to full-scale operation and the regulatory arbitrage resulting from indirect lending, they can operate with operating costs 300–400 basis points lower than traditional banks. Nonetheless, Lending Club, which is one of the largest and longest-established players on the market, has been in the red since its launch in 2011, which justifiably calls into question the sustainability of the business model (*Lending Club 2016*).

Similar to online marketplace platform lending, the goal of crowdfunding is to help individual lenders and borrowers meet online; however, borrowers tend to be newly created companies, sole proprietors or community/individual projects. Potential supporters may browse among the projects and may fund the projects that appeal to them. Thanks to today's digital technology, countless users, initiators and potential donators can cheaply and easily join these sites (*Kuti – Madarász 2014*). The most widespread forms of crowdfunding include the donation- or gift-based model and the equity model (*Belleflame – Lambert 2013*). Crowdfunding largely depends on the network effect created by social media, where contributors increase the chances of raising the total amount of the funding by sharing the campaign among their friends.

One feature of this segment is that both online marketplace lenders and loan brokers engaged in crowdfunding lend only indirectly: they act as intermediaries between those providing the loan and those obtaining it, but assume no direct credit risk. In addition, due to the indirect lending model, players are exempt from the numerous regulatory requirements pertaining to banks. This regulatory arbitrage entails several risks, which calls into question the sustainable and safe

functioning of the sector. Players grant loans under less regulated and controlled conditions, primarily to borrowers with a high risk rating.[8]

Although many people expect that traditional bank lending will lose ground on account of the spread of online lending solutions, we should not forget that the conflict between access to credit and the protection of borrowers cannot be resolved by the new players either. Even though the new players in lending represent an important source of finance in certain segments (for example in start-up financing), bank lending is not expected to come to an end. This is because the increasing popularity of alternative credit providers is not a result of a new, sustainable lending model but a business cycle, which is mainly supported by low interest rates, the loss of confidence in banks and the regulatory arbitrage.

3.3. Technology companies as fintechs

In the fintech sector, start-ups are not the only ones that have become more active. Several large, non-bank companies have recently started providing financial services. The most successful have been large technology companies. This is because they have several features that help them successfully overcome the barriers to entry to the banking market: they have an existing, large customer base, the appropriate IT infrastructure and a solid reputation. Technology companies principally offer payment services to their existing clients, but several of them take part in lending as well. The information pertaining to the companies that we considered relevant is summarised in *Table 3*.

[8] The information provided by borrowers is often not verified by the players extending the loan. For example Prosper, one of the largest actors on the market, verified borrowers' employment status and sources of income in the case of merely 59 per cent of the loans provided between 2009 and 2015.

Table 3
Financial services provided by technology companies

Company	Financial product and service	Launch date
Google	**Google Wallet** – mobile wallet and mobile payment solution for storing and using the virtual copy of users' existing bank cards, credit cards and loyalty cards. The services currently have about 16 million users, and it is only available in the United States.	2011
	Google Checkout – electronic wallet service that enables users to make payments to several online merchants after the registration of card payment information. The service has been unavailable since 2013.	2006
	Android Pay – mobile payment solution enabling tap & pay on mobile phones with a compatible Android operating system.	2015
Apple	**Apple Pay** – mobile wallet and mobile payment solution. It is currently available in 12 countries, and it is estimated that transactions worth USD 10.9 billion were conducted with this solution in 2015.	2014
	Apple ID – personal ID that, when linked to a bank card or other payment account, users can use for real-time payment without a card for purchasing content on the mobile phone.	2013
Amazon	**Amazon Payment** – electronic money institution and electronic wallet service that enables users to make payments to several online merchants after opening an electronic money account and registering their card payment information.	2013
	Amazon Wallet – mobile wallet and mobile payment solution for storing and using the virtual copy of users' existing bank cards, credit cards, loyalty cards and gift cards.	2014
	Amazon Loans – short-term current account loan service for retailers selling on Amazon's platform.	2012
	Amazon Local Register – mobile POS terminal service that enables merchants to accept cards over a smartphone or tablet.	2014
eBay	**Paydiant** – mobile wallet service that trading companies and other market participants give their own brand name to.	2010
	Braintree – payment and card acceptance service for merchants for online and mobile payment.	2007
	PayPal – electronic money institution that holds an account for its clients that can be topped up with a bank card payment, bank transfer or collection order from their retail or corporate bank account.	1998
	PayPal Credit – payment service through which merchants can provide trade credit to their customers. Loans are provided by Comenity Capital Bank.	2015
	Venmo – mobile wallet service that enables users to initiate transfers to each other on their mobile phones.	2009
Facebook	**Messenger Payments** – peer-to-peer, real-time, direct transfer service for the users of the chat service. It is currently only available in the United States.	2015
	E-money licence – Facebook has a licence to issue electronic money in Ireland, however, it does not offer other services to its clients yet.	2016
Samsung	**Samsung Pay** – mobile payment solution enabling tap & pay on compatible Samsung mobile phones.	2015

The main points of Chapters 2 and 3 are summarised in *Table 4*. The changes in digital technology should be examined taking into account several aspects, for which a matrix-like approach could be the most suitable. The first three rows in the table show the fintech companies, their advantages and disadvantages compared to banks in the payment sector, lending and the technology sector. The other rows illustrate the presence or absence of changed consumer habits, technological progress and revolutionary innovations in the above-mentioned dimensions.

Table 4
Summary of the advantages and disadvantages of fintech companies

		Fintechs in the payment sector	Fintechs in lending	Technology giant fintechs
Fintech companies		M-Pesa, AliPay, Apple Pay Ripple	Lending Club, Kickstarter, SoFi	Google Facebook Samsung
Advantages of fintechs compared to banks		managing bank accounts as an "infrastructure"; technology	lack of regulation	brand; confidence; capital
Disadvantages of fintechs compared to banks			circumvention of capital requirements is unsustainable	rules
Changing consumer habits	Emergence of a new generation		√	√
	Undermined confidence in banks	√	√	√
Technological progress	Spread of mobile phones	√	√	√
	Cloud-based storage	√	√	√
	Machine learning	√	√	√
	Artificial intelligence		√	√
	Big data			√
Revolutionary innovation	Distributed ledger technology (DLT) Blockchain	√	√	√
Macroeconomic environment	Monetary policy		√	√
	Regulatory arbitrage	√		√
	Prudential regulation	√	√	√

4. Conclusion

This study sought to establish the extent to which the traditional banking business models are influenced by technological progress and the spread of the Internet and digitalisation, and to what extent the increasing prominence of the fintech sector influences the individual areas of the banking sector.

We examined both the supply and the demand reasons and drivers. The combined effect of the changed consumer habits due to digital solutions, the new solutions that emerged on account of technological progress and the regulatory changes was that masses of new players appeared in the banking industry in recent years, offering some product or service to consumers that are normally provided by banks. The examination of the emergence of the new players and the changes on the financial market is important and timely from the perspective of both competition on the market and regulation.

This study analysed the changes in two areas, payment and lending. It presented the fintech solutions affecting and influencing these fields, the impact of the solutions on market developments as well as the main risks. The results of our research show that fintech solutions will influence the financial sector in various ways. In the area of payments, substantial changes have occurred as a result of technological advancement with respect to the means of payment, retail payments and payment systems, which primarily entailed a reduction in costs and the improvement of the quality of the service. In parallel with this, the new technologies (e.g. blockchain) paved the way for the emergence of several new payment services, circumventing the traditional intermediary system of banks. However, cross-border solutions not subject to banking regulation raise numerous prudential and information security issues, the examination of which is important and timely from a regulatory perspective.

Meanwhile in lending, online marketplace platform lending and crowdfunding have grown into new, popular sources of finance. These mainly indirect forms of financing have become widespread mainly in risky segments underserved by banks (such as small enterprise lending and student loans). Nevertheless, the study argues that the increasing popularity of alternative credit providers is not the result of a new, sustainable lending model but a business cycle, which is mainly supported by low interest rates, the loss of confidence in banks and the regulatory arbitrage.

The last part of the study briefly describes the financial services offered by large, non-bank companies. In parallel with the start-ups, several companies, mainly large technology enterprises, entered the market to provide financial services, utilising their relationship to clients and their existing technology infrastructure.

The study sought to establish the extent of the impact of the increasing prominence of the fintech sector on the individual areas of the banking business. However, this question points to several areas that require further examination. We believe that among these, the examination of the regulation of non-bank players and the impact of fintech solutions on banking models and banks' innovation capacity are important avenues for further research.

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Role and Measurement of Fair Valuation in the Hungarian Credit Institution Sector*

Tamás Szücs – József Ulbert

The crisis demonstrated that the role of the accounting standards applicable to fair valuation may be particularly important in the credit institution sector. The paper examines the influence exerted on the balance sheets of the Hungarian credit institutions by the fair valuation and the international and the Hungarian economic policy regulatory changes relating to valuation. We place special emphasis on examining whether the foreign-owned credit institution subsidiaries operating in Hungary and their parent banks responded differently to the challenges posed by the crisis. We elaborated a method for the measurement of the real involvement and using this we examine how the fair value involvement of the Hungarian credit institution sector has changed before, during and after the crisis. Generalising the problem, we found that the degree of the fair value involvement may represent an additional risk factor upon assessing the credit institutions' operational efficiency and that the Hungarian subsidiaries followed a slightly different path than their parent banks.

Journal of Economic Literature (JEL) codes: G01, M40, M41

Keywords: crisis, fair value accounting, fair value hierarchy

1. Need for fair value

When examining the history of accounting rules, the thought of valuation at fair value first emerged in the early '80s. In parallel with the spread of globalisation, the world's financial markets were accomplished and commenced an unprecedented development. New markets appeared on the scene, which also offered new investment opportunities; thereby, adding colour to the spectrum of traditional transactions.

In addition to the classic transactions, the innovative, novel financial products and the increasingly complex financial instruments gained growing importance. The

* The views expressed in this paper are those of the author(s) and do not necessarily reflect the offical view of the Magyar Nemzeti Bank.

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understanding and pricing of these products, as well as the determination and modelling of their value, represents an increasing challenge for investors.

The acceleration of the spreading of novel financial instruments in the financial markets was fuelled by the perceivable growth in risk in certain risk segments, as the innovative products were often meant – as claimed by the architects of these products – to provide protection against the increased risk.

It is also beyond doubt that one driver of the development of capital and money markets could have been the goal to expand market turnover, since this carried the opportunity for the creators and distributors of the innovative products to tap the revenues received here via various fees and services.

The escalation of these processes spanned over two to three decades, which, as a matter of course, was accompanied by rise in prices and the fact that the measurement of capital market's performance increasingly drifted apart from real economy performance. The market's value measurement function raised increasing doubts, particularly in the case of those novel products that had no underlying real economy performance at all.

The legislation, the financial methodology and the accounting profession alike were unable to keep pace with this rate of development, hence the investors' increasing demand to determine the fair value of these novel products and to state these valuations on the asset side of the balance sheets appeared at the same rate as the rate of these products' "sneaking into" the balance sheet and income statement of the investors (first and the most intensively it could be observed at the credit institutions, and particularly at the investment banks).

Beneish (*1999*) in his paper rang the alarm bells already before the turn of the millennium. In his opinion, fair valuation may be a good way to manipulate financial statements, as the incomes originating from the revaluation of certain holdings may entail unjustified rises in equity prices.

In this respect, albeit slightly late, from the second half of the '80s the company valuation and the accounting profession started to move in the same direction. In the course of determining the value of companies, the methods based on the principle of yield value, trying to measure the value creation function of future yields, also appeared in addition to the asset-based valuations. In parallel with this, the market-based, fair valuation started to replace the cost-based valuation in the international accounting practice as well (*Shaffer 2012*).

Despite the parallelism, the financial approach – with the introduction of the yield value principle – offered a different response to the challenge than the accounting profession, which still sees the solution in the pricing of assets. That is, in the case of finances the emphasis shifted from the assets to the measurement of the assets' yield earning capacity (*Bélyácz 2013*).

2. The fair value concept

According to Regulation 1606/2002/EC of the European Parliament and of the Council, as of 1 January 2005 (in Hungary as of 2007) the consolidated financial statements of all listed companies must be prepared in accordance with the international accounting standards, in the course of which the application of fair valuation is mandatory.

This directive specifies fair value as the amount for which an asset can be exchanged or a liability can be settled between well informed parties intending to conclude a deal, within the framework of an arm's length transaction.

Due to its general formulation and the practical problems relating to its applicability, this definition has been heavily criticised from the start both in the technical literature and in practice.

According to *Barth* (*2004*), the estimation of the fair value of a company's assets varies in time, as market considerations do appear in it, that is, it loses its stability in time, while volatility should be regarded as an additional risk factor, as in the ascending, growth phase it may serve as self-justification for the management, while in the descending phase it may escalate the processes. In the case of assets that have no real or have only limited market background, valuation is based on models that apply uncertain, often impractical conditions, hence the estimation of the value cannot be free from errors either; accordingly, fair valuation may only be applied in a steadily liquid market environment, where nothing hinders the participants from obtaining information.

According to *Hitz* (*2007*), the conditions of applying fair valuation are idealised; thus, the market-based valuations created with the use of these are also only hypothetical, as the definition does not specify, for example, whether it is a purchase or sale transaction. It also does not provide information on the date to be considered relevant for the definition of the balance sheet value, or on the exact meaning of the "arm's length" market condition criterion.

These negative factors are only partially offset by the fact that the definition also made it possible to state such assets in the balance sheet that were formerly off-balance sheet items, and as such remained invisible for the investors (*Bosch 2012*).

Bromwich (*2007*) also provides a good summary of the, often not too practical, assumptions underlying the definition of fair value.

Table 1
Impracticable conditions of fair value

Group	Underlying consideration
1. Prices	a) The prices used upon the measurement of fair value are based on the market, irrespective of the trading objective of the economic agent.
	b) The price is a sales (exit) price.
	c) The prices do not contain the transaction costs.
2. Market	a) The transactions take place on the usual (primary) market (highest volume and activity).
	b) If several markets exist, the most advantageous will be the one where profit maximisation can be achieved.
3. Market participants	a) Unrelated, i.e. independent parties.
	b) Well-informed participants, able to understand the basic attributes of the asset component and the transaction.
	c) When obtaining the necessary information, they act with due diligence and do their best to understand the information.
	d) The individual transactions are without any compulsion.
	e) The individuals have the capacity and willingness necessary for concluding the transaction.
4. The presumed usage	a) The financial instruments are clearly defined by their cash flow structure.
	b) In the case of assets, estimation of the offer price that represents the most profitable usage at the time when the valuation is performed by the market participant, which is:[1]
	• in-use valuation (can be used together with other assets): defining the highest use value;
	• in the case of (independently usable) exchange utilisation value defined on the basis of individual valuation.[2]
	c) Of the prices mentioned in point b) the fair value will be the highest one.
	d) The use is possible in physical terms, acceptable in legal terms and feasible in financial terms.
	e) The transfer of liabilities is possible under identical credit risk (default risk).
5. Accounting assumptions	Traditional accounting assumption:
	• The measurement must be performed in the case of all separable asset components and the aggregated groups of those.
	• The measurement takes account of the condition and location of the asset, if relevant.

Source: Bromwich (2007:53).

While the general market and economic condition was reliable and stable, the definition, despite all of its faults, in fact remained workable. The number of problems started to rise in parallel with the accomplishment of the new crisis.

[1] The assumption of the in-use valuation premise is that market participants want to use the asset together with other assets; thus, the fair value of the assets is influenced, typically increased, by the synergies among the assets.
[2] In the case of the in-exchange valuation premise it can be assumed that the asset can be utilised on its own and this is the way the market participants can realise the maximum profit with it.

3. Fair value and crisis

Has the possibility of fair valuation opened Pandora's box, that is, has it contributed to the development and later on to the escalation of the crisis, or quite the contrary, it opened the possibility of managing the crisis?

Several authors believe (*Wallison 2008; Whalen 2008*) that the procyclical nature of fair valuation could have been the main cause of the crisis. They emphasise that *fair valuation is the primary reason for the unforeseen fall in property value and for the, also unexpected, growth in the instability of financial enterprises.* The application of FASB ASC 820[3] and the fair value-based calculation of the banks' capitalisation caused a downward spiral in property value and contributed to the major fall in solvency. The classification of instruments held to maturity as trading assets was a solution that served business interests. According to the related criticism, often even assets without objective market price were reclassified.

According to other opinions (*Pozen 2009; Le Pan 2008*), fair value accounting cannot be the cause of the crisis. Moreover, certain opinions go beyond this and emphasise that it is much easier for the managers of banks and insurers to put the blame on the accounting standards rather than on the capital adequacy regulations controlled by the credit institutions. *The fair value accounting provided early warning of the impacts and problems that* appeared as a result of the incorrect decisions relating to the secondary mortgage market loans and the credit default swaps (*Rerolle 2008*).

According to *Power* (*2008*) the authors of the standard should have spent much more time on the revision of the valuation in order to make the fair valuation model usable in a much wider domain. *Simply, it was introduced too early.*

In their works, Veron (*2008*) and *Shamkuts* (*2010*) designate *liquidity shortage and procyclicality as the two important problems of fair valuation.* Market price is essential for the definition of the fair value. If this is not available, companies turn to different models, with the help of which they attempt to forecast future processes. This is an acceptable effort, with relative reliability, in a predictable and calculable economic environment, while it is not in a crisis period. They argue for the pressing need to change the regulations, as the present regulation does not calculate with the data loss arising from the potential negative effects and the impacts thereof on the financial statements. They mentioned as a shortcoming to be eliminated that the present measurement system must be adjusted in line with the market conditions and supplemented with proper information in the statements.

Laux and Leuz (*2009a; 2009b*) believe that fair valuation cannot be made liable for the stimulation of the crisis and it should be regarded as nothing else but a potential

[3] Fair valuation standard of US GAAP, formerly FAS 157.

measurement model. In their opinion *the present rules alone do not represent the source of the crisis, but their interaction with other institutional frameworks may cause problems*. In addition, they emphasise that the return to Historic Cost Accounting (HCA) cannot be regarded as a solution, as it reflects the current value of the asset to an even lesser degree. The solution may only be a short-term one: recognising a smaller amount of impairment. However, the critics of fair valuation must not disregard the fact that the model provided early warning signs of the approaching crisis, forcing banks to take the necessary measures. That is*, despite all of its faults, fair valuation had effectively reduced the severity of the crisis*.

Allan and Carletti (*2008*) believe that the main problem with fair valuation is that in a not sufficiently liquid market environment it is extremely difficult to estimate the fair value and in most cases we end up with an unreliable result. *In this approach, in fact fair value can be defined as a kind of indicator of the liquidity level of the market*. According to *Gorton* (*2008*), the other essential problem is that the fair valuation mechanism exerted pressure on credit institutions, and as a result of the estimation process built on uncertain future forecasts, often recognizing such impairments which led to the undervaluation of certain asset components.

Laux and Leuz (*2010*) refute the American position according which, with the exception of a few large banks, fair valuation had limited role in the changes of the banks' income statement and solvency capital, as the banks decided on the increase of their subprime exposure independently and the fair valuation methodology cannot be blamed for the problems. Naturally, the topic was in the focus not only in the professional circles, taken in narrow sense. David Dodge, former governor of the Bank of Canada and Steve Forbes, chairman of Forbes Media vehemently asserted that fair valuation accelerated and boosted the crisis (*McFarland – Partridge 2008*). *Nicholas Sarkozy* (*2008*), in a speech delivered in 2008, also emphasised that "banks are subjected to the accounting rules, which do not provide sufficient guarantee for the avoidance of risk; moreover, in the case of a crisis they exacerbate the situation rather than absorbing the strength of the shock."

According to the former chairman of the U.S. Federal Deposit Insurance Co, William Isaac, the application of fair valuation affected the banks' capital to an unreasonably high degree, which contributed to the accomplishment of the crisis and to the economic downturn (*Magnan 2009*).

4. Fair valuation after the crisis

The most important lesson learnt from the crisis in terms of fair valuation is that rational regulation is essential for the maintenance of financial stability. The justification of this stems from the fact that the profit-oriented behaviour of the credit institutions may entail negative impacts (*Pitz – Schepp 2013*).

As a result of the practical experiences and the aforementioned criticism, the IFRS 13 standard[4] was issued in May 2011 and it is effective from 1 of January 2015. It prescribes a uniform theoretical framework for the determination of fair value, which can be used both for financial and non-financial assets. IFRS 13 defines fair value as follows: *"The price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date."*

Upon determining the fair value, certain key conditions had to be stipulated to ensure the reliability of the valuation result. The economic agent must determine

– the fair valuation units of account (i.e. the evaluated asset or liability),

– the primary market where the ordinary transaction would take place and the assumptions that would be applied by the market participants,

– the highest degree and best utilisation of the assets in the case of non-financial assets, considering whether the assets may be used in combination with other assets or on their own.

The new standard emphasises that fair value is a market-based valuation. In the case of certain assets and liabilities, observable and comparable market transactions or market information may be available. According to *Kovács* (*2012*), the new standard emphasises, in addition to the precedence of market valuation, sector neutrality. In case of other assets and liabilities the appraiser may not have these. Irrespective of this, *the purpose of fair valuation is the same in both cases: to estimate the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date under the existing market conditions.*

This value is often referred to as "liquidation value". In this sense, fair value means an exit price, realised at the time of the valuation between relevant market participants (the owner of the asset or the obligor of the liability).

The economic agent must use valuation methods suitable under the given circumstances and in respect of which sufficient data are available for the determination of the fair value, maximising the use of the observable input data and minimising the use of unknown information. The IFRS 13 (with some exceptions) requires the economic agent to group these valuations and disclosures into a "fair value hierarchy" consisting of three levels, which is based on the nature of the inputs.

[4] International Financial Reporting Standard 13 – Fair value measurement standard

Level 1 – Applies to financial assets and liabilities exchanged on an identifiable, active market. The realisation of the conditions is subject to the simultaneous fulfilment of the following two conditions: a) an existing market, where there is demand for and supply of the assets and liabilities; b) the transaction could be executed at the price specified by the economic agent at the given time of the valuation.

Level 2 – Such assets are allocated to this level that are not the quoted prices related to the asset or liability, applied by Level 1 (derived directly or indirectly from the market price). Due to the not fully independent price formation, these instruments cannot be allocated to Level 1. Upon the categorisation of this level the following cases are typical: a) the quoted price for the assets and liabilities similar to the given instrument is known; b) the quoted price for the assets and liabilities that are the same as or similar to the given instrument is known, but the market does not function at the time of the valuation; c) in addition to the quoted price, other indicators may also be identified in respect of the given instrument: interest rate, yield curve for the given subscription period, volatility, fastness of prepayment, loss-related restrictions, credit risk, insolvency ratio, etc.; d) the price of the instrument can be derived from the market processes with the use of statistical methods (e.g. correlation, regression, averages).

Level 3 – If no relevant, observable inputs are available for the given instrument, unobservable parameters should be used for the determination of the fair value; thereby, such situations may be taken into consideration where the market activity is small at the time of the valuation. The purpose of the valuation at fair value remains the same: to determine a realistic exit price at the time of the valuation from the point of view of the market participant that is the owner of the asset or the obligor of the liability. Accordingly, the unobservable parameters must reflect the conditions that the market participants would use upon the pricing of the asset or liability, including in particular the assumptions related to risk. The economic agent is obliged to use the best information available under the given circumstances, which in part may also include the economic agent's own data.

The valuation logic of the first two levels is essentially built on market information (Mark to Market). The reliability of the obtained results is confirmed by the market processes. However, the valuation approaches of Level 3 are primarily based on model calculations (Mark to Model), for which IFRS 13 recommends several valuation methods to the economic agents: market-, cost- (historic cost) or yield-based approach[5] (*Takács 2014 and 2015*).

[5] Yield-based valuation means the discounted profit or the discounted cash flow.

After the publication of the standard (at the end of the more severe phase of the crisis), the technical literature dealing with fair valuation and the practice formulated much more polished and diverse criticism, free from political impacts, than before the crisis, focusing more on technical issues rather than on looking for somebody to be blamed.

The post-crisis technical literature is also divided in terms of how they judge fair valuation, but new elements also appear, supplementing the previous criticism. Of these new trends, perhaps the most important one for the essence of our paper is that fair valuation can be interpreted as an additional risk, but also as an opportunity. For example, according to the analyses performed by *Reidl and Serafeim* (*2011*) *accounting for the financial instruments at fair value increases the cost of capital, i.e. entails a higher level of risk*. *Shaffer* (*2012*) emphasises that fair valuation is not always objective, clear or transparent. It can lead to erroneous conclusions particularly in the case of inactive markets, in the absence of liquid markets or during the periods of market crises. On the other hand, according to other authors (*Barth et al. 2012*) *fair valuation is not the direct cause of the crisis, as the valuation performed by it represents unrealised gain, hence it cannot be taken into consideration as the financing base of dividends*. They also mention that fair value-based mentality (contrary to the historic cost) is able to treat the concept of good and bad news equally correctly. Having analysed British and German companies *Christensen and Nikolaev* (*2013*) found that in selecting the valuation method for non-financial assets *economic and financial regulations are much more important than the market processes.*

Greenberg et al. (*2013*) provide a good summary of the more sophisticated post-crisis approaches. In their paper they basically formulate three objections to fair valuation:

a) the notion of objective "market price" is very confusing, and may be particularly misleading in less liquid markets;

b) the mechanism of fair valuation may contribute to a larger degree to the infection of the given bank's financial investments, if they have tight correlation with certain investment portfolios or with the financial relations of the network partners;

c) in crisis situations fair valuation may often have coercive effect on the sale of certain assets, even though a higher price could be realised by holding them longer.

On the whole, it can be established that the relevant technical literature and practice have a rather diverse approach to the fair valuation methodology. In the post-crisis technical literature there is no such opinion that would be expressly condemning. Not even in the approaches labelling it as the trigger of the crisis. On the other hand, we did not find such opinions either that would have solely emphasised that the crises could be addressed by fair valuation. This is due to the fact that most authors acknowledge the advantages of fair valuation compared to historic cost. On the other hand, the disadvantages that seemed to have been reinforced by the crisis are also clear.

The authors of this paper tend to take the middle course, according to which fair valuation may have contributed to the outbreak of the crisis, but it surely cannot be designated as the single cause. The other side also has its truth, as in expert hands fair valuation may indeed be capable of addressing problems. This duality can be also traced in our empirical research related to Hungarian credit institutions. However, it cannot be disputed that despite all of its errors and shortcomings, fair value has become/is becoming an increasingly applied asset valuation method. Its role has particularly appreciated in the credit institution sector, since this sector has also been in the centre of the crisis.

5. Measurement of the Hungarian credit institution sector's fair value involvement

The international empirical surveys relating to fair valuation usually examine the relevance of the values at the individual levels (*Bagna et al. 2014; Kolev 2008 Goh et al. 2009; Song et al. 2010*). In our future researches we also plan more detailed value relevance tests in the Hungarian credit institution sector, but for the time being, in this paper we deemed it more important, as a foundation of the topic, to present the weight of fair valuation on the asset and liability sides of the balance sheets in the Hungarian credit institution sector.

We elaborated a potential measurement method for the fair value involvement and sought answers to the following questions.

a) How does the degree of fair value involvement change in the balance sheet of the Hungarian credit institutions?

b) Is it possible to observe before, during and after the crisis typical patterns in the temporal change of fair value involvement, i.e. could the degree of the involvement be indicative of the imminent crisis or should we rather treat these patterns as causes triggering the crisis?

c) Are there significant differences in the patterns of involvement between the subsidiaries and the parent companies?

d) What kind of special features can be observed in the involvement patterns in respect of OTP, as a leading Hungarian bank?

5.1. Database, transformation and time horizon of the empirical survey

The database was compiled from the annual consolidated financial statements for ten years (2006–2015) of OTP, and further five dominant actors of the Hungarian credit institution sector and their parent banks[6], hence it contains balance sheets and income statements of the same structure in accordance with IFRS[7]. The ten-year time series was broken down into four periods (*Table 2*), as in this way we can demonstrate the periodic changes in the effects of the crisis and fair valuation.

Table 2
Periods of the empirical analysis

Pre-crisis period	2006–2008, 3 years
Crisis period	2009–2010, 2 years
First post-crisis period	2011–2012, 2 years
Second post-crisis period	2013–2015, 3 years

From the annual nominal data we calculated periodic average annual data for the above periods by simple arithmetic averaging, after which we expressed the appropriate values of the asset and liability summary rows as a percentage of the prevailing balance sheet totals. The data of the subsidiaries and the parent banks were averaged, thus where the data disclosure refers to subsidiary it means the average of the subsidiaries.

5.2. Concept and measurement of fair value involvement

While examining the annual reports we found that the fair valuation methods could be traced only in the following balance sheet rows[8].

[6] Intesa Sanpaolo Group – CIB Bank Zrt., Raiffeisen Zentralbank Österreich AG – Raiffeisen Bank Zrt., Bayerische Landesbank (continuing the data series also after the transfer of MKB to state ownership!) – MKB Bank Zrt., KBC Group – K&H Bank Zrt., UniCredit Group – UniCredit Bank Hungary Zrt.

[7] In case of Hungarian credit institutions the data are based on the annual reports uploaded to www.e-beszamolo.hu (downloaded on 5 March 2016), while in the case of the parent banks they were collected from the annual reports published on the websites. The authors provide access to the database after prior registration. If you are interested, please contact us by e-mail.

[8] On the asset side it was not possible to break down the data in an unambiguous way, hence we treated the affected rows together.

Table 3
Scope of involvement in the balance sheets

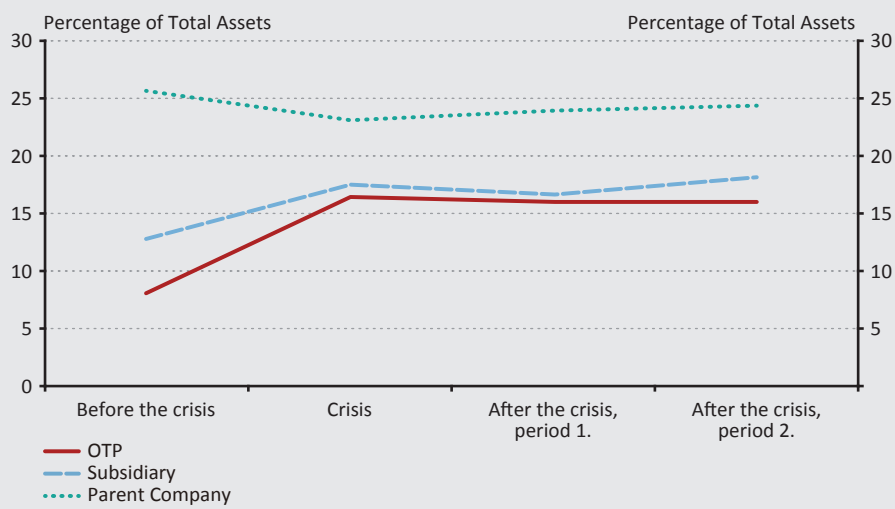
Assets involved
Financial assets recognised against profit/loss
Ratio of derivative financial instruments
Ratio of financial investment available for sale
Liabilities involved
Liabilities recognised against profit/loss

After the described transformations of the input data, we obtained the fair value involvement's primary indicator, which shows to what extent the fair valuation methodology was typical for the given bank, or rather for the average of the banks, on the asset and liability sides.

The primary involvement is expressed as a percentage of the balance sheet total and for the time being does not contain the internal structure of the fair value by levels.

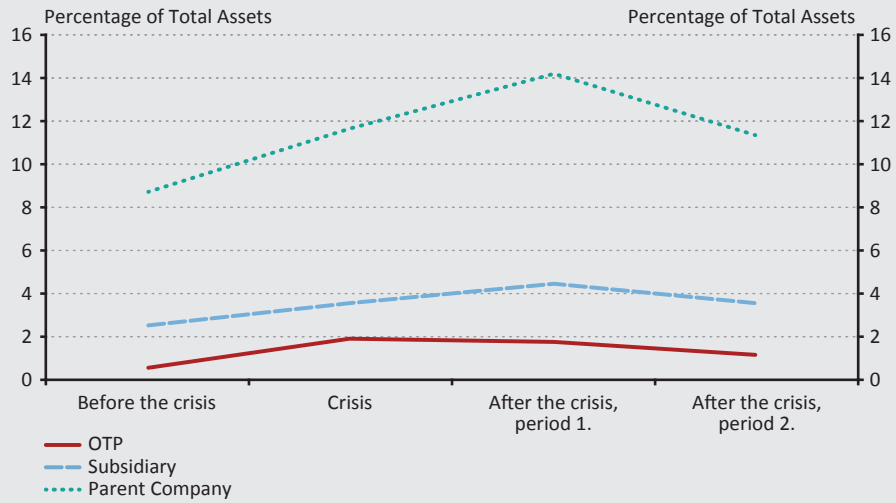
Figures 1 and *2* show the temporal change of the primary involvement values, obtained after aggregating the input data according to the above method, on the asset and liability sides.

Figure 1
Temporal change of fair value involvement on the asset side as a percentage of the balance sheet total



Source: Calculated on the basis of aggregated data.

Figure 2
Temporal change of fair value involvement on the liability side as a percentage of the balance sheet total



Source: Calculated on the basis of aggregated data.

If we also consider the level structures of fair valuation, we get even more perfect involvement data (secondary involvement).

Table 4
Source: Calculated on the basis of aggregated data.

Weight of Level 1 within the assets involved	OTP	SUBSIDIARY	PARENT
Pre-crisis	63.79%	47.75%	51.06%
During the crisis	87.14%	49.43%	47.49%
First post-crisis period	58.83%	48.83%	44.17%
Second post-crisis period	78.39%	72.13%	54.10%
Weight of Level 2 within the assets involved	**OTP**	**SUBSIDIARY**	**PARENT**
Pre-crisis	20.12%	50.34%	42.65%
During the crisis	9.66%	49.41%	48.54%
First post-crisis period	40.86%	49.48%	51.50%
Second post-crisis period	21.17%	27.19%	43.00%
Weight of Level 3 within the assets involved	**OTP**	**SUBSIDIARY**	**PARENT**
Pre-crisis	16.09%	1.91%	7.20%
During the crisis	3.20%	1.16%	3.97%
First post-crisis period	0.31%	1.69%	4.33%
Second post-crisis period	0.44%	0.68%	2.90%

Source: Calculated on the basis of aggregated data

Table 5
Weight of fair valuation by levels within the liabilities involved

Weight of Level 1 within the liabilities involved	OTP	SUBSIDIARY	PARENT
Pre-crisis	0.01%	0.86%	23.23%
During the crisis	0.11%	1.62%	9.87%
First post-crisis period	0.26%	0.56%	7.84%
Second post-crisis period	0.16%	0.61%	12.24%
Weight of Level 2 within the liabilities involved	**OTP**	**SUBSIDIARY**	**PARENT**
Pre-crisis	99.99%	96.99%	68.70%
During the crisis	99.89%	98.16%	85.87%
First post-crisis period	95.47%	96.45%	87.77%
Second post-crisis period	99.84%	99.25%	85.59%
Weight of Level 3 within the liabilities involved	**OTP**	**SUBSIDIARY**	**PARENT**
Pre-crisis	0.00%	2.15%	8.07%
During the crisis	0.00%	0.22%	4.26%
First post-crisis period	4.26%	2.99%	4.39%
Second post-crisis period	0.00%	0.14%	2.16%

Source: Calculated on the basis of aggregated data.

5.3. Most important results of the empirical analysis in respect of the primary involvement (*Figures 1 and 2*)

- The involvement is substantially higher on the asset side than on the liability side. This finding is independent both from the period and the classification. Obviously, this also follows from the feature of the balance sheet, since on the liability side the equity cannot be valued at fair value.

- The involvement of the parent banks with international presence substantially exceeds the involvement of their subsidiaries and also that of OTP. This finding holds true in all periods under review, both on the asset and the liability sides. Accordingly, the degree of primary involvement can be traced back both to the size and the international nature.

- OTP is the least affect. This finding also applies to all periods and appears to be confirmed both on the asset and liability sides. OTP is not under any parent bank's "pressure" in respect of the valuation of the asset components. The parent company's instructions for sure play an important role in the development and valuation of the subsidiaries' asset structure.

- The OTP's fair value strategy on the asset side and the relation thereof to the crisis significantly differ from the parent banks' asset side fair value crisis strategy. The OTP's asset side primary involvement level before the crisis was by far the

smallest. However, during the crisis it doubled and thereafter it practically stagnated. The parent banks' primary involvement was the highest before the crisis. It somewhat declined as a result of the crisis. However, thereafter it once again rises, albeit to a smaller degree.

- The subsidiary banks' primary involvement curves on the assets side resemble to that of OTP rather than of their own parent banks (see *Figure 1*). Accordingly, in the case of the international large banks we tend to designate more easily the possibility of fair valuation as an important medium leading to the crisis than in the case of the smaller Hungarian credit institutions, which settle for a follower strategy. Large banks are also characterised by higher willingness to take risks, as – compared to the balance sheet total – the ratio of those assets and liabilities that are valued at fair value is higher. Before and after the crisis there was no material change in the primary involvement compared to the balance sheet total.

- This suggests that the asset side fair value crisis strategy of the Hungarian credit institution sector differs from the international trends. Receivables from customers and other credit institutions are dominant asset components, which were valued at amortised historic cost.

- It is a reasonable question whether the different activity structure and the corresponding different balance sheet structure may alone explain the different fair value crisis strategy. For this we had to examine the ratio of the receivables and their change in time. We obtained the following results:

Table 6
Ratio of receivables (customers, credit institutions) to the balance sheet total

	Subsidiary	Parent	OTP
Pre-crisis	77.34%	62.73%	73.88%
During the crisis	71.21%	63.11%	72.20%
First post-crisis period	66.61%	62.99%	70.34%
Second post-crisis period	62.56%	63.52%	57.36%

Source: Calculated on the basis of aggregated data.

It shows that the activity structure and the change thereof in time did not cause any tangible change in the parent banks' balance sheet structure. However, in case of the subsidiary banks a major structural change occurred, which was joined by OTP, although with a small delay, but more dynamically.

Obviously this clearly traceable trend can be attributed to several factors: the frozen credit market, and /or the continuous phase-out, prepayment and final repayment of the foreign currency loans, etc. However, the analysis of this is beyond the scope of this paper. However, it can be stated that substantial differences in the balance

sheet structure of the parent and subsidiary banks are more typical before the crisis. This is not the case after the crisis. Due to this, in the case of the parent banks the ratio of the financial assets valued at fair value was perceivably higher only before the crisis. The answer to our question cannot be deemed straightforward by far, hence the problem needs further analysis.

The same question arises in respect of the hedging transactions: i.e. whether the difference in the fair value crisis strategy can be attributed to the different ratio of those. Having analysed this question as well, we came to the conclusion that it cannot, as the share of hedging transactions is marginal in the Hungarian subsidiary banks' balance sheets. It is hardly higher in the balance sheets of the parent banks:

Table 7
Change in the ratio of hedging transactions in time

Description	Assets		Liabilities		Assets	Liabilities
	Subsidiary	Parent	Subsidiary	Parent	OTP	
Pre-crisis	0.54%	0.44%	0.40%	0.48%	0.09%	0.15%
During the crisis	0.34%	0.91%	0.14%	0.73%	0.14%	0.70%
First post-crisis period	0.40%	1.32%	0.43%	1.23%	0.13%	0.85%
Second post-crisis period	0.61%	0.88%	0.25%	1.06%	0.23%	0.69%
Average (2006–2015)	0.49%	0.88%	0.31%	0.90%	0.15%	0.56%

Source: Calculated on the basis of aggregated data.

5.4 Most important results of the empirical analysis in respect of the secondary involvement (see: *Tables 4 and 5*)

5.4.1. Temporal trends

Compared to the pre-crisis situation, in the subsequent periods (particularly in the second period of the stabilisation) we can see on both the asset and liability sides that the role of Level 3 substantially dropped, i.e. there are distinct efforts on both sides of the balance sheet by the market participants to transform the internal structure of their fair value involvement at the expense of Level 3. This reaction may be clearly interpreted as risk mitigation, or at least it carries a clear message to the potential investors, promising the cleaning of the balance sheets form the "elements of higher risk". Surprisingly, this impact is less strong in the relation to the subsidiaries and OTP than in case of parent banks, which essentially can be attributed to two reasons. On the one hand, to the independent decisions of the banks, and to the other hand, to the changes in the Hungarian financial legislation. This is particularly true for OTP. Namely, during 2010 the bonds issued in the Hungarian municipality sector were reclassified as loans. Unfortunately, no active market developed in Hungary for municipal bonds, hence the credit institutions were unable to allocate a relevant market value to these bonds. Based

on the analysis of the accounting content of the given instrument they found that these instruments satisfy the IAS 39 standard, i.e. they can be defined as loans/receivables; thus, from that time they were valued at amortised historic cost rather than at fair value. Another effect is the valuation changes based on the banks' individual decisions, which in case of OTP was attributable to the hedging transactions elaborated for covering the exchange rate risk of the foreign currency-denominated mortgage loans. Upon the valuation of the cross-currency interest rate swaps, due to the speculations related to the EUR/CHF spreads, the bank deemed the market quotes less reliable, hence it decided to reallocate the respective portfolio from Level 2 to Level 3. In 2012, with the improvement in the quality of information, it was reclassified as Level 2. The situation was similar in case of the subsidiaries as well. The hedging transactions' value was measured by model-based valuation instead of the market-based measurement. This explains the slightly rising data of the given period.

During the crisis (2008–2009) and in the period thereafter (2010–2011) the parent companies typically demonstrated prudency in the area of fair valuation. They reviewed the reliability of the value of their assets and liabilities, allocated to Level 1, valued purely on the basis of market information. The reliability of the business and market information in that period was highly questionable. Due to the general rise in volatility, certain instruments were hit by major price or exchange rate fluctuations; thus, the trust in the results of the repeatedly performed valuations was shaken. Due to the ambiguous results, the valuation purely based on market information was increasingly replaced by the adjusted valuation, supplemented by financial models. We can see this in the rise in the assets' (*Table 4*) Level 2 ratios compared to the previous period. In the post-crisis period these effects disappeared and the process took a reverse direction. Once again the ratio of Level 1 increased at the expense of Levels 2 and 3, as the market data became increasingly reliable and the volatility decreased.

Despite the special domestic effects, we can state as a fact that in the Hungarian credit institution sector the weight of Level 3 in the second post-crisis period is generally materially lower than before the crisis, i.e. albeit with a small delay we follow the efforts and trends of risk elimination, appearing more strikingly at the parent banks.

5.4.2. Structural trends of the balance sheet and the fair valuation levels

On the asset side we can see that by the end of the period under review, all actors raised the weight of Level 1 above the pre-crisis index. Thus, Level 1 clearly has a dominant role in the fair value involvement, which is attributable to the improvement in the reliability of market information and to the clear effort that the Hungarian credit institution actors regarded it as one way to recover from the

crisis to modify the balances sheet and fair value level structure in such a way that clearly delivers the message to the investors on the intention to reduce risks.

This is how they intended to comply to a higher degree with the standard's requirements related to fair valuation, according to which the economic agent that wishes to apply it should do its best to use reliable market information for the valuation to the highest possible degree.

The dominant role of Level 2 is evident on the liability side. This is primarily attributable to the hedging transactions, in the valuation of which the market data is an important element, which is not necessarily available directly. The final balance sheet value can be determined by deriving it from the market price and rate of other instruments, after performing the necessary adjustments. Anyway, the deployment of the valuation methodology machinery is necessary to some degree in all cases. Very similar structural changes occurred on the liability side as on the asset side.

Accordingly, our findings correspond to the correlations identified in the technical literature. The crisis clearly has an influence on the fair valuation strategy, as it evokes such adjustment mechanisms, the key objective of which is to reduce the additional risk inherent in fair valuation. This also means that the fair valuation strategy indirectly reacts upon the crisis, as it exerts an influence on the level of market risk. In this sense, particularly the weight of Level 3 may play a material role as potential means of recovering from the crisis.

5.5. Fair value involvement as risk indicator

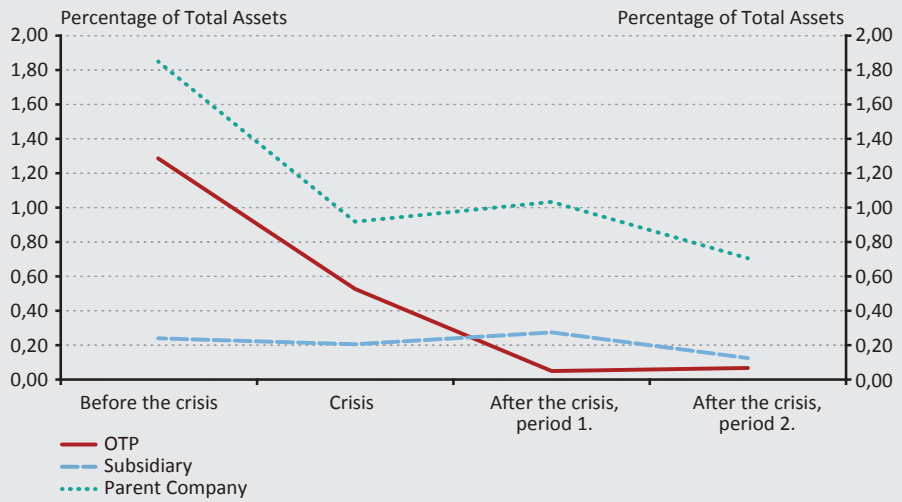
We also examined the role of the individual levels in the periods under review on the asset and liability sides of the balance sheet. In this respect we paid special attention to Level 3, as this bears the highest risks, because at this level the valuation is performed by models. We restricted the analysis to the asset side, because on the liability side the weight of Level 3 compared to the prevailing balance sheet total is negligible.

This is already a sufficiently aggregated and optimised indicator, which may rightly be treated as the risk indicator of the fair valuation involvement, also reflecting the weight of the "risky items" in the balance sheets (asset side). This indicator, boiling down the additional risk of fair valuation to a single figure, may be suitable to deliver important information to the investors on the credit institution's real accounting policy and the impact thereof on the exposure.

It is very easy to calculate it: the primary and secondary involvement indicators must be multiplied by each other at each level; thus, obtaining the weight of the individual levels compared to the balance sheet total.

On the asset side we try to present the role of Level 3, since this level may carry the highest investment risk due to its content.

Figure 3
Temporal change in the risk rate of fair value involvement



Source: Calculated on the basis of aggregated data.

The trends are clearly reflected by *Figure 3*. Before the crisis, the international parent banks relied on the possibility of Level 3 to a substantially larger extent than their Hungarian subsidiaries or OTP. Essentially, this difference did not change during or after the crisis; however, it is a major difference that after the crisis the inherent risk halved, as the weight of Level 3 is hardly half of the pre-crisis indicator.

The reaction of the actors was extremely fast. They tried to shift a large part of their assets subject to fair valuation on Level 3 towards Level 1 and 2, which continuously reduced the role and weight of Level 3 in their balance sheets. The subsidiaries' and OTP's risk of this type became balanced, while the parent banks' exposure (ratio to the balance sheet total) is still almost six times higher than the Hungarian average.

If we also consider the magnitude of the balance sheet totals and not only the ratios to those, then according to our estimation (calculating with the prevailing average annual foreign currency exchange rates), on the asset side of the parent banks' balance sheets the amount affected by Level 3 was on average around EUR 140 million before the crisis, which fell back to one-third by the 4th period. Compared to this, the involvement of the domestic subsidiaries and OTP was negligible.

6. Summary and outlook

According to our finding, the fair value involvement can be measured at three levels:

- primary involvement means the ratio of the individual balance sheet items to the balance sheet total, which is the primary point of orientation on the scope of fair valuation;
- secondary involvement is when the structure of the involvement is measured at the levels of fair valuation, also as ratio of the balance sheet total;
- in our opinion, the fair valuation involvement, as risk indicator, can be applied, if we express the weight of Level 3 on the asset side as a ratio of the balance sheet total.

As regards the debate in the technical literature on the relation between fair valuation and the crisis, we can add that *in the Hungarian credit institution sector the crisis generated clearly demonstrable adjustment mechanisms*, which were realised in the fall of additional risks inherent in the fair value involvement.

We found that in case of the parent banks and their subsidiaries the adjustment took place not at the same pace and not in a homogenous manner. In our view this may have been mostly attributable to the fact that the Hungarian actors did not capitalise on the fair valuation opportunities to the same degree as the parent companies covered by the analysis.

We explain this finding by the material differences in the ratio of assets valued against profit/loss and – within equity – against the valuation reserve[9], which are as follows:

Table 8
Average ratios of recognitions against profit/loss versus, within equity, against the valuation reserve (OCI) in the period under review

Description	Subsidiary	Parent	OTP
Ratio of assets valued against profit/loss	20.34%	59.88%	11.43%
Ratio of assets valued against OCI	79.66%	40.12%	88.57%

Source: Calculated on the basis of aggregated data.

It is clear that the domestic subsidiaries (and OTP), as mentioned before, prefer the more prudent valuation methods. By contrast, in respect of the recognition of the valuation difference, the parent companies give preference to recognition against

[9] Components valued against Other Comprehensive Income (OCI) according to the international technical literature.

profit/loss. Thus, parent companies capitalise on the flexibility provided by fair valuation more often than the Hungarian subsidiaries.

Obviously, we do not regard our research as completed. In many respects it left at least as many questions open as the number of questions it answered. Accordingly, several publications are yet to follow, as the value relevance analyses and the value measurement practice outside the credit institution sector can still contribute a lot to the general acceptability of our findings; thus, our research will be focused on this in the near future.

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Capital Allocation in the Insurance Sector*

Dóra Balog

Capital allocation plays a key role in the enterprise risk management system of insurance undertakings: when applied during performance measurement, it creates a link between risk and business. In addition to performance measurement, capital allocation may also have a role in pricing decisions and in the preparation of strategic business decisions. With the entering into force of the Solvency II regulation the consistent application of capital allocation has become a regulatory expectation in the insurance sector which lands relevance to our topic. The available literature is extremely rich; however, the applicable methods have been designed based on theoretic axioms rather than the needs of the practitioners, so the gap between theoretic research and real-life application is significant. Our objective is to translate the rather abstract formulation of the problem of capital allocation, customary in the literature, to the practical questions arising during implementation by insurance companies; thereby, providing some guidance for choosing the theoretically applicable methods. In this study, we will review the issues arising in connection with the implementation of capital allocation: what needs to be allocated for what specific purposes and how such allocation should take place.

Journal of Economic Literature (JEL) codes: G22, G32, C71

Keywords: capital allocation, insurance, Solvency II Directive

1. Introduction

As insurance events are stochastic by their nature, even if the most advanced statistical methods are applied, the collected premiums and reserves may not cover the claims against the insurer. In such a scenario, the solvency capital guarantees that the insurer can continue meeting its obligations. In other words: the solvency capital is intended to cover the losses incurred in case of the unexpected

* The views expressed in this paper are those of the author(s) and do not necessarily reflect the offical view of the Magyar Nemzeti Bank.

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unfavourable development of events. Although the solvency capital provides protection for the losses suffered by any business line, it is important to know for a number of reasons to what extent the various business lines contribute to the insurer's capital requirements. Keeping capital is costly, and the allocation of such cost is a rather relevant factor for evaluating the performance of business lines and various product portfolios, for product pricing and for certain strategic decisions (e.g. acquisitions, mergers, starting a new or terminating an existing business line). Insurance companies typically allocate their capital to business lines, subsidiaries, products or product groups, but allocation to various geographic regions or possibly even to distribution channels. This problem is not new but the entry into force of the Solvency II[1] Directive as of 1 January 2016 makes it especially relevant for insurance undertakings. The *first pillar* of the directive introduces new rules for capital and capital requirement calculations (causing a change in the volume of capital to be allocated). As part of the own risk and solvency assessment process (hereinafter ORSA) prescribed under the *second pillar*, the capital allocation process itself becomes subject to regulatory supervision (through the requirements pertaining to the integrated enterprise risk management system). Quoting the study of *Maume – Deschamps et al.* (*2016*): "The ORSA (Own Risk and Solvency Assessment) approach of the *second pillar* makes capital allocation an important exercise for all insurers […]*"*. Developing integrated enterprise risk management (ERM) systems[2] for insurers is a task of key relevance not only because of the Solvency II requirements. As McKinsey points out (*Bongiovanni et al. 2016*), insurers having a more advanced enterprise risk management system performed significantly better compared to their peers during the crisis (2008 and 2009). Having recognized that the insurers themselves started to deploy significant resources for developing their ERM systems. Capital allocation is an important component of these ERM systems, since through performance measurement the insurer compares the return (characterising the profitability of the business) realised by its different business lines (subsidiaries, portfolios) to the capital requirement allocated for the given unit (being a relevant risk indicator).

Literature on capital allocation is extremely wide-ranging; however, it mainly focuses on methodology issues of mostly theoretic nature: authors typically apply game theory (e.g. *Denault 2001; Csóka et al. 2009, Csóka and Pintér 2016*), option pricing (e.g. *Myers – Read 2001; Sherris 2006; Kim – Hardy 2007*) or other statistical approaches (e.g. *Kalkberener 2005; Homburg – Scherpereel 2008; Buch – Dorfleitner 2008*). By contrast, little reference is made to issues of practical application, as *Kim and Hardy* (*2007:23*) writes, "capital allocation methodology has mainly been developed based on a list of axioms rather than on motivation *and a little has been researched on how the given capital allocation can be used in light of its*

[1] Directive 2009/138/EC of the European Parliament and of the Council.
[2] See for instance *McKinsey&Company (2014*).

motivations." The objective of our study is to reduce this gap: we want to give an overview of the topic from a pragmatic viewpoint, focusing on the insurance sector.

This study is composed of the following parts. In the second chapter, we provide a formal description of capital allocation, and in the following sections we will use the notations introduced here for discussing the various issues at hand. In the third chapter, we present the possible applications, that is, *why* capital allocation is *important* and *what* insurance companies use it for. In the fourth chapter, we define the possible capital concepts and we examine *what* exactly we distribute during capital allocation. In the fifth chapter, we discuss *how* the allocation should be performed: we list the various applicable methods and the properties we can expect from them. It is always up to the entity using the method to set the priorities in any given capital allocation situation among the many possible expectations, but the summary "map" we prepared as the aggregation of the criteria referred to in the literature (often under different names) may be helpful. Moreover, we define which methods/method types are the most suitable for the various applications. Chapter six concludes.

2. Description of capital allocation, notations

Interpreted for insurers, the problem of capital allocation can be formulated as follows: an insurer is made up of a limited number of subunits (let's call them business lines, but they could also be portfolios or subsidiaries etc.). Let $N=\{1,2,...,n\}$ denote the set of the lines of businesses. The returns of the various business lines are described by random variables on the $(\Omega,\mathrm{M},\mathrm{P})$ probability field, where Ω is the finite set of possible outcomes, M denotes the possible subsets of Ω, while *P* is a probability distribution on (Ω,M). Let the set of probability variables interpreted on $(\Omega,\mathrm{M},\mathrm{P})$ be X. Let $X_i \in X$ designate the net income (loss) realised by business line *i*, so $\sum_{i=1}^{n} X_i = X_N$ is the insurer's net income. We measure risk by the $\rho: X \to \mathbb{R}$ risk measure. The risk measure assigns a real number to the portfolio of a business line (or to a portfolio of a set of several business lines), representing the guarantee for absorbing unexpected losses (we usually call this capital). The application of coherent measures of risk is broadly accepted in the literature[3] (see for example *Csóka 2003*). Let's denote the capital allocation situation as follows: $X_N^\rho = \{N, \{X_i\}_{i\in N}, \rho\}$, and their sets as $RCAS_N$ ("risk capital allocation situation"), while the capital allocation method itself is the $\varphi: RCAS_N \to \mathbb{R}^N$ function, which assigns one vector to every capital allocation situation, containing the capital allocated to each business line (a specific numeric example can be found in the article of *Balog et al. 2010, among others*) The purpose of our study is to translate the above defined methodological and theoretic problem to the issues arising

[3] Coherent risk measures satisfy the conditions of monotonicity, subadditivity, positive homogeneity, and translation invariance.

during the day to day activity of insurance undertakings. In the next chapter, we will discuss the various aspects of the allocation problem with the help of the above described notations.

3. Applications of capital allocation

There are many different application areas of capital allocation. It is used by banks, insurers, fund managers, and also in a number of other nonfinancial areas in the form of cost allocation. In our study, we only focus on the insurance sector; however, even within this sector, we can encounter diverse applications, as presented below.

3.1. Performance measurement

Performance measurement is undoubtedly the most important and the most widespread application of capital allocation. In this case the performance (return) achieved by the business line (or, for example, by the subsidiary) is measured in comparison to the capital tied up by them. The most frequently used indicator for evaluating risk-adjusted performance is RORAC (Return On Risk Adjusted Capital), which based on *Tasche* (*2008*) can be indicated as follows relating to the entire insurer:

$$RORAC(X)=\frac{E(X_N)}{\rho(X_N)}=\frac{\sum_{i=1}^{n}E(X_i)}{\rho(X_N)}$$

where, using the notations from *Chapter 2*, the $X_1,...X_n$ random variables are the profits (losses) of each business line, $\sum_{i=1}^{n}X_i=X_N$ is the profit/loss of the entire insurer; and $\rho(X_N)$ is the insurer's capital requirement measured by risk measure ρ. The RORAC indicators of the various business lines are thus:

$$RORAC(X_i|X)=\frac{E(X_i)}{\varphi_i(X_N^{\rho})}$$

where $\varphi_i(X_N^{\rho})$ stands for the capital allocated to business line *i*. Although the main concern of our study is the denominator of the above expression, we must note here that it is extremely important to proceed carefully when defining the contents of the numerator. The first important question is whether we apply the RORAC indicator *ex ante* or *ex post.* The *ex-ante* application is more typical in case of strategic decisions (e.g. to analyse the impact of a major transaction), while the *ex post* approach is generally used in connection with performance measurement when the numerator contains the actually realised return. When calculating the RORAC, insurers generally take into account their net income after taxes and loss write-offs (*Cummins 2000*).

The treatment of the return realised on investment funds derived from the different products also deserves attention when defining the profit. Namely, due to the

nature of insurance business (collection of premiums, then the payment of claims at a future date), insurers generate a substantial amount of funds to invest; therefore, the proper recognition of the arising risk is rather important and also that we take into account the realised profit in a manner consistent with such investments. We can manage risks in two ways: we either distribute them among the various business lines in proportion to total assets (that is, e.g., we manage the risk of the investment funds derived from the premiums of life insurances together with the risks of life insurances), or we regard the investment division as a separate business line in the course of allocation. We need to consider the purpose of capital allocation when deciding which one of the two approaches should be used. In the course of performance measurement, it is logical to treat investments separately, because underwriting insurance risks and taking investment decisions are, in most cases, completely separated; according to the general practice of insurers, these two activities are handled separately. At the same time, it is also true that the funds to invest are generated by selling insurance products; thus, the insurer implicitly assumes that the business lines invest such funds into risk free investments in a maturity structure adjusted to the expected future cash flow (this would happen if no separate business line existed at the insurer) in performance measurement. And the profit realised on investments are recognized in such a way that only the profit (loss) realised on top of the risk-free return is "accounted" for the investment business line. *Bingham* (*2014*), for example, presents a performance measurement and capital allocation model operating on a similar principle at an American insurer.

Pricing is an exception to the above practice. Namely, if we recognize the profit on investments under insurance products, this is equivalent to the reduction of the product's price in the course of pricing and insurers often act this way on very competitive markets.

3.2. Strategic decisions

The application of capital allocation methods in the course of strategic decision making assumes an advanced enterprise risk management practice. Capital allocation techniques may also be applied in the course of evaluating planned acquisitions and mergers and decisions concerning the launching of new business lines or the development or termination of existing ones.

Assessing the change in capital requirements is a key component of the preliminary assessment of any transaction. With the help of capital allocation, we can estimate not only the change in capital requirement on the level of the entire insurance undertaking, but also how the contribution of each existing business line to the total risk of the insurer changes. This is a very relevant information because even substantial changes may occur in the measured profitability of the business lines.

Risk adjusted profit (see in the previous subchapter) is also an important input in the course of strategic planning, since it is the basis for deciding which business line's development increases the value of the company the most and which one should be shed (see for example *Venter 2004*). When capital allocation is intended to support strategic decisions, the applied methodology is very much similar to the one used for performance measurement, however, such measurement takes place using expected profitability and risk indicators instead of historic ones.

3.3. Pricing

The third important application area for insurers is pricing. According to *Venter* (*2009*), insurance professionals accept the traditional (CAPM) pricing model to a lesser extent than representatives of other financial institutions, due to the fat tail loss distribution approach primarily characterising the life insurance business line, which cannot be properly modelled using the first and second momentum. Consequently, insurers have the need for pricing models that are based on capital allocation methods. The survey on economic capital prepared by *Mueller et al.* (*2004*) under the auspices of the Society of Actuaries[4] also shows that a large part of insurance undertakings use the allocated economic capital for product pricing. As a general approach, the price (the premium) of an insurance product results from the following factors (*Werner – Modlin 2016:5*):

Premium = Receivables from contracts + Costs related to payments + Contracting expenses + Profit

In the above expression, in the optimal case, the profit should cover the expected return on capital: the higher the capital need of a product is, the more profit is expected from it. The capital need of each product can again be defined using capital allocation methods. Although in principle it would be possible to allocate capital directly for products, but in practice this is way too complicated, and the necessary data are not available either on product level. For this reason, when actually defining the capital cost of a given product, the capital allocated to a given business line is typically distributed to the products with the help of some linear approach. Therefore, the profit factor featured in the price of a product can be expressed as $(HR - r) \cdot \varphi_i\left(X_N^{\rho}\right)$, where *HR* is the expected return on capital ("hurdle rate"), *r* is the risk-free return (return realised on the assets ensuring the capital), and $\varphi_i\left(X_N^{\rho}\right)$ represents the capital allocated to the given product.

However, there is no consensus whether the cost of capital should be built into the product price in such a way. Namely, in another approach, capital cannot play a role in pricing as pricing must be based only on the distribution of the insured risk. Based on this argumentation, thanks to the stringent capital regulations for

[4] Society of Actuaries.

insurance undertakings, having excess capital over the required level no longer has additional value, as insured parties will not pay more for the same insurance policy based on the solvency of the party providing the insurance. (However, this, does not mean that capital allocation methods are not needed, as even they are not used for pricing, defining the allocated capital in the course of evaluating the performance of business lines is nonetheless needed: the most relevant information for management is the return realised on the invested equity.)

4. Concept of capital in the literature

As a first step to capital allocation, we need to clarify what exactly we want to allocate, that is, what we mean by the insurer's capital. Although this question may seem trivial, we encounter a great deal of capital concepts either in the literature or when analysing the balance sheets of insurers (regulatory capital requirement, economic capital requirement, various accounting categories). Most studies discussing capital allocation treat the definition of capital with extreme simplification (which is, of course, understandable as methods can be applied for many problems, each of which have a different definition of capital or the risk to be allocated; just as for banks and insurers the terminology and the contents are also different).

As the first step (as proposed by *Farr et al. 2008*), we must differentiate the concepts of *capital requirement* (a theoretic capital requirement quantified by some risk measurement method) and *available capital*. Available capital is an accounting category which, with some level of simplification, can be simply read from the insurer's balance sheet as the difference of assets and liabilities. *Albrecht* (*2006*) uses the also suggestive "physical capital" designation. Required capital should be broken down to at least two additional groups, as also proposed by the "Specialty Guide on Economic Capital" by the Society of Actuaries (*Mueller et al. 2004*): to *regulatory capital requirement* and *economic capital requirement*[5]. In case of solvent financial enterprises, the level of available capital exceeds both the value of the regulatory capital requirement and the economic capital requirement, while there is no generally valid relation between the levels of the latter two.

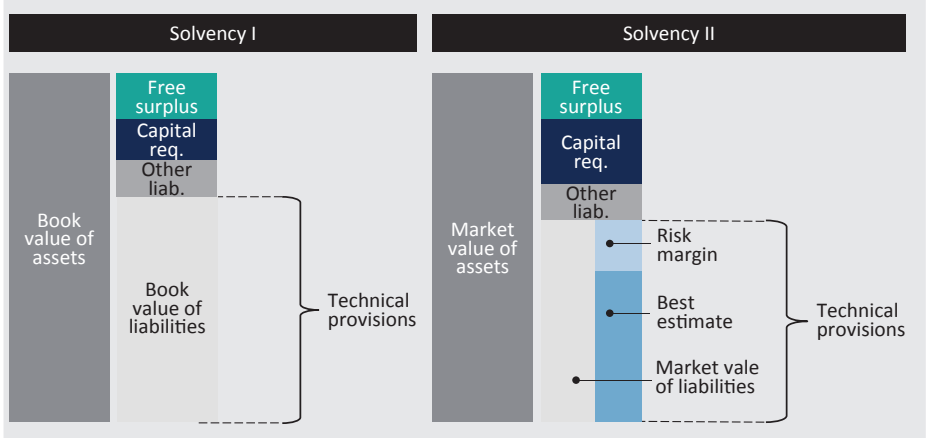
4.1. Regulatory capital requirement – Solvency II

By regulatory capital requirement we mean the compulsory minimum capital requirement prescribed by the regulator – in the European Economic Area this means the capital requirement as per Solvency II. Below we will shortly present the requirements of the directive introduced in January 2016, which are of major relevance for the players of the European insurance sector.

[5] In practice, the regulatory capital requirement and the economic capital requirement is typically simply referred to as regulatory or economic capital, but to avoid misunderstanding, we will not use the abbreviated form.

Similarly to Basel II (and since then Basel III) pertaining to banks, Solvency II is built on *three pillars.* The *first pillar* covers quantitative requirements: the methodology for the required capital calculation and the evaluation rules of certain balance sheet items. For calculating their capital requirements, insurers may decide to apply either the standard method or a partially or fully internal model, the application of the latter two being subject to preliminary supervisory authorization. Whether computed with an internal model or with the standard method, the capital requirement as per Solvency II (SCR – Solvency Capital Requirement) corresponds to a value at risk (VaR) calculated with a 99.5 per cent significance level and a 12-month time horizon (that is, the level of loss which is expected to be exceeded only once every 200 years). Capital requirement calculation in a VaR sense is a significant progress compared to the much less risk sensitive, ratio-based capital calculation practice under Solvency I. Another relevant difference is that the new directive prescribes evaluation based on market prices instead of the previous, book value based evaluation (as per the evaluation standards applied in the given country). The difference between the old and new approaches are demonstrated by the following figure:

Figure 1
The regulatory capital requirement as per Solvency I and Solvency II Directives[6]



The *second pillar* supplements the quantitative requirements of pillar one by qualitative requirements. Besides the outline of the supervisory review procedure, the second pillar contains the requirements pertaining to the company's internal governance and risk management system and its internal capital calculation. Pursuant to the requirements pertaining to the risk management system, risk

[6] According to Article 77 of the Directive "The risk margin shall be such as to ensure that the value of the technical provisions is equivalent to the amount that insurance and reinsurance undertakings would be expected to require in order to take over and meet the insurance and reinsurance obligations".

management function must be an integral part of the company[7]. Having a well embedded enterprise risk management (ERM) system into the companies' daily operation was already part of best practices in the insurance sector, but it only became a regulatory requirement under Solvency II. Among the requirements pertaining to risk management, the directive also expects the existence of a function and processes (policies and procedures) for the identification, measurement and management of the relevant risks as well as the related reporting procedure.

The ORSA process is an important component of the second pillar, which is the equivalent of the banks' ICAAP[8] for the insurance sector. The ORSA process covers the internal (economic) capital requirement calculation (which although it is controlled by the regulator, it does not have an actual capital generation requirement on theoretic level), hence economic capital requirement calculation also becomes subject to supervisory control under Solvency II. In addition to capital modelling, the second pillar also places much emphasis on the related organizational framework and processes: ORSA also ensures the existence of risk-management processes integrated into business decisions.[9] Capital allocation becomes a key factor at this point, as it is one of the most important tools of the internal capital requirement calculation applied in the course of business and strategic decisions (for example, it links the business line's return with its risk, i.e. the capital allocated to it through performance measurement). For the sake of accuracy, let us note here that the directive mentions the capital allocation process explicitly[10] only in respect of the companies using the partial or full internal model under the first pillar, but it follows logically that the existence of such capital allocation process is required in other cases as well (that is, when applying the standard method).

The *third pillar* of the Directive contains the reporting and disclosure obligations.

4.2. Economic capital requirement

Economic capital requirement means the capital requirement calculated based on the company's internal risk assessment. The objective of the economic capital requirement calculation is to assess and quantify as accurately as possible the insurer's risks. Modelling the economic capital requirement is part of the insurance company's internal risk assessment process and the company uses its result in its enterprise management system.

[7] According to Article 44 of the Directive "That risk-management system shall be effective and well integrated into the organisational structure and in the decision-making processes of the insurance or reinsurance undertaking."
[8] Internal Capital Adequacy Assessment Process.
[9] According to Article 45 (4) of the Directive "The own-risk and solvency assessment shall be an integral part of the business strategy and shall be taken into account on an ongoing basis in the strategic decisions of the undertaking."
[10] Article 120.

Sandström (*2011:68*) provides the following definition*: "economic capital* [*requirement*]*, is defined as the company's own amount of capital needed to meet future obligations arising from the existing business with a high degree of certainty over a defined time horizon and to maintain its external credit rating".*

According to *Mueller et al.* (*2004*) although economic capital requirement can be defined in many different ways, common in all of these definitions is that it expresses the volume of capital necessary to cover the losses suffered by the insurer over a given period of time in case of an unfavourable evolution of events, with a predefined risk tolerance threshold (confidence level).

For us this capital concept is the most relevant of all, as this is the one resulting from the measurement of the insurer's (or any other entity's, portfolio's) riskiness; i.e., in practice it is the economic capital requirement that we quantify using a selected risk measure.

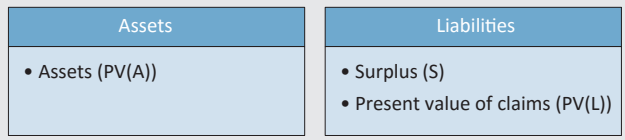
Comparing the concepts of economic and regulatory capital requirement, we can see that internal capital requirement calculated under the second pillar of the Directive can also be regarded as economic capital requirement. Previously economic and regulatory capital requirements (calculated under the first pillar) could have been substantially different due to the standardised and less risk sensitive nature of the regulatory approach; whereas today such difference has been substantially reduced (or even disappeared if the insurer uses its own internal model under Pillar 1) due to the more risk sensitive approach of Pillar 1. This is clearly demonstrated by the fact that the Directive defines capital requirement as per the standard method as a risk indicator equivalent to the 99.5 per cent VaR.

4.3. Comparing capital concepts

In order to apply the methods proposed in the literature, first we have to match the capital concepts used in the literature and in practice. Part of the studies discussing capital allocation from a theoretic perspective typically view capital allocation as the formal problem defined in Chapter 2, i.e. it interprets the capital as a risk ($\rho(X)$) quantified using some risk measure. *Tasche* (*2008*)*, Dhaene et al.* (*2012*)*, Assa* (*2016*)*,* or *Balog et al.* (*2017*)*,* among others follow this approach. This corresponds to the concept of required capital, as this is the amount of capital that must (should) be available based on the assessment of the firm's risks. It is obvious already at this point that the applied terminology is far from being standard, namely, capital defined in such a way is typically referred to in the literature (e.g. *Tasche 2008*) as economic capital. This is because previously only the economic capital requirement complied with the $\rho(X)$ expression in practice, reflecting the actual measurable risks of the portfolio concerned. However, as the result of substantial development of the regulation, today regulatory capital requirement is also defined in this approach, at least for the purposes of Solvency II.

Studies working with option pricing apply a different approach (*Myers – Read 2001; Sherris 2006; Kim – Hardy 2007*), which considers capital as the difference between the value of assets and the present value of expected future claims based, as presented by the following schematic balance sheet.

Figure 2
The insurer's schematic balance sheet



Using the notion "surplus" is common in this approach. The value of surplus is defined based on the accounting equation: $S = PV(A) - PV(L)$, where $PV(A)$ represents the present value of assets and $PV(L)$ denotes the present value of expected future claims. However, it is important to keep in mind that on the left side assets are shown at market value, that is PV(A) already takes into account the probability of the insurer's bankruptcy, but PV(L) does not calculate with such event. Namely, because of its limited liability, the insurer indeed has a put option referred to by the literature as default option[11] (D). If the value of the insurer's liabilities exceeds the value of its assets at the end of the considered period ($L > A$) it only has to pay A, so the value of the option is $D = PV(max(0;L - A))$. We obtain the equity value (E) in the model if we take into account the value of the default option also in the evaluation of liabilities, that is

$$E = PV(A) - \left(PV(L) - D\right) = S + D$$

Thus, the above-mentioned surplus (S) is an input variable for calculating the equity (E).[12]

It is very important to note that the above interpretation of surplus is not the same as the surplus capital defined by the Solvency II Directive (see *Figure 1*). Looking back at Figure 1 the market value of liabilities, $PV(L) - D$ in the *Myers and Read* (*2001*) approach corresponds to the technical provision (best estimate plus risk margin) in the figure. While equity value (E) is the sum of the SCR and the surplus capital shown in the figure. The concern with the *Myers and Read* (*2001*) approach is that in this interpretation capital is merely an accounting category derived from the accounting equation, which has little to do in itself with the company's risk profile.

[11] Use of the term "solvency exchange option" is also common.
[12] *Butsic (1994*) does not distinguish at all the surplus capital used by *Myers and Read (2001*) and the insurer's equity.

4.4. What should be allocated?

This is the only question concerning capital allocation to which straightforward answer can be given: it is always recommended to allocate the economic capital requirement. As also noted by *Vrieze and Brehm* (*2003*) in their analysis of the practical implementation possibilities of *Myers and Read*'s model (*2001*): economic capital requirement characterises the actual risk profile of the given institution; therefore, it is advisable to examine the allocation on this entity mutatis mutandis – consistently with those authors who define the capital to be allocated as $\rho(X)$.

In the course of performance measurement insurers used to base their calculations on regulatory capital requirement, but the use of the economic capital requirement is increasingly spreading (*Mueller et al. 2004*). This is useful not only because the economic capital requirement gives a more accurate picture of the actual risks taken by companies than the regulatory capital requirement[13] but also because in the case of insurers present in several countries, the difference of regulatory capital requirements country by country may be an issue. Focusing on performance measurement, *Albrecht*[14] (*2006*) provides detailed guidance on the capital types proposed to be applied and the adjustments to be done. For the sake of a more accurate risk assessment and also in view of the possible deviation of the regulatory capital requirements, it is advisable to use the economic and not the regulatory capital requirement for both pricing and individual performance measurement purposes.

5. Selection of the allocation method

The most important question in relation to capital allocation is probably the selection of the adequate allocation method. Several methods defined in different conceptual frameworks, having different properties can be found in the literature and it might be seriously challenging for practitioners to select the adequate method. This exercise is made even more difficult by the fact that authors often refer to the same characteristic under different names. To facilitate the practitioners' selection, we have collected the mathematical properties that can be expected from the available allocation methods (see *Annex 1*) and have summarised how these attributes – referred to by the different names of the various studies – can be matched (*Annex 2*).

Although a large number of possible methods exist for allocating risk capital, there is no general best practice solution. This is partly attributable to the impossibility

[13] Except if the two coincide.
[14] *Albrecht (2006*) refers to the regulatory capital requirement as external risk-based capital and the capital requirement calculated based on an internal model as virtual risk-based capital; he suggests the application of a modified version of the risk-based capital requirement in the course of performance measurement, i.e., the risk adjusted capital.

of satisfying all the properties listed in Annex 1 at the same time. *Csóka and Pintér* (*2016*) prove that if coherent risk measures are applied, it is impossible to allocate capital in a way that it is strongly monotonous[15], core compatible and satisfies equal treatment property, i.e., we must give up at least one of these three naturally occurring requirements. The same theorem also means that there is no method that fulfils the properties full domain, incentive compatibility and core compatibility (see *Balog et al. 2017*). This means that users have to choose from the various required properties and as such, from the different allocation methods based on the specific capital allocation situation. However, it also should be taken into account that the decision is a fairly complicated process in practice, as numerous players having different motivation can take part in it. For example, if we want to allocate the insurer's capital to lines of business, then the heads of the various business lines, the head of risk management and the company's management will have different motivations.

In order to facilitate the method selection, below we first group the applicable methods, then we suggest methods (method types) for the different applications based on some practically relevant considerations.

5.1. Types of applicable methods

Proportionate allocations

The methods that can be listed in this group distribute total risk $\left(\rho\left(X_N\right)\right)$ among the subunits proportionally: $\varphi_i\left(X_N^{\rho}\right)=\alpha\rho\left(X_i\right)$ in such a way that $\sum_{i=1}^{N}\varphi_i\left(X_N^{\rho}\right)=\rho\left(X_N\right)$. The big advantage of these methods is that their application is simple, yet their mathematical properties are less favourable. We must mention two methods among proportionate distributions. The *activity-based method* (*Hamlen et al. 1977*) distributes risk in proportion to the risk taken by the various units ($\rho\left(X_i\right)$), which may seem an obvious solution, but its major shortcoming is that it fails to take into account the diversification effects among the various units (i.e. how much the given unit contributes to the risks of the overall organization). The so-called Beta or *covariance method* (see for example *Dhaene et al. 2012*) also belongs to proportionate distributions: its calculation is relatively simple, but it already takes into account diversification effects. The detailed analysis of both of these methods can be found in the study of *Balog et al.* (*2017*).

Incremental allocations

Incremental allocations, in line with their appellation, distribute risk among the various subunits account taken of the incremental risk caused by them. We can distinguish two types within these methods: "last-in" type methods (*Venter 2009*), which interpret increment on the entire portfolio $\left(\rho\left(X_N\right)-\rho\left(X_{N\setminus\{i\}}\right)\right)$, and the Shapley method which uses the average contribution of the given unit as reference.

[15] The explanation of the various properties is included in *Annex 1.*

The "last-in" methods distribute risk based on the incremental risk of a given unit calculated on the entire portfolio $\left(\rho(X_N)-\rho\left(X_{N\setminus\{i\}}\right)\right)$. The *incremental method* (*Jorion 2007*), the *cost gap method* (*Tijs – Driessen 1986*), and *the method proposed by Merton and Perold* (*1993*) belong to this allocation type.

The *Shapley method* (*Shapley, 1953*) widely known from game theory offers a more sophisticated approach, also distributing risk based on the incremental risk caused by the given unit, evaluating it not only based on the portfolio of the entire insurer without the given unit $\left(N\setminus\{i\}\right)$) but also in comparison with every possible $S\subseteq N\setminus\{i\}$ subset, taking the average of these. No wonder the Shapley method is so widespread: it has numerous favourable mathematical properties (see for instance *Csóka and Pintér 2016*).

Marginal risk contribution

The marginal risk contribution type methods include the often discussed Euler method (see for instance *Tasche 2008*), which allocates risk with the partial derivation of the risk measure, as well as the allocation based on directional derivatives (see *Balog et al. 2017*). If defined, the Euler method can be an optimal solution for pricing; and according to *Tasche* (*2008*) it may be an ideal choice for performance measurement as well since it is reconcilable with RORAC calculation. The also popular Myers–Read method (*Myers and Read 2001*) can also be grouped year, which, similarly to the Merton–Perold method, distributes the insurer's equity to the various lines of business account taken of the value of the bankruptcy option, applying the Euler method.

5.2. Selection of the most suitable allocation method

As we mentioned, there is no general best practice of capital allocation, method selection always should depend on the actual situation. To select the applied method, *Albrecht* (*2006*) formulates some practically relevant criteria as opposed to the exact requirements presented in *Annex 1* (although he also considers full allocation as a basic condition). According to the study, it is important Is the allocation's consistency with the enterprise risk measurement; the properties of the risk measure used by the company; how dependency structure of the losses of various segments are taken into account; how the given method can be implemented in practice; and that the selected allocation method has the properties corresponding to the purpose of application. *Ruhm and Wolf* (*2015*) also add as a key factor that the applied allocation method should be acceptable for every stakeholder of the organization; that it should be stable in time and should not be allocate negative capital to any of the subunits.

For the purposes of practical application, we focused on individual rationality from among the mathematical properties listed in *Annex 1*, which expresses the requirement that the capital allocated to each unit should not exceed the

individual risks of the given unit. Although "individual risk" is not necessarily a relevant basis for comparison in respect of a line of business or product portfolio, as individual business lines typically could not operate as independent units, this requirement is still a key fairness criterion and thus greatly aids the acceptance of the method by the concerned decision-makers. In addition, the transparency and the relative simplicity of the allocation mechanism are also key criteria in practice. The experiment conducted by *Homburg and Scherpereel* (*2008*) using real economic actors underpinned the primary role of the above criteria in the course of practical application. The authors found that due to the limited rationality of real economic players, the perceived fairness of the distribution is more influenced by transparency, simplicity and the fulfilment of individual rationality by the allocation mechanism than the satisfaction of the most frequently analysed core compatibility. The efficiency of the method is also considered a key aspect, that is, that the method should allocate the entire risk among the various lines of business. Thus, in line with *Kalkbrener* (*2005*)*, Albrecht* (*2006*) and many other authors, our table includes only the methods meeting this criterion, so we are not indicating it specifically among the advantages of each method.

When it comes to the various applications, to support strategic decisions (planned acquisitions, mergers, assessment of starting a new line of business, or decision on the termination of an existing line of business), the incremental methods, especially the "last-in" types are the most suitable, as in such cases we can indeed assume that the entire portfolio is fixed, and we take the decision based on the relationship of the given line of business to such condition. This is also the argumentation used by *Merton and Perold* (*1993:29*) stating that *"the marginal cost of capital must be taken into account for marginal decisions*[16]*"*, and also by *Buch et al.* (*2011*) according to whom the selected methodology must also be aligned to the structure and nature of the subunits: in the case of few, heterogeneous subunits (such as decisions on termination of existing or launching of new business lines and the performance measurement of business lines) incremental allocation methods are more suitable. The Shapley method may also be an optimal solution for performance measurement: although its calculation is more complicated, it results in a stable and fair allocation, compared to the "last-in" methods.

For product pricing differential based methods are the most suitable, as subunits are more or less homogeneous and their portfolios contain a large number of contracts. For this reason, we believe that the Euler method is more suitable for pricing, although, according to *Tasche* (*2008*)*,* it is also ideal for performance measurement. *Myers and Read* (*2001*) reached a similar conclusion. They demonstrate that their proposed allocation method is suitable to be used in pricing since the capital allocated does not sensitively react to the adding of new business lines; while for

[16] In their interpretation, this refers to the exiting from a given business line or launching a new one.

the same reasons, it is less suitable for making decisions on new business lines and the termination of existing ones.

If the purpose of capital allocation is only to meet external (regulatory or parent company) requirements, then it may also be justified to use the simplest proportionate methods (of the two, the activity-based method can be implemented the easiest).

The following summary table gives an overview of the methods best suited to the different applications. For each method (method type) we show the advantages and disadvantages most relevant in the course of practical application. The study of *Balog et al.* (*2017*) may also be of additional help for selecting the adequate method where the authors analyse in detail the mathematical properties of each method.

Table 1
Advantages and disadvantages of the methods proposed for the various applications

Objective of allocation	Recommended method type	Recommended method	Advantages	Disadvantages
Performance measurement	Incremental risk based	Shapley method	• IR • Clear interpretation • Favourable other mathematical properties	• Its calculation is fairly complicated
Performance measurement & Strategic decisions	Incremental risk based (last entrant)	Incremental method	• Simple application • Clear interpretation	• Non-IR • The increment may be negative resulting in counter intuitive distribution
		Cost gap	• IR • Clear interpretation	• Its calculation is fairly complicated
Pricing	Marginal contribution to risk	Euler method / Myers-Read method	• IR in practice • Its calculation a simple using the RMK algorithm[17]	• Unstable result under certain circumstances[18]
In case of external expectation	Proportionate	Activity-based / Beta method	• Simple application • Clear interpretation	• Non-IR • The least favourable mathematical properties

[17] RMK: Ruhm-Mango Kreps algorithms, see for instance *Ruhm and Mango* (*2003*).
[18] The essence of this method is that the risks allocated to each portfolio are defined based on their realization in the world situations determining the risk of the entire portfolio. (For instance: if maximum loss is applied, how much is the loss of each subunit when the loss of the total portfolio is at its maximum.) If we use few data points when defining the risk of the large coalition, the result may become incidental.

6. Conclusion

Although the literature on capital allocation is very rich and a large number of different methods have already been designed, the majority of the studies covering this topic derive methods from desired (or considered to be desirable) mathematical properties and not based on the users' motivation. The purpose of our study is to reduce the gap theory and practice by providing some guidance for the method selection and implementation, furthermore even for the formulation of the capital allocation problem itself.

The first step of capital allocation is to define the type of capital to be allocated. It is important to distinguish regulatory capital requirement, economic capital requirement and available capital. We found that it is always the economic capital requirement that should be allocated as it is the one that actually reflects the risk profile of the company.

Since there is no generally applicable best practice for the capital allocation problem, the selection of the method should always be aligned to the purpose of application. We identified the three main application areas of capital allocation at insurance companies and recommend which method types should be applied in the various cases as well as the advantages and disadvantages of the methods.

Incremental methods are the most suitable for performance measurement and for supporting strategic decisions. These methods distribute total risk among the subunits account taken of the incremental risk caused by them. For the best choice relating to strategic decisions are the "last-in" methods (which consider how the risk of the total portfolio changes when adding/taking away a given unit), while the Shapley method, well known from game theory, results in a more stable allocation with more favourable properties in the course of performance measurement. The third important area of application is pricing, although the experts are arguing whether there is any need for using allocation methods for pricing. If pricing takes place with the help of capital allocation, then the most suitable for this purpose are the marginal risk contribution methods: the Euler method and a special version of it, the Myers–Read method. To meet an external requirement, when the insurer does not actually use the allocation results, it is best to apply the simple proportionate distributions.

To further facilitate the method selection, we collected the possible properties of capital allocation methods mentioned in the literature (*Annex 1*) and in a summary table we also listed the different names used by the different authors to refer to these properties (*Annex 2*).

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Annex 1: Most relevant properties expected from allocation methods

The criteria expected from capital allocation methods most often mentioned by the literature are presented below. A capital allocation method is[19]:

1) *Efficient* if $\sum_{i=1}^{N} \varphi_i\left(X_N^{\rho}\right) = \rho\left(X_N\right)$, that is, exactly the total risk is being distributed among the subunits. Although *Merton and Perold* (*1993*) argued that is not necessary to distribute the entire capital among the different business lines, the vast majority of the authors rather proposes the distribution of the entire capital.

2) *Full domain,* if it is interpreted on the entire range of capital allocation situations, with every coherent measure of risk and for each possible portfolio.

3) *Individually rational*, if it is efficient and $\varphi_i\left(X_N^{\rho}\right) \leq \rho\left(X_i\right)$ for every $i \in N$, that is, it allocates as much risk to each subunit (at most) as the amount of individual risk such subunit would have. Individual rationality can be regarded as the basic criterion of the fairness of distribution.

4) *Core compatible*, if it is efficient and $\sum_{i \in S} \varphi_i\left(X_N^{\rho}\right) \leq \rho\left(X_S\right)$ for every $S \subseteq N$, that is, the total portfolio does not have any subset to which it allocates more risk than what the risk of the subunits forming the subset would be if they formed an independent portfolio, if they would "spin off" from the total portfolio. This criterion could also be interpreted in such a way that the various subunits (e.g., business lines) do not have to finance the other units (*Hougaard – Smilgins 2016*); and in the interpretation of *Csóka and Pintér* (*2016*) at least as much risk should be allocated to each coalition with the amount of which the coalition increases the risk of the external subunits by joining them. Core compatibility is a well-known game theory concept which guarantees some kind of fairness of the distribution, a criterion stronger than individual rationality. *Denault* (*2001*) demonstrates for general cases while *Csóka and Herings* (*2014*) demonstrates for illiquid portfolios that it is always possible to distribute risk in compliance with the conditions of core allocation. However, in connection with capital allocation both *Homburg and Scherpereel* (*2008*), and *Kim and Hardy* (*2007*) *dispute the practical relevance of this axiom*: the former argues based on an experiment conducted with the help of actual players, making reference to the limited rational behaviour of the economic player, while the latter argues by stating that in reality the managers of the various business lines cannot decide about exiting the insurance company. *Homburg and Scherpereel* (*2008*) *also found* that in practice compatibility with individual rationality is more relevant.

[19] The properties numbered from 1 to 9 have been indicated based on *Balog et al.* (*2017*) while we indicate the sources separately for the remaining properties.

5) *Satisfies the equal treatment property*, if for every $i,j \in N$, $\rho\left(X_{S\cup\{i\}}\right)-\rho\left(X_S\right)=\rho\left(X_{S\cup\{j\}}\right)-\rho\left(X_s\right), S\subseteq N\setminus\{i,j\}$ is fulfilled, then $\varphi_i\left(X_N^\rho\right)=\varphi_j\left(X_N^\rho\right)$, that is, if the risk of two units is the same, and by adding them to every other possible portfolio, the risk of the portfolio will increase to the same extent in both cases, then the same amount of capital should be allocated to both units.

6) *Results in risk free allocation*, if it is true for every $i \in N$ *that* if $c_i \in \mathbb{R}$ exists, for which $X_i = c_i$, then $\varphi_i\left(X_N^\rho\right)=-c_i$, that is, if a given unit realises a given fixed return (loss) in every word situation, then the capital allocated to it will be exactly its opposite.

7) *Satisfies the property of strong monotonicity*, if for two different X_N^ρ, Y_N^ρ capital allocation situation and for $i \in N$, if $\rho\left(X_{S\cup\{i\}}\right)-\rho\left(X_s\right)\leq\rho\left(Y_{S\cup\{i\}}\right)-\rho\left(Y_s\right)$ then $\varphi_i\left(X_N^\rho\right)\leq\varphi_i\left(Y_N^\rho\right)$, that is, if we take two different capital allocation situations in which the players and the measures of risk are identical, but their portfolios are different, then if the risk contribution of a given unit to the other subsets does not decrease, then the capital allocated to it may not decrease either (i.e. it should be interested in reducing riskiness).

8) *Incentive compatible, if for every* X_N^ρ, Y_N^ρ capital allocation situation and $i \in N$ *subunits*, if $X_i \leq Y_i$, and $X_j = Y_j, j \in N\setminus\{i\}$, then $\varphi_i\left(X_N^\rho\right)\geq\varphi_i\left(Y_N^\rho\right)$, that is, if the capital allocation situation so changes that the risk of only one subunit changes in such a way that it slightly decreases, then the risk allocated to it may not decrease. Incentive is a weaker version of strong monotonicity: if the method is strongly monotonous than it is also necessarily incentivising, but this is not true the other way around.

9) *Decomposition invariant*, if it is true in the case of $X_i = Y_i$ and $X_N = Y_N$ that $\varphi_i\left(X_N^\rho\right)=\varphi_i\left(Y_N^\rho\right)$, that is, the risk allocated to a given unit depends only on the portfolio of the concerned unit and on the total portfolio, but on nothing else.

10) *RORAC compatible* (*Tasche 2008*), if it is efficient and there are such $\varepsilon_i > 0$ figures, that $RORAC\left(X_i|X\right) > RORAC\left(X\right) \Rightarrow RORAC\left(X+hX_i\right) > RORAC\left(X\right)$ for every $0 < h < \varepsilon_i$, where $RORAC\left(X_i|X\right)$ and $RORAC\left(X\right)$ the expressions defined under Chapter a 3.1. *Tasche* (*2008*) defines RORAC compatibility as a necessary condition for being applied in the course of performance measurement.

11) *Continuous* (*Kalkbrener 2005*), if for every $i \in N$ *in case of* $Y_N = X_N + (1+\varepsilon)e_i X_i$, $\lim_{\varepsilon\to 0}\varphi_i\left(Y_N^\rho\right)=\varphi_i\left(X_N^\rho\right)$, where e_i is unit vector number i; a small change in the portfolio of a given unit modifies the risk allocated to it only slightly.

Annex 2: Various naming of the most frequently occurring properties in the literature

Property/ author	*Balog et al. (2017)*	*Denault (2001), Buch & Dorfleitner (2008); De Angelis & Granito (2015)*	*Kalkbrener (2005)*	*Tasche (2008)*	*Homburg and Scherpereel (2008)*	*Tsanakas et al. (2010)*	*Csóka and Pintér (2016)*	*Maume-Deschamps et al. (2016)*	*Balog et al. (2011)*
1) Efficiency	Efficiency			Full allocation		Full allocation	Efficiency	Full allocation	
2) Full domain	Full domain								
3) Individually rational	Diversification		Diversification		Individual core condition				
4) Core allocation	Core compatibility	No undercut			Core compatibility		Core comp. / Coalitionally rational		Stable
5) Equal treatment property	Equal treatment property	Symmetry					Equal treatment property	Symmetry	Symmetric
6) Riskless allocation	Riskless portfolio	Riskless allocation[20]						Riskless allocation	
7) Strong monotonicity	Strong monotonicity						Strong monotonicity		Incentive
8) Incentive compatibility	Incentive compatibility						Incentive compatibility		
9) Decomposition invariance	Decomposition invariance		"Basic" requirement[21]						
10) RORAC compatibility				RORAC-compatible					
11) Continuity			Continuity					Continuity	

[20] *Deanult* (*2001*) also refers to the riskless allocation property as "dummy player property".
[21] Not featured under separate name.

Optimal Resource Allocation at the Blue Economy Type of Firms*

Katalin Hartung

This article attempts to model the optimal resource allocation and the definition of firm's internal transfer prices of aiming to minimise their environmental impact. The author defines the concept of zero waste principle, also referred to as the blue economy principle, with the help of the linear activity analysis model. She demonstrates that if the firm cannot operate the technology which applies the zero-waste principle, then a firm can realise profit only by polluting the environment. She also shows how the internal transfer price of a by-product can be quantified and can take both a negative or positive value as well; thereby, promoting an open market driven by the objective of the blue economy. Finally, she also demonstrates that shadow prices relating to emission constraints may serve as the basis for environmental penalties motivating firms to restrain from environmental pollution.

Journal of Economic Literature (JEL) codes: C65, Q56

Keywords: internal transfer price, resource allocation, environmental impact, zero waste principle, environmental penalty

1. Introduction

According to Ghisellinia et al. (*2016*) and *Munck – Scheel* (*2016*) it is a fundamentally important objective that the economic growth would be accompanied by lower environmental pressure. Consequently, production technologies causing minimal adverse effects on the environment and human health should become higher on the agenda, while, if possible, the total output would be utilised during the profitable operation of the company. In his study, *Jaehn* (*2016*) mentions that the concept of sustainable production appeared – only ten to twenty years ago – for managing the negative environmental consequences entailed by growth. By sustainable production, *Jaehn* means the trends supporting resource efficiency.

* The views expressed in this paper are those of the author(s) and do not necessarily reflect the offical view of the Magyar Nemzeti Bank.

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Recently, companies are increasingly inclined to use new sustainable development trends at the firm level. Our article discusses in details the operation of the blue economy (*Bocken et al. 2014; Pauli 1998*) which strives to follow the zero-waste principle. Some existing theories, such as industrial ecology (*Esty – Porter 1988*), the zero-waste principle (*Pauli 1997*), and the biomimicry (*Benyus 2002*) have, to some extent, already formulated the core principles of blue economy. Despite these existing theories, the clearly new feature of blue economy is that it envisages the entire economy to function in harmony with the ecosystem (*Pauli 2010*). The starting point of this holistic approach, based on its original understanding, is that every company is intrinsically related to its environment, so any given economic system can be examined in its totality only together with its environment. Only with this approach can we come to know any given economic system and its components. Biomimicry is best following this principle, mainly on product level. The other theories are originally not holistic (in general their term also refers to this fact). It is generally true for every sustainability trend that they think in terms of circular patterns; thus, reducing the utilisation of mineral raw material and resource stocks and the businesses' direct environmental impact. According to the approach of the blue economy, companies consider waste as resource, providing some kind of an answer to handling environmental issues. The generated waste during firm's production process therefore can substitute the entire resource need of companies or a part of thereof, while they can reduce costs or can result in additional revenues. The literature review of *Hartung* (*2016*) reveals that the exact definition of the concept of blue economy is still not defined by the terms of mainstream economy in the literature to date and the optimal internal transfer pricing of by-products used in the course of production has not been clarified yet either. The blue economy also has enterprise level applications and thanks to its resource efficiency, companies following the principles of blue economy often form intra-or intercompany synergetic co-operations in order to create a more efficient circular structure. According to *Ghisellinia et al.* (*2016*) the strategy of a company operating based on the principles of the blue economy embraces cleaner production and ecologically minded planning. *Khalili et al.* (*2015*) and *Ghisellinia et al.* (*2016*) pointed out that cleaner production has the fundamental benefit of being resource efficient. It deals with the reduction of waste and harmful emission in the course of product and process design at the enterprise-level. It supports integrated and preventative environmental strategies in order to create equilibrium between the company and the environment. *Klemes et al.* (*2012*) supports that cleaner production will become an increasingly important tool for every industrial player. In the experience of *Genovese et al*. (2015), in addition to end-of-pipe solutions, businesses now place increasing emphasis on monitoring and improving the impact they have on the economy, the environment and society throughout the lifecycle of the entire product or service. According to the research of *Li – Su* (*2012*) the circular economy strives to sustain human and environmental equilibrium by more efficiently utilising natural resources. In addition, the circular economy defines production processes. By this we mean that the firm operates in a closed system where the waste kept within the system replaces

the possible need for mineral and natural resources. *Li and Su* (*2012*) observed that businesses using the circular economy approach typically had lower initial investment costs, they minimised their emission of industrial contaminants while using their available stocks to the maximum and exerted the least possible negative effect on the environment. In his research, Pauli (*1998*) calls attention to the fact that a company is unable in and of itself to comply with the zero-waste principle; consequently, he considers the trading of by-products among companies as indispensable. Therefore, cooperation among companies is a key component of the principle of blue economy encouraging that the by-product generated during the production of one company be used as raw material, as semi-finished product or as processing aid in the production process of the other company.

The valuation of by-products (semi-finished products, waste or contaminants) reused within the company or purchased from a partner company is far from being properly regulated when it comes to business operations. These transactions are sold at an internal settlement price, the so-called transfer price that influence the companies' expenses and profit. It is clear that transfer prices are not defined by the rule of supply and demand, but mainly by the intention to minimize payable taxes, tax type budgetary contributions and customs duties. (*Gao – Zhao 2015*). In the international context, a study prepared by the OECD[1] provides guidance for companies regarding the setting up of their internal transfer pricing while in Hungary, Act LXXXI of 1996 on corporate taxation and dividend tax provides guidance on the rules for tax base adjustment needed when transfer pricing is applied within the network of companies or when the pricing applied among independent parties deviate from current market prices. *Ding et al.* (*2015*) analysed as to what happens when the costs of a company stemming from its negative impact on the environment (input and output) show up in its accounting. In their research, they examined the optimal pricing of sustainable supply chains using quantitative methods, namely they tried to internalize environmental externalities. They studied the differences of the various pricing options (decentralized, centralized or specific pricing options applicable among the different units) and the driving forces influencing the players of the supply chain and finally the role of enterprise incentives used by governments. The authors concluded that the literature hardly mentions any such cooperation, which would motivate the players of the sustainable supply chain to make investments aimed at reducing polluting waste or the trading of by-products (such as pollutants). In their article, *Lakatos – Karai* (*2015*) sought to answer the question of how the evolution of market prices, the specifics of the Hungarian Accounting Act and the existence of affiliated corporate relations influence the procurement and the trading of carbon credits. Their literature review reveals that the accounting classification of emission units has been answered,

[1] Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations. OECD, 2010, ISBN 978-92-64-09018–7

but corporate taxation and the related transfer pricing issues of carbon credit trading remained uncharted territories. In their conclusion, the transfer pricing of carbon credits is not exempt from the obligation to apply the market price. If the affiliated companies deviate from market pricing, they have to adjust their corporate tax base accordingly. According to *Kuti* (*2014*) it is not always possible to quantify the financial significance of social and environmental externalities for investment purposes and on the other part, due to the discounting of long-term expenses and impacts, these externalities become marginal. We disagree with this latter statement since in our view the impact of companies on the environment is substantial even in the longer run.

Moreover, literature on the fines for environmental penalties levied for polluting companies is still rather immature. According to *Karpoff et al*. (*1998*) the levied environment pollution fines do not correlate with the extent of the pollution. In their experiences, these penalties are rather varied and unpredictable. However, they managed to identify some correlation between the price reduction of a company shares caused by pollution and the magnitude of the penalty. A 2009 study of the OECD analyses the rules applied to fining environmental pollution in Eastern European, Caucasian and Central Asian countries. It reveals from the study that the regulation is rather incomplete in many countries. The meaning of some basic concepts frequently remains unclarified, such as environmental fine, environmental charge and environmental damage or the concept of compensation. However, we see some similarities among the countries mentioned by the *OECD* (*2009*) study and Germany in terms of the factors mitigating the penalty. If the perpetrating company previously performed some environment protection activity, but the environmental pollution occurred nonetheless, then the extent of the imposed fine is reduced (*Schelmminger – Martens 2004*). But the scale of the penalty varies country by country. In Eastern European and Caucasian countries, the fine levied for emission exceeding the permitted level depends on the quantity and harmfulness of the emitted polluting substance. In Kazakhstan, the fine imposed for environment pollution is determined exclusively based on the extent of the damage caused by the company. By contrast, the German criminal law may impose financial penalty and/or prison sentence (*Schelmminger – Martens 2004*).

In view of the above-mentioned lack of coverage in the literature, the purpose of this study is to define blue economy businesses by using firm's model minimizing adverse effects on the environment, as well as the internal transfer pricing of by-products (contaminants) and to suggest the proposed scale of environmental penalties. To this end, we shall use the linear activity analysis model applied in the article of *Bessenyei* (*2016*). The linear activity analysis model (LAM) is used for optimal resource allocation problems enabling the selection of technologies and the application of production of multiple products at a time (*Zalai 2012*). The significance of multiple products' production appears when incorporated into the by-product and pollutant emissions

into the model, since the LAM model is able to illustrate the flow of by-products and semi-finished products generated in the course of production. Presenting the technology choice is indispensable in the blue economy, since each technology pollutes the environment differently. The linear activity analysis model treats the emission of various polluting substances separately, which makes it possible to take into account that a specific technology emits more of type "A" polluting substance, while another technology emits more of type "B" pollutants. Some other, more complicated models are also suitable to formulate this problem, but those are beyond the framework of this article. Let us also assume, based on the above-mentioned remarks of *Pauli* (*1998*), the market and technology openness where the environmental protection strategy aspects also play a central role.

The second section of the study briefly presents the LAM methodology. The third section presents the firm-level application of the environmental friendly strategy, namely the firm-level application of the blue economy principle within the methodology framework of the linear activity analysis model. This section reveals the correlation between the shadow price and the internal transfer price and determines the basis for imposing the environmental penalty. The fourth section presents the operation of the quasi blue economy type of firm who is unable to follow the principles of the blue economy, but who strives to minimise its environmental impact in the LAM context. Finally, the study concludes with the presentation of future research directions and conclusions.

2. Methodology

Corporate value creation takes place through the application of activities or processes that are possible technically and operation-wise[2], though the intensity and the level of application may differ. As mentioned earlier, the tool of the linear activity analysis model is perfectly suitable for describing the flow of by-products among the different activities and later on also for defining the blue economy principle. Accordingly, this section briefly presents the basic structure of the LAM model.

A given production unit produces products and/or services. As part of this, it uses products and services produced by the firm, and the resources purchased on the market, such as labour, water, electricity, etc. For the sake of simplicity, we shall refer to the service produced by the company as product.

Let the company have n types of products, also including semi-finished and by-products and services and wastes. To produce these, let the company use N types of primary resources! Let R_+ designate the set of nonnegative real numbers, then any core technology can be described with the help of the following three

[2] *Zalai* (*2012*) refers to these activities or processes as primary or core processes.

vectors: $\mathbf{k} \in R_+^n$ is the vector of output coefficients, $\mathbf{r} \in R_+^n$ is the vector of input coefficients while $\mathbf{d} \in R_+^n$ is the vector of primary resource utilisation coefficients. The components of the three vectors indicate the necessary and produced product and input requirements necessary during the unit level operation of the basic technology. The intensity of the given activity can be expressed by any natural unit. This could be, for example, the operating duration of the activity or the quantity of some of the primary resources (for example electricity) utilized for the activity.

Let us note that vector **k** generally has more positive elements, since during most processes, in addition to products suitable for further processing or sale, some by-products, wastes or polluting substances are also generated. If every component of vector **k** is zero, then the purpose of the given activity is to neutralize pollutants. But the process of neutralization is rarely perfect; therefore, there are always some positive components. If free removal is not available, that is, unsellable wastes or pollutants cannot be removed from the system free of charge, then the $\mathbf{y}^{\mathbf{p}}$ variable must be introduced describing the emission into the environment of the pollutants created during the joint operation of the various activities, including the emission of waste as well. If vector **k** has several positive elements designating the produced quantity of products suitable for sale or further processing, then we talk about production of multiple products. Vector $\mathbf{y} \in R_+^n$ describes customer demand. The elements of this vector indicate for the production manager the quantity to be produced of each product. For those semi-finished and by-products, processing aids, wastes and services for which there are no customer demand, the corresponding component of vector **y** is zero, although the firm also produces these. Because we assume market openness, the company may sell for its partner firms the positive elements found in vector $\mathbf{K}\underline{\mathbf{x}}$ the quantity of which is found in vector **z**. Furthermore, the company may also procure intermediary- and semi-finished products on the market from partner firms if these partner firms produce them more efficiently. Vector **u** describes the quantity of these products.

If every element of vector **r** is zero, then the given basic technology uses only primary resources; the semi-finished products, processing aids, wastes and services produced by the company are not needed for the basic technology. Vector **d** has only zero elements less frequently, because most technologies use some kind of primary resources.

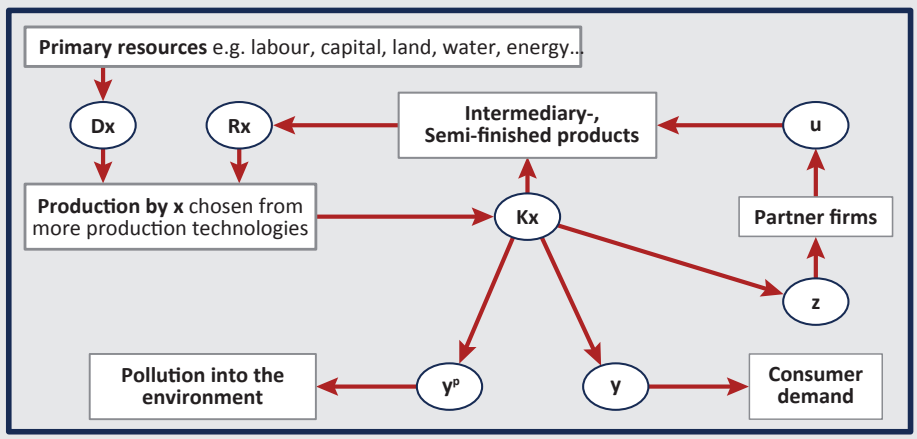
But of course, most companies are able to engage in more than one basic technology. These basic technologies are described by vector $\underline{\mathbf{x}} \in R_+^m$. Let the number of activities technically and operationally available be *m*. Each of these can be described with the above introduced three vectors, so the following matrices can be created:

– The matrix of output coefficients: $\mathbf{K} = (\mathbf{k_1}, \mathbf{k_2}, \ldots, \mathbf{k_m})$, where k_{ij} shows how much of product *i* is being produced by the per-unit application of activity *j.*

– The matrix of input coefficients: $\mathbf{R}=(\mathbf{r}_1,\mathbf{r}_2,...,\mathbf{r}_m)$, where r_{ij} shows how much of product *i* is being produced by the per-unit application of activity *j.*

– The matrix of primary resource utilisation coefficients: $\mathbf{D}=(\mathbf{d}_1,\mathbf{d}_2,...,\mathbf{d}_m)$, where d_{lj} shows how much is needed from the primary resource *l* for the per-unit application of activity *j.* The above described processes are summarized in *Figure 1*.

Figure 1
Explanation of the operation of a production firm with the help of the LAM marking system.



In the linear activity analysis model, these three matrices define the firm's technological possibilities. Technical management and engineers have information about the exact value of their elements which must be in line with the data that can be obtained from the firm's accounting system. It is worth noting that if there is more than one positive component in line *i* of the matrix of output coefficients, then the firm is able to produce product *i* through several activities. In such case, we are talking about technological selection. In this case, the role of the linear activity analysis is the selection of the appropriate technological combination.

We define the optimal task of the linear activity analysis model in the following way: Let the customer demand be given ($\mathbf{y}\in R_+^n$). The net output results from the difference of the **Kx** product output and the **Rx** product utilization, which, according to the constraint, should be at least **y** of the customer demand. The product equilibrium of the firm is expressed in the model with the following equation: $(\mathbf{K}-\mathbf{R})\mathbf{x}\geq\mathbf{y}$. Furthermore, let the stock of the primary resources be **s**. The primary resource utilisation of the firm is expressed by the matrix **Dx.** Let us assume that the firm uses less primary resources than the available quantity. Then the resource balance will be as follows: $\mathbf{Dx}\leq\mathbf{s}$. Assuming these conditions and the condition of

x non-negativity, we are looking for the production level at which the cost is the lowest or the revenue is the highest.

To resolve this problem we recommend using the GAMS (General Algebraic Modelling System) software, providing for the user a high-level programming language expressly developed to resolve problems of this nature presented in the following part of the study. The classroom version of this software can be downloaded free of charge on the Internet.

3. Environmental friendly strategy, namely firms blue economy principle

In the section below we shall present the operation of a production firm within the framework of the LAM methodology, where environmental protection strategy and, in the current case, the principle of the blue economy play an emphatic role in the life of the firm. Moreover, the interpretation of the primal and dual problems of the LAM model provides some guidance for defining the environmental penalty and internal transfer prices.

In addition to the products suitable for further processing and satisfying customer demands, most production activities performed by firms also produce by-products as well as wastes or pollutants harmful to the environment. According to *Georg et al.* (*2015*), production processes of the market economy result not only in the end product, but also produce unwanted waste the elimination of which entails expenses for the firm. This has also been confirmed by *Dobos* (*2008*) who adds that by-products cannot be removed from production. But the problem is that these goods are not indicated in the production plan. *Hartung* (*2016*) notes that the recognition of *Dobos* (*2008*) is significant, since the utilisation opportunities of by-products generated in the course of production becomes impossible as the business designer is not aware of their existence. The situation is the same in the case of wastes and polluting substances. Let us now also include these items in the list of goods[3]. Let $\overline{\mathbf{y}}$ denote the quantity of unsold products that can be emitted into the environment. The amounts included therein can be defined by both the firm's environmental protection strategy and the environmental protection authority. However, according to *Dobos* (*2008*), the legal obligation in and of itself does not necessarily mean a binding force for the firms, since in many cases firms often opt for the more easily payable fine (depending on its extent).

When a firm strives to comply with the zero-waste principle, it must be open not only to its customers, but also to other firms as well. It results from the principle of the blue economy mentioned in the introductory section that semi-finished

[3] "The precondition for describing a technology. This description presents the goods occurring in the possible production activities of the examined unit, presenting a comprehensive list of such goods free from any overlap" (*Zalai 2012:72*).

products, processing aids and production services should not only be produced by the firm itself, but in addition to or in place thereof, it should also be possible to procure these items from the market. So next to the semi-finished products produced by the firm, semi-finished products procured from the market also appear. Vector **u** describes the quantity of these products. If the company does not have sufficient capacity, it may happen that for *i* product $0 < y_i \cdot u_i$, where y_i is the customer demand for product *i.* This means that the firm satisfies part of its customer demands not from its own production, but procures the finished product from the market and directly sell to the customer. But in general this is not the case, and instead $\forall i = 1,...,n: 0 = y_i \cdot u_i$, namely if the firm procures some products from the market, then it does not sell such products.

The environmental friendly strategy – just as the blue economy principle – requires the elimination of spendthrift activities, but also the sale of every by-product, waste and possibly contaminants for which there is solvent market demand, or alternatively, these items could be more efficiently neutralized by other companies. This market openness towards other companies is of fundamental importance. If beyond satisfying customer demands, resource management is efficient, then the firm's negative impact on the environment is also reduced. In our model, the quantity of products transferred to partner firms is described by vector **z**. In the spirit of market openness, the firm mostly sells products for which there is customer demand ($z_i \cdot u_i = 0$), and does not buy this product from the market ($z_i \cdot u_i = 0$). We will see later that this openness creates the link between market prices and the internal transfer prices of the products produced to satisfy customer demands.

We assume that in the course of utilizing the opportunities stemming from market openness, the firm is unable to influence the prices and it may procure the various products at the prices described by vector $\mathbf{p}^m$, and can sell these products at the prices described by vector $\mathbf{p}^e$. For the sake of generalization, we assume that $\mathbf{p}^e \leq \mathbf{p}^m$. Based on these we can say that in the course of utilizing the opportunities stemming from market openness, the firm incurs losses equal to $\mathbf{p}^m\mathbf{u} - \mathbf{p}^e\mathbf{z}$, and it may finance such losses with the help of a working capital loan. We consider negative losses as profit, reducing the need for working capital financing. The extent of such working capital financing is limited by the value d_e defined by the firm's financing conditions. In the case of $0 < d_e$ it is permitted that in the course of utilizing the opportunities stemming from market openness, the firm incurs losses up to the limit, and in the case of $0 > d_e$ it must attain profit at least of the extent defined by the limit. Less frequently the $0 = d_e$ equilibrium criterion is also prescribed for the firm.

Let $\overline{\mathbf{s}}$ denote the existing quantity of the primary resources available for the firm. These mostly include capital assets, machinery, equipment, fixtures and workers. This primary resource quantity must be supplemented to the extent so as to satisfy customer demands. The additional primary resource quantity thus being procured

is described by vector **s**. The validity of $s_i \cdot \overline{s}_i = 0$ is not true in general, instead, the stock of existing primary resources must be expended. We assume that the firm does not have a dominant position on the resource market either. Then, the prices of primary resources are the constants that the firm is not able to influence, contained in vector **q**. Because customer demands are given, and as such, the firm's revenues are also given, the profit may only be increased through reducing the cost of the primary resources to be procured additionally. The magnitude of this expense is defined by the **qs** scalar multiplied.

The primal task of the firm applying the environmentally friendly strategy, as opposed to the LAM task presented in the methodology, evolves as follows:

$$\mathbf{x},\mathbf{z},\mathbf{y}^{\mathrm{p}},\mathbf{s},\mathbf{u} \geq 0 \tag{1}$$

$$(\mathbf{p}) \qquad \mathbf{Rx}+\mathbf{y}+\mathbf{z}+\mathbf{y}^{\mathrm{p}}=\mathbf{Kx}+\mathbf{u} \tag{2}$$

$$(\mathbf{w}) \qquad \mathbf{Dx}-\mathbf{s} \leq \overline{\mathbf{s}} \tag{3}$$

$$(\upsilon) \qquad \mathbf{p}^{\mathrm{m}}\mathbf{u}-\mathbf{p}^{\mathrm{e}}\mathbf{z} \leq d_e \tag{4}$$

$$(\mathbf{t}^{y}) \qquad \mathbf{y}^{\mathrm{p}} \leq \overline{\mathbf{y}} \tag{5}$$

$$-\mathbf{qs} \rightarrow \max \tag{6}$$

In front of each condition we indicated in brackets the dual variables belonging to them, also called as shadow prices[4] for which we will provide the explanation later on. Conditions (1) of the primal problem provide limitations for the sign of the variables. Conditions (2) are the product equilibrium where the conditions of equilibrium are met on the market of products and resources. Conditions (3) are the primary resources equilibrium. Conditions (4) are the equation describing the maximum loss allowed, incurred during the sales of the by-products, wastes and polluting substances, where d_e may take either a positive or zero value, but through $0 < d_e$ a profit may also be realised. Equations (5) yield the quantity of products that can be emitted into the environment. And finally, equation (6) is the objective function maximizing profit.

The following are given during the resolution of the primal problem: the **K**, **R** and **D** matrices describing the production technology of the firm; the firm's supply of primary resources $\overline{\mathbf{s}}$; the magnitude of maximum achievable loss in the course of the opportunities stemming from market openness d_e; **q** denoting the market procurement prices of primary resources; and $\mathbf{p}^{\mathrm{m}}$ denoting the procurement price of the firm's products and $\mathbf{p}^{\mathrm{e}}$ the sales price of the firm's product.

[4] "The dual solutions of the linear optimal resource allocation tasks are called shadow prices. They are the opportunity costs of goods and resources featured in the restrictive conditions expressed in the objective function value. They express how much the last unit of the goods available from external resources contribute to the objective function value" (*Zalai 2012:84*).

The resolution of the primal problem yields: the application level of each activity **x**, the quantity of the primary resources to be procured additionally **s**, the quantity of the products to be procured and to be transferred through market openness **u** and **z**, and shadow prices $\mathbf{p}, \mathbf{w}, \upsilon$ and $\mathbf{t}^{\gamma}$.

Interpretation of the shadow prices appertaining to the various conditions:

(**p**) The shadow price of a product shows to what extent the cost of the primary resources to be procured additionally would be reduced if customer demand of a given product was reduced by a certain unit: $p_i = \delta \mathbf{qs} / \delta y_i$. If this value is lower than what the customer is willing to pay for the given product, then the customer demand for the given product could only be satisfied with a loss.

(**w**) The shadow price of the primary resource shows the extent to which the cost of the primary resource to be procured additionally would be reduced if the firm had more units of the given resource and it did not have to procure it: $w_i = \delta \mathbf{qs} / \delta \overline{s_i}$. If this value is zero, then, in line with duality, the additional procurement of the given primary resource is unnecessary.

(υ) The shadow price of the loss incurred in the course of market openness shows the extent to which the cost of the primary resources to be procured additionally would be reduced if this loss is increased by one unit: $\upsilon = \delta \mathbf{qs} / \delta d_e$.

($\mathbf{t}_i^{\gamma}$) The shadow price related to the output limit shows by how much the objective function value would improve, namely the extent to which the firm's profit would increase if the emission of product *i* into the environment increased by one unit. This value is a good indicator for defining the environmental protection penalty to be imposed for exceeding the emission constraints. Moreover, this definition procedure helps to resolve the unpredictability and differences surrounding environmental protection penalties mentioned in the literature.

Therefore, the objective of the firm is to produce a given emission of **y** so that the cost of the primary resources to be procured additionally be minimal by adhering to the environmental protection conditions prescribed by vector $\overline{\mathbf{y}}$. In the case of $\overline{\mathbf{y}}_i = 0$ it is a semi-finished product, by-product or waste to be further processed.

We obtain the internal transfer prices as the solution of the dual problem of the firm applying the environmentally friendly strategy[5]. The *Appendix* contains the simplex table necessary for expressing the duality:

[5] "The shadow price of intermediary products not having a market and the shadow price of primary resources is the firm level internal transfer price defined by their opportunity costs. The internal transfer or accounting price is similar to the shadow price in many respects" (*Zalai 2012:104*).

$$\mathbf{w}, \upsilon, \mathbf{t}^{y} \geq 0 \tag{7}$$

$$\mathbf{p}(\mathbf{K}-\mathbf{R}) = \mathbf{wD} \qquad (\mathbf{x}) \tag{8}$$

$$\mathbf{w} \leq \mathbf{q} \qquad (\mathbf{s}) \tag{9}$$

$$\mathbf{p} \leq \upsilon \mathbf{p}^{m} \qquad (\mathbf{u}) \tag{10}$$

$$\mathbf{p} \geq \upsilon \mathbf{p}^{e} \qquad (\mathbf{z}) \tag{11}$$

$$\mathbf{p} + \mathbf{t}^{y} \geq 0 \qquad (\mathbf{y}^{p}) \tag{12}$$

$$\mathbf{w}\overline{\mathbf{s}} + \upsilon \cdot d_e + \mathbf{t}^{y}\overline{\mathbf{y}} - \mathbf{py} \rightarrow \min \tag{13}$$

Our firm will opt for the **x** activity combination ensuring minimal primary resource costs and thus ensuring maximum profit if it applies the internal transfer prices obtained as the result of this problem solved.

In this case, the dual variables of the dual problem, that is, the variables of the primary problem here stand after the conditions. It is worth drawing attention to the fact that we do not apply any restrictions whatsoever to the signs of the **p** variables due to the equality condition featured in the primal problem. Accordingly, the internal transfer price of certain products may also be negative. However, according to conditions (11) and (12) it is necessary that the sales price of the given product be negative. This is exactly the case when it comes to polluting substances, as our firm may purchase these at a negative price, namely it is the partner firm who pays for taking them over. In this case, it is our firm who will take care of the dumping, processing and destruction of the polluting substances taken over. As for those polluting substances in the case of which our firm does not perform such activities, it may transfer these polluting substances to be destroyed to other firms. However, in this case, it is our firm who will pay for transferring them.

Interpretation of conditions of the duality problem:

(8) It describes the correlation between the internal transfer price of primary resources and the internal transfer price of products.

(9) It describes the correlation between the internal transfer price and the market price of primary resources. It is to be noted that if the firm purchases one of the primary resources, then this condition shall be met in the form of equality. Therefore, the internal transfer price of a product depends on the market price of the primary resources, which confirms the result of the research conducted by *Lakatos – Karai* (*2015*) as discussed in the introductory section.

(10–11) If the firm transfers some by-product or waste to another firm, then its internal transfer price is proportional to the price applied during the transfer which may also be negative, for example, in case of waste neutralization. If the firm takes

over some by-products or waste, the internal transfer price will also be proportional to the price applied during the transfer.

(12) If $p_i < 0$, then $t_i^y > 0$. Accordingly, if a product has a negative internal transfer price, then with the increase of $\overline{y}_i$ the objective function value of the primal problem would improve because the firm would reach the $\overline{y}_i$ limit of environmental emission of the given pollutant!

Moreover, in view of duality, the objective function value of the dual and primal problem is identical:

$$\mathbf{w}\overline{\mathbf{s}} + \upsilon \cdot d_e + \mathbf{t}^{\mathrm{y}}\overline{\mathbf{y}} - \mathbf{py} = -\mathbf{qs}\,, \tag{14}$$

of which

$$\mathbf{w}\overline{\mathbf{s}} + \mathbf{qs} + \upsilon \cdot d_e + \mathbf{t}^{\mathrm{y}}\overline{\mathbf{y}} = \mathbf{py}\,. \tag{15}$$

The sales revenue stemming from satisfying customer demands stand on the right side of equation (15). This has to finance the cost components on the left side. These are the following by order:

– $\mathbf{w}\overline{\mathbf{s}}$ the cost of financing the primary resources already available at the firm,

– $\mathbf{qs}$ the cost of primary resources to be procured additionally,

– $\upsilon \cdot d_e$ the loss incurred in the course of selling by-products, wastes and polluting substances,

– $\mathbf{t}^{\mathrm{y}}\overline{\mathbf{y}}$ the loss incurred by limiting the emission of harmful materials into the environment.

Considering the comment related to condition (9) of the dual problem, we can say that the firm does all of this by calculating at internal transfer prices.

The correlations existing between the market price and the shadow price of a product result from the dual task. Let us assume for a second that $\mathbf{p}^{\mathbf{m}} = \mathbf{p}^{\mathbf{e}}$! In this case shadow prices are proportional to the market prices and the proportionality factor is: υ. If $\mathbf{p}^{\mathbf{m}} \neq \mathbf{p}^{\mathbf{e}}$, then the shadow price of the product that the firm purchases will be proportional to its procurement price while the shadow price of the product that the firm sells as by-product or waste will be proportional to its sales price. The proportionality factor remains υ. And if $u_i + z_i = 0$, that is, if the firm does not purchase certain products but only sells them to satisfy customer demand, then $\upsilon p_i^m < p_i < \upsilon p_i^e$ is valid for its shadow price.

We can talk about blue economy if the above task has an admissible solution if $\overline{\mathbf{y}} = 0$, since the model shows the most important criteria of the blue economy principle: the integration of semi-finished and finished products into production; the sales of

by-products and polluting substances among companies (**z**) and (**u**); instead of the customarily used inequality (e.g. *Zalai 2012*) equality has been introduced into the product equilibrium; and adherence to the zero waste principle-based production ($\overline{\mathbf{y}}=0$). However, the latter is usually not possible in this form and as a result of the proportionality of the linear activity analysis model, satisfying customer demands at a lower level, that is, reducing the components of **y** does not help either.

4. The quasi blue economy type of firm

This section presents the operation of the quasi blue economy type of firm who is unable to follow the principles of the blue economy, but who is striving to minimise its negative environmental impact. We shall see that in the lack of a technology necessary to comply with the zero-waste principle, the firm may realize profit only by impacting the environment negatively.

In order to obtain a model that is applicable for a firm approaching the principles of the blue economy, the firm must give up its profit maximizing behaviour, and instead, it must strive to minimize its negative environmental impact. Although the firm is unable to maintain its output in line with the zero-waste principle, but it can reduce the quantity of primary resources taken from the environment and the volume of polluting substances emitted into the environment. Account taken of this, the primary problem of a quasi-blue economy type firms evolves as follows:

$$\mathbf{x},\mathbf{z},\mathbf{y}^{\mathrm{p}},\mathbf{s},\mathbf{u}\geq 0, \tag{16}$$

$$(\mathbf{p}) \qquad \mathbf{Rx}+\mathbf{y}+\mathbf{z}+\mathbf{y}^{\mathrm{p}}=\mathbf{Kx}+\mathbf{u} \tag{17}$$

$$(\mathbf{w}) \qquad \mathbf{Dx}-\mathbf{s}\leq\overline{\mathbf{s}} \tag{18}$$

$$(\upsilon) \qquad \mathbf{p}^{\mathrm{m}}\mathbf{u}-\mathbf{p}^{\mathrm{e}}\mathbf{z}\leq d_e \tag{19}$$

$$-\mathbf{ry}^{\mathrm{p}}-\mathbf{qs}\rightarrow\max. \tag{20}$$

From the primal problem presented in section 3, on the one part, we omitted the condition limiting the emission of polluting substances as the firm is unable to operate with zero emission. On the other part, the minimizing of negative environmental impact stemming from the emission of polluting substances and the utilisation of primary resources is now part of the objective function.

Namely, the firm's emission of polluting substances and its utilisation of primary resources (freshwater, other renewable and non-renewable natural resources) are the items impacting the environment. The first is aggregated by the weighted amount $\mathbf{ry}^{\mathrm{p}}$, where r_i quantifies the negative environmental impact stemming from the emission of one unit of product *i* as polluting substance into the environment. On the other part, q_k contrary to the previous section, is not the procurement price of primary resource *k*, but instead, it shows the extent of negative environmental

impact caused by the utilisation of a primary resource of type *k*. Accordingly, the profit maximizing objective of the firm as explained in section 3 is now replaced the by an objective function minimizing negative environmental impact. This, however, cannot be regarded as a business operation fully adhering to the principles of the blue economy, but it is approximating it since $\mathbf{y}^{\mathbf{p}} \geq 0$ is permitted.

The dual problem obtained based on the table of the (16-20) simplex problem (the *Appendix* contains the simplex table necessary for expressing duality):

$$\mathbf{w}, \upsilon, \mathbf{t}^{\mathrm{y}} \geq 0, \tag{21}$$

$$\mathbf{p}(\mathbf{K}-\mathbf{R}) \leq \mathbf{wD} \qquad (\mathbf{x}) \tag{22}$$

$$\mathbf{w} \leq \mathbf{q} \qquad (\mathbf{s}) \tag{23}$$

$$\mathbf{p} \leq \upsilon \mathbf{p}^{\mathrm{m}} \qquad (\mathbf{u}) \tag{24}$$

$$\mathbf{p} \geq \upsilon \mathbf{p}^{\mathrm{e}} \qquad (\mathbf{z}) \tag{25}$$

$$\mathbf{p} \leq -\mathbf{r} \qquad (\mathbf{y}^{\mathrm{p}}) \tag{26}$$

$$\mathbf{w}\overline{\mathbf{s}} + \upsilon \cdot d_e - \mathbf{py} \rightarrow \min. \tag{27}$$

Opting for the combination of activities $\underline{\mathbf{x}}$ resulting in minimal negative environmental impact will be the rational choice for our firm if it applies the internal transfer prices obtained as the solution of the problem.

According to condition (27), if a certain polluting substance is being emitted, then its internal transfer price is equal to the additional negative environmental impact stemming from the emission of one unit according to the definition of **q**. The situation is similar for primary resources as well. If the firm procures some kind of primary resource, then its internal transfer price will also be equal to the additional negative environmental impact stemming from utilization. Moreover, if there is emission of polluting substance *i*, then $p_i = r_i$, and if the firm transfers part of this polluting substance to another firm, then $p_i = -r_i = \upsilon p_i^e$. So, based on this $p_i, p_i^e < 0$ and $\upsilon = -r_i / p_i^e$, that is υ can be interpreted as the "exchange rate" of the negative environmental impact due to the emission of polluting substances. An even more interesting case is when the firm purchases polluting substances from another firm and emits them into the environment. This can serve the minimizing of the objective function and the reduction of the negative environmental impact if the polluting substance is taken over at a high p_i^m price because then the $\mathbf{p}^{\mathbf{m}}\mathbf{u} - \mathbf{p}^{\mathbf{e}}\mathbf{z}$ difference improves significantly, enabling the financing of additional activities aimed at reducing negative environmental impact. In this case $p_i = -r_i = \upsilon p_i^m$, and it can be interpreted as $\upsilon = -r_i / p_i^m$, as the "exchange rate" of the negative environmental impact. This case does not happen if vector **r** is identical for every firm, but **u** is not necessarily a zero vector in this case either, as our firm may

have the technology which is able to transform the waste generated by another firm into a product satisfying customer demands or utilize them in the course of neutralization. Accordingly, the basis of the internal transfer prices applied by the firm is the negative environmental impact stemming from the utilisation of natural resources and the emission of polluting substances.

Moreover, the duality results in the equality of the objective function value of the dual and primal problem:

$$\mathbf{w}\overline{\mathbf{s}} + \upsilon \cdot d_e - \mathbf{p}\mathbf{y} = -\mathbf{r}\mathbf{y}^{\mathbf{p}} - \mathbf{q}\mathbf{s}\,, \tag{28}$$

of which

$$\mathbf{p}\mathbf{y} - \mathbf{w}\overline{\mathbf{s}} - \upsilon \cdot d_e = \mathbf{r}\mathbf{y}^{\mathbf{p}} + \mathbf{q}\mathbf{s}\,. \tag{29}$$

On the left side of equation (29) we have the sales revenues stemming from the satisfaction of customer demands minus the cost components. This finances the negative environmental impact shown on the right side.

Notes

1. The firm generates profit (if and when this is the case) not because its objective to maximize its profit, but so that it can satisfy customer demand with minimal negative environmental impact.

2. We took into account the cost of primary resources procured additionally as negative environmental impact.

3. *If the firm is able to satisfy customer demand with zero negative environmental impact (in the case of an optimal solution the objective function value of the primal problem is zero), then it will not realize any profit*.

Point 3 presents the main result of the study. Based on this, a firm may become profitable only by impacting the environment. This means, however, that blue economy companies cannot be profitable. Our result is similar to the theory of land rent according to which the scarcity of natural resources (land) results in lasting economic profit (*Barancsuk 2012:279*). This is the rent which is acquired by the owner of the natural resource.

5. Conclusions and future research directions

In our study, we modelled the optimal resource allocation of companies respecting their embeddedness into the natural environment with the help of the linear activity analysis framework. In the third section, we reviewed the conditions of a business respecting the principles of the blue economy and incorporated them into the

linear activity analysis model. Within the LAM model we defined a profit maximizing objective, accompanied by $\overline{\mathbf{y}}=0$ zero pollutant emission. In the dual problem, we demonstrated that internal transfer prices may be both negative and positive, enabling the transfer and the taking over of polluting substances. Moreover, we demonstrated that shadow prices linked to emission constraints may serve as the basis for efficient environmental penalty. To this end, we must know the **K**, **R**, **D** matrices describing the production technology of the firm and the $\overline{\mathbf{s}}$ vector describing the firm's primary resource supply.

In the fourth section, we defined a quasi-blue economy type enterprise model within the framework of the LAM, minimizing the negative environmental impact in the event the firm is unable to comply with the strict zero waste principle. The minimizing of negative environmental impact stemming from the utilisation of primary resources and the emission of polluting substances became part of the objective function. The main result of the study is obtained from the dual problem according to which any firm may become profitable only if it impacts the environment; consequently, blue economy type companies cannot be profitable. Moreover, the basis of the internal transfer prices applied by the firm is the negative environmental impact stemming from the utilisation of natural resources and the emission of polluting substances.

Defining a function that is aggregating the environmental pressure emerges as a future research direction, since defining the level of environmental pressure through the application of the $\mathbf{ry^p}+\mathbf{qs}$ linear cost function is not always appropriate given the fact that the emission of certain polluting substances is not always proportional to the resulting negative environmental impact. Although the references found so far in the literature assume a linear connection between the emission of polluting substances and their impact on the environment (*Wenzel et al. 1997; Potting – Hauschild 1997; Brink et al. 2001; Abdullah 2014*), it would make sense to assume that in certain cases the situation is worse than that: if the emission of polluting substances is increased to λ-fold, the resulting environmental pressure usually increases by more than λ-fold. In order to model this problem, we must give up the linear objective function and apply the following convex function instead:

$$f\left(y^p,s\right)=\sum_{i=1}^{n} r_i\left(y_i^p\right)^{\alpha_i}+\sum_{k=1}^{l} q_i\left(s_k\right)^{\beta_k}, \text{ where } \alpha_i,\beta_k\geq 1. \tag{30}$$

The conditions of the model define a convex polyhedron and because the cost function is convex, the local solution may well be a global one, and consequently we do not expect more serious mathematical problems.

According to *Kuti* (*2014*) sustainability represents numerous risks and opportunities for companies. These risks include infringement fines, waste management,

increasing competition for scarce resources, and the increasing expenses thereof. Opportunities include improving operating efficiency, better risk management and revenues stemming from responsible product/services. It is worthwhile examining the effect of the risks and opportunities raised by *Kuti* (*2014*) on production companies, but to this end, we should switch to a stochastic model.

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Appendix

Simplex table necessary for formulating the dual problem of firms striving to minimize negative environmental impact:

	$\mathbf{x}$	$\mathbf{s}$	$\mathbf{u}$	$\mathbf{z}$	$\mathbf{y}^p$		
$\mathbf{p}$	$-(\mathbf{K}-\mathbf{R})$	0	$-\mathbf{E}$	$\mathbf{E}$	$\mathbf{E}$	$=$	$-\mathbf{y}$
$\mathbf{w}$	$\mathbf{D}$	$-\mathbf{E}$	0	0	0	$\leq$	$\overline{\mathbf{s}}$
υ	0	0	$\mathbf{p}^m$	$-\mathbf{p}^e$	0	$\leq$	d_e
$\mathbf{t}^y$	0	0	0	0	$\mathbf{E}$	$\leq$	$\overline{\mathbf{y}}$
	$\geq$	$\geq$	$\geq$	$\geq$	$\geq$		
	0	$-\mathbf{q}$	0	0	0		

Simplex table necessary for formulating the dual problem of the quasi blue economy type of firm:

	$\mathbf{x}$	$\mathbf{s}$	$\mathbf{u}$	$\mathbf{z}$	$\mathbf{y}^p$		
$\mathbf{p}$	$-(\mathbf{K}-\mathbf{R})$	0	$-\mathbf{E}$	$\mathbf{E}$	$\mathbf{E}$	$=$	$-\mathbf{y}$
$\mathbf{w}$	$\mathbf{D}$	$-\mathbf{E}$	0	0	0	$\leq$	$\overline{\mathbf{s}}$
υ	0	0	$\mathbf{p}^m$	$-\mathbf{p}^e$	0	$\leq$	$\mathbf{d}_e$
	$\geq$	$\geq$	$\geq$	$\geq$	$\geq$		
	0	$-\mathbf{q}$	0	0	$-\mathbf{r}$		

"Resources in the Service of the Nation" – Alternative Options for the City Loan of 1925 and Its Spending*

Tamás Fülöp

Foreign loans acquired a dominant role in the stabilization and reorganization of the Hungarian national economy in the interwar years. The loans lent by the Speyer Banking House opened the opportunity of obtaining development resources for Hungarian cities through mortgage bonds. The localities spent the majority of the American loans on investments in infrastructure and public utility developments. The foreign loans imposed an enduring and significant burden on the cities, but they resulted in substantial and permanent changes in the lives of local governments, they contributed to the development of public utilities, public institutions and to the improvement of living conditions in the interwar years. However, we find significant differences from city to city in the utilization of the loans and the successful implementation of the capital investments. In some cities the repayment imposed a lighter burden and in other places the debt service strained the budget of the city by resulting in a persistent problem. In my study I explored the economic and economic policy circumstances of the borrowing of the city loan of 1925 and the characteristics its utilization.

Journal of Economic Literature (JEL) codes: N14, N24, N44, N94

Keywords: loan of the League of Nations, Speyer loan, Hungarian cities, urban development, infrastructure development

1. Introduction

On 22 July 1925, Act XXII of 1925 on foreign loans of Hungarian cities was enacted, which enabled towns and cities with municipality rights and with a regular council to *"borrow a long-term bond repayment loan denominated in foreign value, up to the amount corresponding to 1100 billion koronas, in order to cover the costs of their useful investments authorized by the governing authorities".*[1]

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* The views expressed in this paper are those of the author(s) and do not necessarily reflect the offical view of the Magyar Nemzeti Bank.

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[1] Act XXII of 1925 on the loan of cities. https://1000ev.hu/index.php (Downloaded: 9 February 2017)

The provision by the government of foreign loans available for cities was part of the large-scale stabilization programme, which was meant to serve the reorganization of the Hungarian national economy, after the First World War and the peace treaty of Trianon.[2] However, in order to recover the normal functioning of the country and to obtain the external resources essential for the development of the economy, it became absolutely necessary to increase the international recognition of Hungary after the treaty of Trianon and to achieve an equilibrium in government finances. After a successful stabilization, in 1925 the loans issued by the Speyer Banking House opened the opportunity of obtaining development resources for Hungarian cities by borrowing long-term loans. The municipalities affected by this credit facility spent the majority of the American loans – under the strict control of the financial governance – on infrastructural projects and public utility developments. In the subsequent decades, the amortization of foreign loans imposed a significant and enduring strain on the financial management of Hungarian cities, but the external financial resources resulted in significant and enduring changes in the lives of the municipalities. The capital investments enabled by the loans contributed to the modernization of cities, to the development of public utilities, public institutions, to the improvement of living conditions in the interwar years. In my study I intend to assess the economic, economic policy circumstances of the borrowing of the city loans of 1925 and 1926 and the characteristics of how they were spent.

2. The restoration of creditworthiness and the obtaining of the League of Nations loan

After the First World War, the Hungarian economy and society had to face challenges never encountered earlier.[3] The extremely severe loss of territories and population owing to the peace treaty of Trianon caused such a trauma for Hungary that the country could not resolve or even process in the short term. The protracted war had already exhausted the economy of the country, the losses of the war caused a shortage of labour force, the life of the hinterland was strained by a severe shortage of goods and raw materials, acute problems of supply, then after the war the military occupation imposed on a significant part of the country, the dictatorship of the proletariat and the subsequent retribution, caused substantial damages in both human lives and properties.[4] The country gained its sovereignty parallel with the dissolution of the Austro-Hungarian Monarchy, under extremely adverse conditions, after the war the fundamentally changed circumstances of foreign policy and foreign economy prevented the recovery of the country to a significant extent. The sources of earlier foreign loans dried out, foreign trade practically ceased, the country did

[2] In more detail: (Honvári 2001:330–51); (Honvári 2006:19–42); (Kaposi 2002:269–282)
[3] In more detail: *Romsics* (*1999:99–147*)
[4] *Bojtos* (*2013:327–388*); *Gyenesei* (*2015:77–402*)

not have a currency of its own or customs protection, while the neighbouring new nation-states imposed an economic blockade on a Hungary driven back behind the new borders. Parallel with that, the country had to face a radical change of the spatial structure of the economy, the loss of a substantial part of the raw material resources and infrastructure of the Hungarian economy, as well as the obligation to pay severe restitution. In this quagmire of economic problems mutually strengthening one another, the capacity of the national economy dropped, the drying-up of state revenues and the deepening inflationary crisis also played a determining role.

It was after signing the forced peace treaty of Trianon that the road opened up to consolidation in foreign and domestic policy and to the stabilization and reorganization of the national economy. The first major attempt to stop the inflation that started during the war and then accelerated and to restore the balance of government finances was masterminded by minister of finances Lóránt Hegedűs at the end of 1920 (*Honvári 2001:330–338*). The most important aim of the resolution plan was to address the liquidity problems of government finances and to restore the balance of the budget, but in the development of the stabilization programme the fact that the strengthening of the economy could almost exclusively rely on internal resources at that time had also be taken into consideration. The fact that the restitution obligations of Hungary had not yet been defined could also be a problem and all revenues and the entire wealth of the country was mortgaged as security to fulfil obligations. In order to control inflation, the financial governance tried to artificially tighten the supply of money and by the introduction of property tax they tried to increase the revenues of the state budget, as well as to reduce the expenditures of the state by the implementation of severe austerity measures. One of the fundamental pillars of the large-scale stabilization plan of Lóránt Hegedűs was the balance of the state budget accomplished by property redemption and the reduction of the issue of currency, but the plan of the financial minister only focused on aspects of government finances and disregarded the low profitability and significant capital requirement of the real economy (*Tomka 1996:71–74*). Therefore, in the short term it seemed that the plan managed to reduce the volume of currency in circulation and to improve the exchange rate of the temporary currency, the Hungarian korona, created by the overstamping of the former common currency of the Monarchy, in the international money markets. However, the revenues generated from property tax did not reach the desired level, and by creating a kind of deflationary crisis, the anti-inflationary financial policy resulted in adverse impacts on the real economy. The growth of the national economy fell short of the expectations, and by September 1921 it turned out that the stabilization of the Hungarian economy based on internal resources, i.e. the attempt of Lóránt Hegedűs to consolidate finances and the state budget, failed.

Thereafter, the new financial governance, which only had a very narrow economic policy latitude, started increasing the circulation of banknotes, in order to

finance state expenditures and to provide loans to the private economy (*Kaposi 2002:278–279*). Established after the termination of the common central bank of the Monarchy, the Austro-Hungarian Bank, the central financial institution, the Royal Hungarian State Bank started expanding the circulation of money by issuing fiat currency. From the end of 1921 loans provided directly by the State Bank were the only source of funding of the economy. Since the interests of loans emitted that way did not keep pace with the increasing rate of inflation, resources could be obtained at very favourable conditions. Since undertakings tried to convert their money, losing its value at an accelerating rate, by investments into the real economy, during 1922–23 a seeming and temporary economic upturn started developing (*Honvári 2001:337*). This kind of financing had a temporary favourable impact on both financial institutions and the processes of the stock market, the number of credit institutions and the turnover of the stock market increased (*Tomka 1996:76–77*), however, this did not happen in accordance with an investment strategy implemented in line with long-term economic policy objectives; thus, the development of the sectors considered important relating to the enduring growth of the national economy was not achieved.

The inflationary policy became a tool for the central depletion and redistribution of income, the increasing inflation resulted in the devaluation of the currency, which had the most negative effects on people living off wages and salary and those with savings. In contrast, by taking advantage of loans lent in high amounts, with a long maturity and fixed interest, those borrowers who primarily had loans secured by mortgage on real property – primarily landowners, municipalities – could repay their loans borrowed before the war much more easily by relying on a currency that was losing its value rapidly. In a way the state also benefited from inflation, since owing to the devaluation of the currency it was mostly relieved of the obligation to repay the non-indexed war loans borrowed during the world war. However, by the end of 1923 inflation had become so high that it started to fundamentally prevent the functioning of the Hungarian economy, which struggled with the replenishment of the losses and damages of the war and with shifting to peacetime production. The devaluation of money frustrated monetary circulation and resulted in huge capital losses for credit institutions in Hungary, which further compounded the economic problems arising from the shortage of capital. Although after the war the state became more and more involved in finances, it also contributed to the failure of controlled inflationary economic policy and the lack of success of the attempt to put the national economy on a trajectory of persistent growth that at that time Hungary did not yet have an independent central bank and a stable currency of its own, by which it would have been able to support the economic turn, e.g. by applying a policy of exchange rate regulation.

During 1923 it became clear for the Hungarian government that a long-term foreign loan of a major amount would be required for the successful stabilization of the

economy. During 1922–1923 prime minister István Bethlen and minister of finances Tibor Kállay conducted preparatory negotiations in order to obtain a high-volume foreign loan (*Ormos 1964:42–57*). However, it turned out during the negotiations that any rescue program for the disastrous Hungarian government finances and the national economy, which struggled with a shortage of capital, could be implemented with the involvement of external resources, which was only possible with the approval of the victorious Western great powers and the support of the League of Nations. In an effort to provide collateral for the foreign loan, the prime minister requested the Restitution Committee of the League of Nations to release the mortgage imposed on the wealth of the nation and the revenues of the state. By December 1923 the delegation of the League of Nations prepared the reconstruction proposal, in which a high amount, long-term foreign loan lent to Hungary was to play a dominant role. Containing strict conditions, the reconstruction plan required the Hungarian financial governance to stop the issue of fiat money and to halt inflation, to create a balanced state budget, to establish an independent central bank and to settle the issues of restitution. Financial reconstruction had to be supplemented by a comprehensive reconstruction programme, the purpose of which was the maintenance of the favourable economic processes. The League of Nations delegated a chief commissioner to Hungary to supervise execution (*Soós et al. 1993:520–556*).

Act IV of 1924 – the statute on the restoration of the balance of government finances – enacted the programme of the reorganization of the Hungarian economy. This law authorized the minister of finances that in the implementation of the stabilization program *"he may borrow a loan resulting in the repayment of 250 million gold koronas, in order to cover those needs registered as of 30 June 1926 that are not covered by the current revenues"*.[5] The announcement about the subscription of the Hungarian state loan was published at the beginning of July 1924 in the international money markets, with the signature of chief commissioner of the League of Nations Jeremiah Smith and minister of finances Frigyes Korányi (*Honvári 2001:343*). This loan was placed in a total of 8 countries, almost 55 per cent of the loans of 307 million was subscribed by the Brits, each of the Americans and the Italians subscribed 12 per cent, and 8.5 per cent was absorbed by Switzerland, while the remaining part was shared by 4 countries – Sweden, the Netherlands, Czechoslovakia, and also Hungary (*Ormos 1964:135–136*). The loan was issued in 8 *tranches*, each of which was denominated in the currency of the country subscribing the loan, and repayment was to take place over a term of 20 years, by drawing lots or by repurchase (*Tomka 1996:82–83*). The loan of the League of Nations was received well in the United States, which is reflected by the telegram of the Speyer and Co. Banking House sent to the Hungarian Minister of finances with the date of 8 July 1924, and published by the Hungarian News Agency: *"We are happy to let you know that the American tranche of the Hungarian loan was fully subscribed.*

[5] Act IV of 1924 on Restoring Fiscal Equilibrium. https://1000ev.hu/index.php (Downloaded: 9 February 2017)

We have closed the subscription list and the banking group that committed to issue the loan by its signature, was fully released. We were extremely happy to have been able to participate in this action that we trust will be just as beneficial for Hungary as it is for the American capitalists who participated in the subscription".[6]

With reference to the fact that this loan was not only designed to resolve the fiscal problems but also to create the conditions for a sustainable growth of the Hungarian economy in the form of new loans and to gain recognition for Hungary after the peace treaty of Trianon, the professional literature of economic history was right in highlighting that the loan of the League of Nations was offered with extremely adverse conditions, the subscription price of the loan was very low (80–87 per cent) and its interest rate very high at 7.5 per cent (*Honvári 2001:343–344*); (*Kaposi 2002:279–280*). It is reflective of the secondary role of the loan of the League of Nations in establishing international financial trust in the country and the resultant strengthening of sovereignty that even though in 1924 lending to Hungary seemed favourable to foreign creditors, the attempt to place these loans fully in the western European money markets failed. This is how it became necessary to place a part of the loan worth 11.6 million gold koronas with still weakened Hungarian investors. Minister of finances Frigyes Korányi issued a press release on 12 August 1924 on the success of the subscription of the loan of the League of Nations in Hungary, in which, in addition to "obligatory optimism" he also tried to highlight to the general public the further-reaching beneficial effects of the loans and the psychological aspects of subscriptions in Hungary: *"I am glad and satisfied to be informed that the subscription of the Hungarian tranche of the loan of the League of Nations was a total success. The Hungarian society has proven that it is not only aware of what is its obligation to the entire nation, but it can also exercise sober deliberation in finding the most lucrative investment opportunities for its capital. […] On this occasion I gladly discharge my duty of conveying my patriotic thanks to every section of our society that has participated in the entire loan actions, and likewise in the establishment of the Magyar Nemzeti Bank, either by moral support, or in the form of financial involvement. […] I consider this moral support […] the guarantee of this great effort that we embarked on eighteen months ago under difficult circumstances, and that still involves much struggle and tribulations today. This enthusiastic support is the measure of self-confidence. And if we have trust in ourselves, then we will manage"*.[7]

The establishment of a central bank independent of the state, having the monopoly to issue banknotes and the creation of a stable valued national currency, was an essential condition for the economic stabilization to be successful (*Soós et al. 1993:556–566*). Magyar Nemzeti Bank, the independent Hungarian central bank, started operating

[6] News of the Hungarian News Agency 1920–1956. Weekly edition, 1924–1941. 08 July 1924) https://library.hungaricana.hu/ (Downloaded: 9 February 2017)
[7] News of the Hungarian News Agency 1920–1956. Weekly edition, 1924–1941. 12 August 1925) https://library.hungaricana.hu/ (Downloaded: 9 February 2017)

on 24 June 1924, as a company limited by shares. The new central bank shouldered the public debt accumulated up to that point from the former state bank, and with it the gold and foreign currency stock of the state bank. The Magyar Nemzeti Bank stabilized the korona with the support of the Bank of England, tied to the exchange rate of the British pound. The korona, which had become a value certain currency by now, was converted into the new, gold-based official currency, the pengő as of 1 January 1927. The rates of foreign currencies against the pengő were also set, at the time of introduction 1 British pound was worth 27.8 pengős and one American dollar 5.7 pengős. The central bank maintained the convertibility of the new banknote for gold and foreign currency above the legal requirements, and in the initial period, it pursued a very modest emission and lending policy, in order to avoid the danger of another bout of inflation. By creating a stable and stable valued currency, the Magyar Nemzeti Bank significantly contributed to consolidation, to the strengthening of the international financial situation, creditworthiness of the country, and to the subsequent economic upturn (*Botos 1999:72–83*).

The reduction of expenses was a priority in the stabilization program, which was intended to be accomplished by "settling the remuneration of public servants and reducing their number", among others, which was also accomplished by increasing the revenues of the state through the significant increase of taxes and duties and the reorganization of public services. This statute already mentions the intention to establish the central bank, but ultimately, the establishment of an autonomous financial institution independent of the government was enacted by Act V of 1924 on the establishment and patent of the Magyar Nemzeti Bank.[8] It enhanced the optimism about the enduring success of the economic reconstruction that, instead of the reconstruction period defined by financial experts originally until 30 June 1926, inflation stopped in the same year, the fiscal equilibrium was restored by as early as October 1924 and in the next fiscal year the balance of public finances showed a small surplus at the end of the year (*Tomka 1996:83*). The chief commissioner of the League of Nations called this fast and successful stabilization a "*surprising recovery*", and the former minister of finances reflected on the results of the process by these words: *"The success of financial reconstruction happened within such a short time that it was a surprise for even those who accepted the political and moral responsibility for these efforts"* (*Korányi 1928:1–11*).

Successful stabilization also meant that Hungary accomplished important results in coping with the consequences of the war, and having regained a significant part of its sovereignty, in the middle of the 1920s it was capable of getting involved in the upturn of the world economy based on the utilization of American and English loans. The period between 1925 in 1929 was considered a very favourable time

[8] Act V of 1924 on the establishment and patent of the Magyar Nemzeti Bank. https://1000ev.hu/index.php (Downloaded: 9 February 2017)

for obtaining loans in the international capital markets (*Tomka 1996:83*). After the resolution the opportunity opened up for the Hungarian corporate sector and municipalities to obtain the resources necessary for their missed developments by borrowing foreign (primarily American) loans, to remedying their acute capital shortages by international loans (*Balla 1935:258*). It was in 1925 that Hungarian cities got an opportunity to borrow the much-needed mortgage loans of significant amounts, with a long maturity, financed by the international capital market.

3. Borrowing by Hungarian cities

After the First World War, in addition to the challenges going back to the time of dualism, Hungarian cities had to face several new dilemmas. Many communities had to address problems of controlling the damages caused by the war, the revolution and the occupation, of remedying the economic and social changes caused by the new borders imposed by the peace treaty of Trianon, while the public utility and infrastructure developments, the social, public health, educational and cultural tasks deriving from processes of urbanization and population growth affected almost all types of localities. All these together caused a kind of forced modernization in the lives of rural localities, considering the fact that owing to the world war and the economic consolidation, there had been no means to implement a significant part of developments for almost one decade.

In the decades between the two world wars the relationship of Hungarian towns and cities with the central government and with public administration, as well as the tasks of municipalities were basically defined by a legal environment originating from the era of dualism. Of the efforts at the modernization of the legislative system, Act XXX of 1929 on the reform of public administration was the most outstanding, which attempted to place the administration of local municipalities on a new basis, but in reality it did not change the institutional foundations, in fact, in addition to retuning the most important elements, it even made the legacy of dualism more stringent.[9] As a result of the public administration Act of 1929 – since this law did not invalidate Act XXI of 1886 on municipalities, which in turn left Act XLII of 1870, the first law on municipalities intact – *"an idiosyncratic legal chain of survival and coexistence was created in the world of local public administration, consisting of counties, towns* (*and villages*)*"* (*Antal 2010:6*). Therefore, with all of its special characteristics, the public administration and municipality level administration after 1920 show a kind of continuity with the main direction of public administration in the era of dualism, in which the reduction of the territorial autonomies of public administration was assigned a central role by the strengthening of centralisation and by increasing the influence of agencies of the state (*Fülöp 2014:207–208*). This was

[9] Act XXX of 1929 on the rearrangement of public administration https://1000ev.hu/index.php (Date of access: 09 June 2017).

also true for the financial management of cities, since *"the gradual development of law was then constantly approaching a state in which every economic action of the cities that primarily affected their asset status, required the approval of a higher-level organ, a governing authority"* (*Drághfy 1941:58*).

According to the legal interpretation of the interwar years, local governments, i.e. villages, towns and cities and counties participate, with a certain degree of autonomy, in the exercise of the executive powers of the state through the fulfilment of tasks delegated from the state because of practical reasons, i.e. in governance and public administration, and therefore *"governance at municipality level is essentially […] nothing else than the involvement of the people in public administration"* (*Homolyai 1943:6*). The contemporaneous professional literature, which classified the public administration duties of local governments according to obligatory tasks conveying the central will of the state and voluntarily committed tasks reflecting the self-government intentions of localities was of the opinion that during the 20th century in the scope of tasks to be fulfilled by Hungarian towns and cities *"as a result of the huge rate of urbanization that started in the 19th century […] and with the increase of cities, the advancement of culture and the increase of demands, it was mainly the weight and significance of optional tasks that have showed an increase";* therefore, the fulfilment of urban development, cultural, educational, and public catering, public health and social tasks – and the fulfilment of the urban management tasks financing these – increased significantly (*Homolyai 1943:4*). The aims of urban development ideas of the time significantly overlapped with modern urban planning ideas, since the developments were designed to achieve, even during the interwar years, such results which would lead to better coverage, than before, of social needs by the localities, changing both in space and time, which means, in a complex manner, the expansion of physical, social, healthcare, cultural and educational infrastructure and services, the improvement of the living conditions of city-dwellers constituting a spatial community.

The autonomy of municipalities primarily manifests in legislation, financial self-government and the election of officials, which also fundamentally determined the implementation of development concepts. In order to ensure the success of stabilization and to avoid excessive indebtedness, after 1920 the intention of control by the state was applied more strictly in the financial operations of Hungarian cities. Act IV of 1924 already authorized the government to implement the actions necessary for the rearrangement of the finances of cities, then Act V of 1927 made the validity of budgets of cities subject to the approving consent of the minister of the interior and the minister of finances, *"in order to ensure the appropriate application of the necessary austerity in the finances of local government bodies and in the imposition of local government taxes".* Accordingly, certain items of the city budget may be reduced, increased, deleted, and even new expense items may be added, or the approval of the budget may be rejected entirely, and it is even

possible to instruct the municipality to create a new budget (*Drághfy 1941:59–60*).[10] This rigidity also applied to borrowing by cities, which we will also see regarding the Speyer loans.

Referring to the New York correspondent of Reuter agency, on 11 July 1925 MTI news agency published that *"The Speyer Banking house concluded the negotiations on a loan of 10 million dollars to be lent to Hungarian cities."*[11] This enabled the disbursement of the American loan affecting 48 rural cities with the mediation of Hungarian Commercial Bank of Pest.[12] Thereafter, the process of local governments borrowing foreign loans accelerated. This is how counties and the capital received communal loans in 1926 organized by the General Credit Bank of Hungary. The issues of mortgage bonds for the purpose of giving loans to cities and counties were becoming an increasingly dominant form of long-term foreign loans and a significant rivalry began in the mediation of the sources of funding between the two leading financial institutions of the capital city, i.e. the Hungarian Commercial Bank of Pest and the General Credit Bank of Hungary (*Tomka 1996:84–85*). While the General Credit Bank of Hungary mainly relied on the Rotschilds of London, the Hungarian Commercial Bank of Pest primarily maintain connections with American financial groups, including the Speyer Banking House. It was an early sign of the increasing role of American capital in the financing of the Hungarian economy that in August 1924 the Government delivered debentures of the loan of the League of Nations with a face value of 1.5 million dollars to the Speyer Banking House, originally subscribed in Hungary (*Honvári 2001:344*). In the market of communal loans provided to local governments a serious fight developed among competitors of the international capital market; therefore, it was considered a significant diplomatic achievement that once again the Speyer Banking House was commissioned to lend the second city loan of 6 million dollars (*Tomka 1996:85*). However, it should be noted that naturally, in addition to the agreement concluded with the Speyer Banking House, there were several instances when a mortgage loan denominated in a foreign currency had been lent until the outbreak of the financial crisis in Hungary.

Even during the war years, Hungarian cities were forced to put their development concepts on the back burner and only finance their fundamental public administration services and the maintenance of their institutions, a backlog of several decades had been accumulated in the modernization of the network of roads and public utilities and the maintenance of public buildings (*Statistical Yearbook 1928:35*). The reduced capacity of the local economy and the steadily decreasing tax potential of the residents, coupled with accelerating inflation,

[10] Act V of 1927 on the reduction of certain taxes and duties and on provisions regarding calculation in pengő value, furthermore, on the more effective control of the finances of local government assemblies. https://1000ev.hu/index.php (Downloaded: 9 June 2017).
[11] News of the Hungarian News Agency 1920–1956. Weekly edition, 1924–1941. Issue of Week 53, 11 July 1925 https://library.hungaricana.hu/ (Downloaded: 9 February 2017).
[12] On the operating figures of the Bank for 1926 Pesti Magyar Kereskedelmi Bank (Hungarian Commercial Bank of Pest) (*Kallós 1926:137–143*).

resulted in the drying-up of revenues and the disruption of the city budget (*Inántsy-Pap 1938:481*). A significant part of the territory of the country sided by the new borders drawn after the first world war was affected by the occupation of foreign military force, which caused damages in several communities with varying terms and intensity. These events burdened the budgets of individual cities by significant reconstruction costs in the years following the war.[13] The social tensions arising from the consequences of the war and the general situation of the national economy were also directly present in the lives of cities, taking care of those in need – disabled veterans, widows and orphans – and the unemployed, the restart of cancelled public works posed a significant challenge for city leadership. The acute shortage of capital jeopardized the operation of public utilities of major communities, and thus the supply of the general public; therefore, on 15 September 1924, in Nyíregyháza, in the centennial celebrations of the city, the National Congress of Hungarian Cities once again urged the settlement of the loan issues of cities.[14]

The contemporaneous analysis of the borrowings of cities pointed out that in the fulfilment of their public tasks defined in law, local governments *"need additional and significant funds in order to create and maintain public institutions, institutes, public utilities, general public facilities and to implement projects of urban development and create works of great significance influencing even the distant future",* and since the localities can mainly fill these needs through the involvement of external resources, therefore *"for reasons of financial management, the loans of cities are of special significance, because owing to the nature of this matter, the increase of the needs of urban citizens coupled with efforts to build up the capacity to fulfil the constantly registered additional needs created by the fast pace of urban life, the significance of these loans is sharply increasing year by year"* (*Inántsy-Pap 1937:802803*). During this era the borrowing right of cities was regulated by Acts XXI and XXII of 1886 on municipalities (counties and cities with municipality rights) and villages (local governments of localities), Act XXII of 1925 on city loans and Act XXII of 1929 on the reorganization of public administration. These legal frameworks ensured the borrowing rights of cities, but the borrowing of the loans was subject to the approval of the supervisory authorities, in order to prevent excessive indebtedness and to ensure the control of the government (*Lukácsi 1928:37–38*).

After the First World War Hungarian cities borrowed loans in various amounts and in diverse forms. The localities usually had the opportunity of obtaining credit facilities for their operating type expenses that could not be financed from their budgets, while they could finance investment projects by long-term loans. Since *"Hungarian cities, towns and villages have no capitals or reserves […], this is why they can only cover*

[13] In Szolnok, for example, during the time of the Romanian occupation and the dictatorship of the proletariat, in addition to the road bridge of the Tisza, the County Hall, the Castle Church and the road network of the city, several other public and private buildings sustained serious damages in 1919 (*Fülöp 2013:105–110*).
[14] Nyírvidék, 17 September 1924.

their investment needs by borrowing" but pursuant to the financial policy guidelines, *"the Government usually only allows cities to borrow loans to be repaid on a longer-term, for the purposes of works of investment nature"* (*Lukácsi 1928:37–38*). In the opinion of the professional literature of the time, the long-term loan *"is practically the most natural form of subsequent accumulation of wealth, arising from the regime of financial management", which "enables revenues expected for the future to be brought forward, in order to create coverage for such absolutely necessary expenses that would otherwise only be satisfied at a later date and therefore public bodies can only commit to fulfilling the tasks whose fruits would be enjoyed not only by economic individuals constituting the public body at the time of borrowing, but also and importantly, by individuals of a later era as well"* (*Drághfy 1941:56*). The resources necessary for the accomplishment of aims serving the future became available for Hungarian cities after the successful consolidation. However, the fast influx of foreign (mostly American) loans and the appetite of the cities for loans encouraged the government to introduce strong regulatory controls for borrowing, in order to prevent the excessive and irresponsible indebtedness of the localities.

Back in 1924, the interior minister let it known to the general public of cities in a circular directive that they *"are not allowed to launch negotiations aimed at obtaining foreign loans without the knowledge and consent of the government,"* despite this, in 1926 local governments once again had to be emphatically warned that they *"have to refrain from such stand-alone, isolated loan actions for their own best interests, but also with regard to national interests".*[15] The governance of interior affairs was right in concluding that *"the separate negotiations of cities on foreign loans cannot deliver the desired results, because […] in addition to isolated loan actions of certain local government organs, it is not possible to negotiate such favourable conditions in the money market as in the case when they act with their united moral and financial powers in the open market, under the direction and with the support of the government".* In addition, the *"random, isolated endeavours of the local governments at obtaining loans make the conduct of a planned credit policy […] more difficult",* while "*if the loan needs of the cities are satisfied under the direction of the government […] it becomes possible to prevent the local government from incurring unnecessary debt, which is suitable to restrict the burdens payable to foreign entities under the heading of interest and principal repayment and therefore it becomes possible to prevent that the payment of balances of the country shift in the direction of liabilities to such an extent that would give us reason to worry about the financial order of the country, which was accomplished with so many difficulties.*" Realizing the deepening of the financial tensions of the world economy – related to the increase of foreign indebtedness of the country and to the deterioration of its balance of payments – the Interior Ministry ordered in its circular decree of 14

[15] Circular decree with B.M. no. 54.033/1926. on the borrowing of foreign loans. Belügyi Közlöny (Home Affairs Gazette), 1926. Volume 31, issue 42, 3 October 1926 pages 704–705.

October 1929 that the strict process developed related to the borrowing of cities be maintained and borrowing by local governments be restricted.[16]

Therefore, Hungarian cities with significant assets and revenues had made even earlier several failed attempts to borrow domestic or foreign loans for the maintenance of their operations and for the accomplishment of their development concepts (*Honvári 2004:47–48*). However, the Hungarian financial institutions did not have the necessary amount of capital, on the one hand, on the other hand, loans were available according to the current conditions of the money market, while the international financial groups were not willing to lend to localities individually, for lack of a state guarantee.[17] And even though a group of cities that did not qualify for the first Speyer loan started negotiating with English financial circles competing with the Speyer Banking House on borrowing, it was the firm opinion of the government that the initiating and coordinating role of the state is essential in the negotiations of the loan, since standalone attempts of the individual cities would deteriorate the creditworthiness of the country, small towns simply will not be able to obtain loans that way and the credit brokers would increase the interest surcharge.[18] Therefore, the government embraced the cause of mortgage loans to be lent to cities and initiated a survey in order to find out which cities would need loans and in what amounts, including the assessment of whether the financial capacities, assets and revenues of the cities would provide an appropriate guarantee for the repayment of the loans. As a result of the survey, it turned out that the overwhelming majority of Hungarian towns and cities needed foreign resources: 10 cities with municipality rights and 38 cities with regular councils reported their needs for a loan in a total of 139,904,000 gold koronas, of which 104,166,000 gold koronas were intended to be invested in revenue-generating projects and 35,738,000 gold koronas in non-revenue-generating projects (*Inántsy-Pap 1938:483*). There were only 6 cities that did not report a need for borrowing. The 54 localities having the rank of city at the time were thoroughly assessed for their asset position, budget appropriations, revenues and expenditures and tax revenue capabilities. It was found that the asset positions of cities, their expected revenues and the high ratio of productive investment projects to be financed from the loans provide an appropriate guarantee for the borrowing of major loans. The need to strengthen the creditworthiness of Hungarian cities, to increase the marketability of the loan bonds and to stimulate the interest of the international investment market required the centralization of city loans. In an effort to enable cities to obtain a direct connection together with the international financial markets, the government initiated negotiations with the Speyer Banking House of New York on the provision of a loan of 50 million gold

[16] Circular decree with B.M. no. 79.381/1929. on the restriction of borrowing by counties, cities, towns and villages. Belügyi Közlöny (Home Affairs Gazette), 1929. Volume 34, issue 50, 27 October 1929 1104–1105. p.
[17] News of the Hungarian News Agency 1920–1956. Weekly edition, 1924–1941. Issue of Week 53, 09 July 1925 https://library.hungaricana.hu/ (Downloaded: 9 February 2017).
[18] Közgazdasági Krónika (1925:668–669); Makó (2015:86–88).

koronas. At first the banking house insisted on the guarantee of the state and wanted the cities to assume joint and several guarantee for the entire amount of the loan, for which the real properties of the cities would have been mortgaged, but the cities managed to negotiate an arrangement under which they were allowed to dispose freely of their real properties after the borrowing of the loan as well and the collateral for the loan was the flow of revenues of the cities, primarily revenues from sales and wage taxes. The contemporaneous report stated that the conditions of the loans lent to the cities *"[…] are generally more favourable than the so-called reconstruction loan lent to the state, because the bonds will be issued at a price of 80 per cent, as opposed to the 82 per cent of loans lent to the government".*[19] The negotiations resulted in the creation of a type of loan which had hardly been known earlier even in the international money markets and which involved the joint issue of bonds by the Hungarian cities requiring loans; thereby, establishing a direct link between localities interested in borrowing – with the involvement of the government – and foreign financial groups (*Inántsy-Pap 1937:806*).

Pursuant to Act XXII of 1925, approved by the Parliament, the cities were allowed to borrow a significant volume of long-term loans primarily at the expense of their own revenues, of which every city was allowed to borrow as much as was approved by the interior minister in agreement with the financial minister, according to the resolution of the assembly of city representatives, but the amount of the annual debt service of the loan was not allowed to exceed half of the total revenue of the city from sales tax and wage taxes (*Honvári 2004:50*). The cities had to provide suretyship for the loans borrowed by them, offering all assets and public revenues as collateral, but since several cities were involved in the borrowing of the loan, the law stated that each city was only liable for the loan it borrowed itself.

Therefore, pursuant to the statute the bond issuing committee issued on-sight dollar bonds in a total face value of 10 million dollars, the name of which was *"Consolidated Hungarian City Loan with 7.5% Guaranteed Gold Bond for Twenty Years".* The Speyer Banking House purchased the bond at a price of 82 per cent, settlement was made with the cities at a price of 82.5 per cent. The annual interest was set at 7.5 per cent, the annuity of the loan was 9.73 per cent for a term of 20 years; the annuity had to be paid in 40 subsequent semi-annual instalments, beginning on 1 January 1926. Only 500 thousand dollars of this loan could be sold above the price of 89 per cent in the capital market of Amsterdam (*Közgazdasági Krónika 1925:669*). One of the reasons for this was the fact that Western European investors knew little about Hungarian cities. In order to obtain security for the payment of the interest and principal instalments of the loan, the revenues of the cities deriving from general wage taxes and their share of sales taxes were encumbered in such a manner that these city revenues had to be paid to the

[19] News of the Hungarian News Agency 1920–1956. Weekly edition, 1924–1941. Issue of Week 53, 09 July 1925 https://library.hungaricana.hu/ (Downloaded: 9 February 2017).

regional Royal tax office, similarly to state taxes, and the office paid these sums – to the extent necessary for the full repayment of the loan – into a separate bank account maintained by the Magyar Nemzeti Bank. As a guarantee for repayment, it was provided that no subsequent loan would receive a higher ranking than this loan. In the manner prescribed by law, the Magyar Nemzeti Bank acted as an important intermediary in brokering the foreign loans borrowed by Hungarian cities and in mediating their repayment. Owing to the high interests and the lower initial price, the business management of the central bank tried to interfere in several ways in order to reduce the interests in the placement of foreign loans borrowed by city self-governments with Hungarian financial institutions (*Botos 1999:53–54*).

The loan was borrowed based on the notarized recognizance of cities (main bond), the loan bonds were issued on behalf of the borrowing cities by a committee of four members, each of the interior minister and the minister of finances appointed one member, one person was delegated by the cities, while the president of the committee was the delegated representative of the ministry. In order to improve the creditworthiness of the loan bonds, they were declared suitable to be used as security deposit and villages, bodies, foundations, institutions under public supervision, funds of persons under guardianship or care, furthermore, funds of entails and funds in deposit, as well as funds held at savings banks as deposits were allowed to be placed in the bond. Furthermore, city bonds and their interest coupons were exempt from the documentary and interest duties and in the case of repayment the repaid principal was tax-free.

However, in the distribution of the Speyer loan of 10 million American dollars, borrowed in 1925, it turned out that certain cities were not able to complete their planned investments by the loan amount allocated to them, while other cities were in need of additional loans in order to finance their constantly increasing and highly urgent social, public health, economic and cultural tasks; therefore, the localities once again approached the government with the request of fulfilling their additional loan needs (*Inántsy-Pap 1938:489–490*). According to the report of the cities, 9 cities with municipality rights and 34 cities with regular councils required additional loans, 80 per cent of which was intended to finance income-generating and one-fifth to finance non-income-generating investment projects. The government and the legislation authorized the borrowing of this additional foreign loan; consequently, pursuant to Section 18 of Act XV, under the agreement concluded on 27 October 1926, the cities borrowed an additional sum of 6 million from the Speyer Banking House, with an interest of 7 per cent.[20] The following cities received funds from the second consolidated loan: Baja, Győr, Hódmezővásárhely, Miskolc, Pécs, Sopron, Szeged and Székesfehérvár cities with municipality rights, furthermore, Budafok, Békéscsaba, Cegléd, Eger, Esztergom, Gyöngyös, Gyula,

[20] Act XV of 1926 on the state budgets of 1925/26 and 1926/27. https://1000ev.hu/index.php (Downloaded: 2 March 2017).

Hajdúnánás, Hajdúszoboszló, Jászberény, Kaposvár, Karcag, Kiskunhalas, Komárom, Mezőtúr, Nagykanizsa, Nagykőrös, Pesterzsébet, Salgótarján, Szekszárd, Szolnok, Szombathely, Vác and Veszprém cities with regular councils.[21] The additional loan, for which lower interests and higher prices were negotiated, had to be borrowed from the Speyer Group once again because under an earlier agreement those cities that were the beneficiaries of the loan of 1925 – of which 27 localities were also involved in the second loan – were not allowed to issue additional loans during the term of the repayment of the loan in Hungary without offering the opportunity to the Speyer Banking House first (*Inántsy-Pap 1938:493–498*). According to the statements, of the Speyer loan of a total amount of 16 million American dollars, cities with municipality rights were permitted to borrow 7.3 million dollars and (county) cities with regular councils 8.7 million dollars. Those cities that were beneficiaries of the loan actually received an amount of 74,349,659 pengős after the deduction of the costs related to the issue and in the case of the no. I loan, a loan service reserve in the amount of the annuity for six months. In respect of localities with the same legal status, 90 per cent of cities with municipality rights received credits from the Speyer loan, while in the case of county cities 80 per cent of the localities applied for and received funds from the loan. Of cities with municipality rights, Szeged received the highest and Sopron the lowest amount from the loan, while Kecskemét did not receive any share of this loan type. Of the 45 (county) towns and cities with regular councils only 9 did not apply for a share of the Speyer loan, of those that applied for the loan Újpest received the highest amount and Hajdúböszörmény – which was still a town at the time – the lowest.

4. The utilization of the city loans

The government clearly expected the foreign loans lent to local governments after 1925 to boost the economy, to increase the number of productive investments and to enhance the economic performance of the country. In his speech of 5 December 1925 in the national assembly, interior minister Iván Rakovszky highlighted that *"the loan of cities of the countryside will, in fact, have a beneficial and fruitful impact on our economic life, furthermore, it is also remarkable for addressing the need to reduce unemployment significantly".*[22] Therefore, it was a requirement of the foreign loan needed by the cities that the loan *"must not be used for any other purpose than useful investments, therefore it must not be spent on the construction of a city hall or barracks for the gendarmerie".*[23] A list of what are the investments on which the cities may spend the borrowed amounts constituted the annex of the agreement defining the terms and loan. Three-quarters of the loans borrowed by the cities had

[21] Circular decree with P.M. number 5.445/1926., on the implementation of the provisions regulating the conditions of the lending of an additional foreign bond loans to cities. Belügyi Közlöny (Home Affairs Gazette), 1926. Volume 31, Issue 49, 21 November 1926.
[22] The speech of minister of the interior Iván Rakovszky was published in: 8 órai újság, 5 December 1925.
[23] News of the Hungarian News Agency 1920–1956. Weekly edition, 1924–1941. Issue of Week 53, 9 July 1925 https://library.hungaricana.hu/ (Downloaded: 9 February 2017).

to be spent on income-generating investments and the representative of Hungarian Commercial Bank of Pest, which was involved in the disbursement of the loan, had to authorize the proposed investment projects. Based on this, commercial, industrial and economic aims included surfacing of roadways, the market hall, construction of railways and bridges, wood cutting, in the scope of urban public utilities the power plant, the gas factory, the thrash collection plant, the printing shop, the distillery, the brick and tile factory, the bread and the ice plants were defined, aims related to public health included the bathhouse, the hospital, the disinfecting plant, the water pipeline, the public toilet, the canal and the slaughterhouse, while the scope of social aims included small apartments, the workers' house and the dormitory; furthermore, in the scope of various other investments, purchase of real property and the regulation of the riverbed were listed (*Inántsy-Pap 1938:491*). It is a reflection on the capital needs of Hungarian cities at that time that the applications of a high number of localities were received before the closing of the negotiations. The cities themselves wanted to spend the loans primarily on infrastructure development and the on construction of urban public utilities. The city of Szeged intended to use the loan of 4 million gold koronas that it applied for to construct a railway line for farmhouses, Pécs wanted to borrow 3 million in order to expand its water pipe, sewage canal and power network, Kaposvár requested a loan of 1 million for the construction of the electricity plant and the market hall and to build up the canal and water pipe network of the city, Szolnok intended to build a thermal bath and a hotel. Debrecen spent the loan borrowed in 1926 on building 18 schools in areas with farmhouses and a market hall.[24]

However, some cities proceeded with more caution, they believed that not only was the loan very expensive and came with very adverse conditions, they also considered the encumbrance of the revenues of the city to such an extent risky, since mortgaging a significant part of revenues in the budgets of the localities could cause the disruption of everyday operations; furthermore, they also objected to the provision that originally the loan was not allowed to be used for cultural purposes or construction of housing. The general assemblies of the cities were also generally divided on the issue of borrowing the foreign loan, but most of the localities were of the opinion that the investments to be implemented for the benefit of future generations will become sources of the development, economic and cultural strengthening of the cities (*Dobrossy 1996:425*). Despite all these issues, the contemporaneous correspondent was of the opinion that *"the successful conduct of the foreign loan of cities demonstrates in a convincing manner that the benefits of the trust expressed by foreign countries to Hungary recently can be already collected".*[25] After the successful borrowing of the first city loan, several

[24] News of the Hungarian News Agency 1920–1956. MTI, 5 August, 1926. https://library.hungaricana.hu/ (Downloaded: 9 February 2017).
[25] News of the Hungarian News Agency 1920–1956. MTI, 9 July 1925 https://library.hungaricana.hu/ (Downloaded: 9 February 2017).

other similar, long-term or high-volume lending transactions were concluded. The cities and counties received loans on 8 occasions in 1926, 9 occasions in 1927 and on as many as 14 occasions in 1928, with steadily improving conditions (*Tomka 1996:85*).

Realizing the increasing foreign indebtedness of the country and that of local governments, the central bank submitted a proposal to the financial governance and legislation on the restriction of long- and medium-term borrowing and on tightening the control of the utilization of the loans (*Botos 1999:55–57*). Naturally, the government itself has also recognized the risks of excessive borrowing of HUF loans without central regulation, but no central regulation was introduced owing to the changes of lending conditions occurring after 1929. The appetite of certain cities for loans was increasing constantly and they tried to obtain funds for urban development from other sources as well, but when new loan contracts were concluded, they often disregarded their obligations stipulated in the former loan contract, and in the new agreements they failed to maintain the priority rank of the repayment of the Speyer loan.[26] In the autumn of 1926 the interior governance issued a special circular decree in which it alerted the affected localities that the Ministry will not authorize the borrowing of additional loans until these conditions have been stipulated in the contract: *"The communities […] of cities with municipality rights are requested to consider the fourth and sixth sections of the contract concluded with Speyer & Co., which impose the obligation of giving priority to the foreign loan. At the same time, I warn the communities of cities with municipality rights that any resolutions adopted by cities receiving the foreign loan and containing the assumption of obligations for valuable consideration will only receive the approval of the governing authorities if the priority of the Speyer loan is expressly stipulated in this contract, which is why it is recommended that a provision to this effect is included in the relevant contracts in advance."*[27] Typically, some of the cities carried on this practice in the borrowing of the new loans as well; thus, in the spring of 1928 the interior minister issued a new decree in which it mandated the cities to ensure that *"in the case of any short-term city loan, even those secured by promissory notes only, the creditors shall expressly acknowledge the unconditional priority ranking of the Speyer loans".*[28] Ultimately, all cities with municipality rights –

[26] In the city of Nagykanizsa the largest development financed from the Speyer loan was the establishment of the sewage network and the construction of rental apartments, but this Transdanubian community had to borrow additional loans, mainly from local financial institutions, to finance the purchase of properties valuable from the aspect of urban development (*Barbarits 1929:137–138*).

[27] Circular decree with B.M. no. 54.455/1926. on the assurance of the priority of the Hungarian Consolidated City Loan borrowed by cities. Belügyi Közlöny (Home Affairs Gazette), 1926. Volume 31, issue 47, 7 November 1926.

[28] Circular decree with B.M. no. 43.020/1927. on the assurance of the priority of the Hungarian Consolidated City Loan borrowed by cities. Belügyi Közlöny (Home Affairs Gazette), 1928. Volume 33, issue 25, 3 June 1928.

with the exception of Budapest, Kecskemét[29] and Hódmezővásárhely – and 34 cities with regular councils took the opportunity of the Speyer loan (*Közgazdasági Krónika 1925:669*). It cannot be disregarded that between 1925 in 1928 the loans lent to Hungarian cities and counties were designed to serve not only the reconstruction of infrastructure damaged or destroyed during the war, or the closing of the investment gap of several years in public utilities, but also to improve the living conditions, general welfare of the Hungarian society, as well as the processing of the trauma of the peace treaty of Trianon in an indirect way.

The loan application was made in such a manner that the general public of the city had to identify the investment intended to be financed from the loan in a resolution of the general assembly, as well as its expected costs, supported by calculations, it had to declare its intention to borrow the loan and commit to incorporate the amount of the loan to be borrowed as well as its interest and principal instalments into its annual budget, to identify and encumber the amounts arising from wage and sales tax as collateral for the loan, and to authorize the mayor to proceed regarding the loan.[30] The relevant general assembly resolution had to be submitted by county cities together with the approval of the municipality of the county and cities with municipality rights directly to the interior minister, who decided in agreement with the minister of finances on the approval of the government resolution and the authorization of the loan. Thereafter, the cities presented to the loan issuing committee the resolution on the borrowing of the loan, bearing the approval of the governing authority, the notarized recognizance issued for the benefit of the creditor, the committee discussed the loan, then transferred the partial amount by a voucher bearing the countersignature of the authorized representative of the bank commissioned to lend the loan. The contemporaneous report did not only state enthusiastically that by the end of September 1925 loans in the amount of almost 2.5 million dollars had been lent to Hungarian cities and those localities that participated in the loan negotiations with all the necessary documents *"received the check in a matter of minutes",* but also concluded that *"it is beyond doubt that the American dollars will efficiently enhance the cultural and economic development of Hungarian cities".*[31]

[29] The city of Kecskemét obtained development resources in another way. The city borrowed a loan of 10 billion gold koronas against a promissory note, which was lent by a large financial institution of Budapest, selected from several applicants, at an interest rate of 7.9 per cent, which was higher than that of the city loan, however, all commissions and other costs were waived (*Közgazdasági Krónika 1926:844*).

[30] The General Assembly of the city of Szolnok with regular council adopted its resolution accordingly, on the borrowing of a "repayment loan" with a nominal value of 2,000,000 gold koronas. Jász-Nagykun-Szolnok Archives of the National Archives of Hungary, (MNL JNSZML) V. 400. Files of the assembly of representatives of the city of Szolnok 9640/1925.; *Inántsy-Pap* (*1938:497*).

[31] Magyarország, 20 September 1925.

Table 1
Amounts of the Speyer loan authorized for and provided to cities with municipality rights

City with municipality right	Amount of the authorized loan in dollar	Received amount in pengő
Baja	500,000	2,329,199
Debrecen	900,000	3,941,747
Győr	1,008,073.40	4,777,505
Hódmezővásárhely	600,000	3,066,799
Miskolc	843,474.20	3,928,940
Pécs	887,040	4,024,163
Sopron	266,552	1,229,977
Szeged	1,495,000	7,113,400
Székesfehérvár	800,000	3,774,114
Total	7,299,139.60	34,185,844

Source: Inántsy-Pap (1938:499).

Table 2
Amounts of the Speyer loan authorized and lent to county cities

County cities	Amount of the authorized loan in dollar	Received amount in pengő
Békéscsaba	520,000	2,420,220
Budafok	275,862	1,362,165
Cegléd	194,000	878,309
Eger	500,000	2,390,680
Esztergom	345,000	1,594,164
Gyöngyös	446,609	2,088,734
Gyula	200,000	1,002,520
Hajdúböszörmény	5,000	22,138
Hajdúnánás	93,000	417,197
Hajdúszoboszló	120,975	568,904
Jászberény	30,000	149,506
Kalocsa	52,000	228,756
Kaposvár	365,000	1,544,513
Karcag	72,020	317,582
Kiskunfélegyháza	270,000	1,196,479
Kiskunhalas	124,136.40	618,493
Kispest	300,000	1,329,374
Komárom	78,300	368,972
Magyaróvár	27,600	122,236
Makó	172,000	762,201
Mezőtúr	160,000	797,108
Mohács	77,000	341,113
Nagykanizsa	527,083	2,530,960
Nagykőrös	116,862	551,301
Pápa	170,000	769,159
Pestszenterzsébet	346,000	1,567,630
Rákospalota	154,300	683,108
Salgótarján	135,000	597,095
Sátoraljaújhely	315,600	1,488,552
Szekszárd	210,000	973,954
Szentendre	40,000	175,235
Szolnok	332,453	1,494,603
Szombathely	603,860	2,757,933
Újpest	700,000	3,099,175
Vác	530,000	2,529,819
Veszprém	91,200	423,927
Total	8,700,860.40	40,163,815

Source: Inántsy-Pap (1938:499).

The cities received the amount of the loan in instalments and they were obligated to place the assigned amounts at member institutions of the Centre of Financial Institutions until these have been utilized for the specified purpose. Since the cities received the first tranche of the loan in the second half of September 1925, in most cases the planned investments could only be started in the spring of 1926. The localities tried to place the available and temporarily disposable amounts with local financial institutions or with local branches of national financial institutions (*Honvári 2004:53*). The cities elaborated ambitious plans for the implementation of their development concepts and they intended to spend the borrowed loans on a variety of purposes, primarily on infrastructural, communal and community investment projects. Accordingly, the concepts with the highest allocated amounts included railway construction, construction of schools, construction of water pipelines and sewage canals, construction of power plants, surfacing of roadways, construction of roads and bridges, establishment of port waterfront facilities, flood protection works, transport development (*Közgazdasági Krónika 1925:669*). Among developments aimed at the improvement of public health we find construction of hospitals, medical facilities for lung patients, maternity hospitals and disinfecting facilities, funeral plants and establishment of waste transport services. A substantial part of city development concepts was directly and indirectly related to tourism, accordingly, the cities intended to use the foreign loans not only for infrastructure development, but also for the construction of swimming pools, restaurants and blocks of rental apartments.[32]

The dominant part of the loans authorized for the individual cities by the governing authorities was constituted by income-generating investments, primarily aimed at urban development, the construction of public utilities and the acquisition of assets, but even the non-income-generating investments were considered infrastructural investments serving public health, science, education, culture and urban development. Accordingly, among cities of the Great Plane, in the scope of income-generating investments the city of Debrecen intended to spend the loan on housing construction, a sewage filtering plant, the expansion of waterworks, construction of a printing shop and a slaughterhouse, the establishment of a public cemetery and public sanitation company, while in the category of non-income-generating investments the construction of schools and the museum was planned. The city of Szeged intended to spend the majority of the loans on a railway with an economic function and on the construction of the university. Being a beneficiary of the second loan, the city of Hódmezővásárhely intended to start an income-generating investment aimed at surfacing of roadways, construction of rental housing and a hospital, purchase of land and construction of a coastal swimming pool, in addition, funds were allocated to the construction of schools. Békéscsaba

[32] 8 órai újság 13 October 1925.

spent the borrowed loans on road construction, construction of bathhouses and bridges, a power plant and a hospital and on the construction of schools. Jászberény planned to spend the allocated loan amounts on the surfacing of roadways, Karcag wanted to finance a community house in the cinema as well as deep drilling, while Mezőtúr wanted to spend these funds on the reconstruction of the marketplace, the establishment of a horse farm and the construction of a city hall with stores. In Szolnok the Speyer loan was spent on the construction of a bathhouse and a slaughterhouse and on schools. In cities with municipality rights 77.83 per cent of all the disbursed loans were spent on income-generating and 22.17 per cent on non-income-generating investments, in the case of county cities 85.63 per cent of the received loans served purposes of income-generating investments and 14.37 per cent were spent on non-income-generating investments (*Inántsy-Pap 1938:505*).

The borrowing of the Speyer loans and the start of the investments enabled by them coincided with the short period of economic boom preceding the Great Depression; thus, the favourable impacts could strengthen one another both at local and national economy level. This is how a contemporaneous analysis assessed this period: *During the economic upturn Hungarian cities rushed to productive work as diligent bees and gladly accepted the offered loans, with special regard to the fact that this not only strengthened their existing sources of revenue, but also opened up new sources of revenue providing them with a lucrative yield. In fact, the cities spent those loans mainly on absolutely necessary and lucrative investments, so on the one hand the income from the investment abundantly covered the amounts spent on debt service, on the other hand, the investments resulted in a significant expansion of wealth. In addition, having entered the circulation of economic life, the loan amount also increased its strength, and therefore the loans fulfilled their functions in every respect, they started and continued their productive cycles"* (*Inántsy-Pap 1937:807*).

As a result of borrowing the foreign loans, between 1925 and 1928 the indebtedness of Hungarian cities continuously increased, by the autumn of 1933 the total loan stock of Hungarian cities reached 166,514,244 pengős, within which the share of cities with municipality rights totalled 96,180,829 and that of county cities 70,333,415 pengős (*Inántsy-Pap 1937:807–816*). The amount of principal and interest instalments falling due on the loan debts of cities was as high as 21,370,280 pengős; therefore, the burden of debt service was 13.31 per cent compared to the existing debt. However, this indebtedness was not really significant compared to either the level before the First World War or the assets of the localities, since in cities with municipality right this burden was 15.73 per cent of the assets in cities with municipality right, and 19.86 per cent in county cities. It may be a basis for comparison that at the same time the loan debts of Budapest Capital amounted

to 366,447,892 pengős; therefore, in the case of the capital city the ratio between debt and assets stood at 27.94 per cent.

Two of the 10 cities with municipality rights – the free royal cities of Debrecen and Szeged – had debts exceeding 20 million pengős, while two had debts between 20 and 10 million pengős, three under 10 million pengős and two under 5 million pengős. Among the 45 county cities (cities with regular council), with the exception of two cities – Szombathely and Nyíregyháza – the loan portfolio per one locality fell in the range within 5 million pengős, loan debts of 11 cities were between 2 and 5 million pengős, those of 13 localities between 1 and 2 million pengős, while 19 cities had a debt of under 1 million pengő. In terms of the sources of the loan stock, in 1933 slightly less than 50 per cent of the loans of Hungarian cities was related to foreign financial groups, and the overwhelming majority of foreign loans (87.4 per cent) were long-term ones, in which – naturally – a portion of about 13.3 million dollars still outstanding at the time of the loan borrowed from the Speyer Banking House represented a dominant ratio. The debt stock of cities denominated in foreign currency was primarily in American dollars, while the localities borrowed their loans in British pound and Swiss francs to a smaller extent. Of the cities with municipality rights, Debrecen (4 million) and Szeged (3 million) were the most heavily indebted, among county cities Eger was on top of the list with 640,321 dollars, while among the localities in the Great Plane Békéscsaba had a loan debt of 432,385, Cegléd 156,609, Gyula 164,268, Jászberény 23,728, Karcag 55,934, Mezőtúr 169,349, Nagykőrös 91,144 and Szolnok 268,274 dollars. One-fifth of county cities Balassagyarmat, Csongrád, Hajdúhadház, Kisújszállás, Kőszeg, Nyíregyháza, Szentes, Túrkeve and Zalaegerszeg – no longer had any debts to financial institutions denominated in a foreign currency. It can be determined from the data that cities without municipality rights could obtain foreign loans at more adverse conditions – usually with higher interest –, which can be attributed to the lower international awareness of the cities, the longer distance from the centres of financial institutions as well as the fact that the value of their assets and income-generating capacities were lower. However, a contemporaneous summary on the indebtedness of Hungarian cities tried to highlight that *"in most cases the significant amounts of the roles are coupled with outstanding active assets, and it may be a consequence of the fact that the great wealth enabled the borrowing of more significant loans, or perhaps, it was exactly the investments completed by the loans that widened the frames of the asset statement of the city",* in other words *"it is therefore not possible to infer that the indebtedness of the city is favourable or adverse merely from the amount of the loan, or even from the per capita value of the loan"* (*Bene 1935:94–95*). In addition, a city that failed to take the opportunity of borrowing may have missed its chance to implement major economic, public health investments, while cities that seemed heavily in debt according to primary

data could implement developments improving the quality of life of their citizens or acquired significant productive assets exactly with the help of foreign loans.

When servicing the debt, cities affected by the mortgage loan paid their revenues encumbered for the purpose of interest and principal repayment during the term of the existence of the loan – under the supervision of the regional royal Hungarian tax office – onto a special checking account of the savings bank, from which the amount was transferred to the account of the Magyar Nemzeti Bank. The Magyar Nemzeti Bank transferred the amount equalling the semi-annual annuity and the commission to the Speyer Banking House in dollars, through the trustee bank. The financial difficulties caused by the international economic crisis resulted in changes in the repayment of the Speyer loans as well. On 23 December 1931 the Hungarian Government ordered a transfer moratorium in order to save the gold and foreign currency stocks of the country; it prohibited the payment of existing foreign debts in foreign currency.[33] Under this order, the collected repayments of the city loans were transferred by the Magyar Nemzeti Bank to the Fund of Foreign Creditors, then the domestic bondholders could freely redeem their coupons from these amounts, while the value of coupons of foreign bondholders presented for the purpose of redemption was transferred to a blocked pengő account.

In terms of loan amortization, the cities were hit by the economic crisis to varying degrees, the most severe problem was the drying-up of additional city taxes, the decrease of the revenues of the city, but owing to the proportionately bigger drop in agricultural prices, the recession affected agricultural communities, cities in the Great Plane more deeply (*Makó 2015:96–97*). In 1929-30 a significant part of Hungarian cities were no longer primarily frustrated by the burdens arising from the long-term Speyer loan, rather by the credit facilities that carried much higher interests (*Solymár 1989:103–138*). The economic crisis had a negative impact on the prices of the bonds of the Speyer loan as well, at the end of 1928 the price of the first bonds was as high as 98 per cent; however, in 1931 it dropped to 30 per cent, then following the crisis, until the end of the 1930s, it showed an increasing trend, with fluctuating prices (*Kallós 1928:83–84*). In January 1938 – while the general sentiment of the stock exchange was optimistic – in the market of unlisted fixed income papers the price of the Speyer bonds stood at 85.25 per cent; however, by May the prices dropped by 15 per cent and the Speyer bonds fell back to 67 per cent.[34] The cities affected by the loan contract and struggling with loan amortization problems raised the idea of purchasing back the bonds with reduced prices in a big volume as early as 1932, or the conversion of the loan and the reduction of interest, but the financial ministry did not authorize this solution (*Makó 2015:99*). In several

[33] Decree with M.E. no. 6.900/1931., on the payment of certain debts to foreign parties in pengő value. Repository of Hungarian Decrees 1931 Volume 65, Royal Hungarian Ministry of the Interior Budapest, 1932 pages 1549–1551.
[34] Az Újság 16 January 1938. Volume XIV no. 12; Az Újság 8 May 1938. Volume XIV issue 103.

localities facing a difficult situation it was hoped that if they had possessed an appropriate amount of cash, they could even pay off the Speyer loans at one quarter of the original price, and by this the cities would get rid of not only the "*suffocating loan*", but also *"the burden of paying high interests for a term of 10–20 years"*.[35]

Parallel with the deepening of the economic crisis, increasingly radical government actions had to be implemented regarding the foreign loans as well. On 28 February 1933, the Ministry of finances suspended the principal repayments of debentures and other bonds and reduced the debt service of the loans to 5 per cent.[36] Finally, on 22 January 1936 the government ordered the conversion of the mortgage bonds into securities held by domestic parties, under which *"[…] any payment to be made against a coupon of a debenture or bond […] shall be allowed only if the share, the debenture or the bond is in the possession of a domestic party, and the person presenting this coupon certifies this in the manner defined by the Magyar Nemzeti Bank".* [37] As a result of this process, the bonds of city loans were acquired by domestic parties to an extent of approximately 60 per cent, while the Magyar Nemzeti Bank had to spend less foreign currency on the redemption of the coupons (*Inántsy-Pap 1938:510*). Under the original agreement, the Speyer Banking House redeemed the maturing interest coupons from the debt service amount transferred to it by the Magyar Nemzeti Bank semi-annually, the part remaining after the redemption of the coupons was spent on amortization of principal, by selecting bonds with a face value corresponding to this amount by drawing lots and redeeming them at face value. However, owing to the transfer decree of 1931, the bank could not receive the debt service amount in dollars; therefore the selection of the bonds by drawing lots was cancelled. The last draw was held on 13 April 1932 for bonds of the year 1925, and on 7 October 1931 for bonds of the year 1926. The bonds were still redeemed in the first and second half of 1932, but after that only the Magyar Nemzeti Bank was allowed to redeem the maturing coupons. In order to preserve the creditworthiness of the country in the international money market, the financial government committed to pay an interest of 1.75 per cent on the interest coupons of the bonds to foreign creditors, in foreign currency. Accordingly, domestic creditors received an interest of 5 per cent in pengő, and of the foreign creditors those who intended to collect the interests in pengő also received an interest of 5 per cent on their blocked accounts, while those foreign creditors who intended to collect the interests in dollars only received an interest of 1.75 per cent (*Inántsy-Pap 1938:511*).

[35] Esztergom és Vidéke, 24 January 1932.
[36] Decree with P.M. no. 450/1933 on the definition of the measure of the deposit obligation imposed in Decree with M.E. no. 6.900/1931 on the payment of certain debts to foreign parties in pengő value. Budapesti Közlöny, Volume 67 issue 48, 28 February 1933 1–2 pp. 48. szám 1933. február 28. 1–2. p.
[37] Decree with M.E. no. 300/1936 on the prohibition of the import of securities, on new regulation of the redemption of the dividend coupons of shares, coupons of debentures and bonds and the payment of debts from the purchase price of goods to foreign parties in pengő. Pénzügyi Közlöny (Financial Gazette), 1936, issue 4, 01 February 1936 pages 17–19.

Hungarian cities remained heavily indebted in the decade following the economic crisis as well, the amortization of the borrowed loans remained a serious burden on the finances of local governments. The contemporaneous analysis dealing with the loan debts of cities drew light on the fact that – even though a ratio of 26 per cent between the assets of the city and the burden of the loan is not a problem – the profitability of the assets owned by the local governments and the income-generating capability of the localities are extremely low, given the current financial conditions, they can only obtain extremely adverse credit facilities for covering their operating expenses; therefore, they have no meaningful options to reduce their debts permanently. *"[…] Our cities of the countryside are in a much more adverse situation when it comes to fulfilling their credit needs than any other economic community",* because *"a significant part of our cities have no appropriate capitals, reserve stocks or surplus cash; therefore, even the smallest disruption of the regime of expenses and revenues would generate quite serious disturbances and difficulties in the finances of the cities"* (*Drághfy 1941:73–76*). From this he has arrived at the conclusion that *"it is necessary to establish the rural cities' own credit institution, which will serve the relevant needs in an appropriate manner, much more perfectly than the current conditions"* (*Drághfy 1941:83*). The cities tried to get rid of the burden of two decades according to the basic contract of the Speyer loan, some localities attempted to repurchase the loan bonds at a low price during the economic crisis and then after the Second World War, by borrowing new loans or selling their real properties, but these efforts failed (*Dobrossy 1996:445–446*). The majority of the localities that received a part of this loan were unable to repay the borrowed amounts by the original maturity, as a result of the Second World War and the economic and political processes that followed it, the fulfilment of tasks relating to foreign debt service were placed under a new system of conditions and central direction. Long-term loans originating from the era before 1945 and not repaid to foreign financiers – including the Speyer loan – were settled by the Hungarian government in the three decades between 1950 and 1970, in the form of bilateral financial agreements.

5. The impact and afterlife of the loans

One decade after the first disbursements the positive and negative impacts of the city loans borrowed after 1925 were clearly noticeable. As a result of the loans, several public utility developments, infrastructural, public-health, cultural, educational investments were implemented in the Hungarian cities that the localities simultaneously struggling with a shortage of funds and the need to modernize, would only have accomplished relying on their own resources with great difficulties, if at all. The newly built institutes, rental buildings, hotels, roads significantly changed the cityscape in Hungarian cities, their structures were modernized, as a result of the public utility developments, public health, educational and cultural

investments the quality of services provided by the localities increased significantly and the quality of life of the residents improved. The loans provided funds for the necessary developments, they terminated development gaps of several decades and formed the cityscapes of Hungarian cities in a future-proof manner; therefore, this period deserves to be considered a progressive era from the aspect of the elaboration of ambitious urban development concepts of the 20th century as well. Many investments served representative urban development aims motivated by ideological considerations, they also had emotional roots. We can agree with the contemporaneous summary assessing the borrowing of the loan that stated: *"Although the debt service of the Speyer loan imposed a noticeable burden on the cities, they were still willing to participate in the borrowing of the loan, because they were aware of the fact that this is how they can identify and construct the path of progress, and that this loan will enable them to utilize the unused resources available for them for the accomplishment of national aims"* (*Inántsy-Pap 1938:516*).

In several localities there were many debates even at the time of the borrowing of the loans, and there were cities where the investments launched from the loan exceeded the capacities of the community. It happened that the beneficial impact of the large investments on local enterprises did not prove to be enduring, and the companies owned by the city did not generate appropriate revenues despite the preliminary calculations. It can be presumed that the body of city officers were not always prepared for the fulfilment of the tasks related to the handling, utilization of the incoming loans and the coordination of the started investments either. As soon as the loans were disbursed, problems occurred concerning the legitimate utilization of the amounts and there were cities where the interior minister ordered strict investigations: *"Speyer disciplinary actions all over the country"* – was the headline of the newspaper Magyarország on 11 April 1928. The unjustifiably high number of developments could often only be completed by borrowing new loans, which could lead the cities into loan traps that could result in bankruptcy, insolvency or even the forced sale of the real properties of the city (*Dobrossy 1996:426–445*). The professional literature has so far noticeably somewhat neglected those cities (e.g. Esztergom, Szolnok, Kaposvár), where serious problems, economic frauds and political scandals raised their ugly heads regarding the utilization of the foreign loans (*Vécs 1931:64*). However, basic and exploratory research on the "afterlife" of the loans – which can be primarily reconstructed from the contemporaneous press and the records of litigations of the time – are yet to happen for the most part and since such research works would go beyond the scope of this study, these matters could even define a new direction for the research on the utilization of the loans during the interwar years.

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Cycle Changing Years, Parallel Biographies*

János Müller

Levente Kovács – József Sipos:
Ciklusváltó évek, párhuzamos életrajzok
Arcképek a magyar pénzügyi szektorból, 2014–2016
Hungarian Banking Association, Budapest, 2017, pp. 244
ISBN: 978-963-331-407-4

On the occasion of the General Meeting of the Hungarian Banking Association held on 11 May 2017, Levente Kovács, secretary general, published a book with the support of the Board of the Association that may be interesting to the banking community. This meeting is an important event of the banking community, because according to the statutes of the Association, a complete renewal of the leadership must be performed every three years. The occasion and time almost demands the assessment and the evaluation of the situation and development of the banking sector in the wider sense in the given period. Behind and next to these processes there are the people as well, the several thousands of employees of financial institutions and last but not least the leaders of these institutions.

The period of three years between 2014 and 2016 was, hopefully, the closing period of the perhaps most difficult time of the modern history of Hungarian banks, after that the financial institutions can now breath again and concentrate on their future tasks. This condition is reflected and recurred on the pages of the book, partly in the form of a comprehensive professional analysis assessing the period and then within the framework of interviews of the current leaders of financial institutions, presenting their professional past and their own institutions.

In order to present and evaluate the book on its merits, we have to place its message and selected method of editing in space and time. The title itself "Cycle changing years" is thought-provoking, whereas the indicated period, 2014–2016, inevitably points to an era and milestone. The presentation of this cycle is commendable in this respect as well, since it is a part of the well-defined phases of Hungarian banking history.

* The views expressed in this paper are those of the author(s) and do not necessarily reflect the offical view of the Magyar Nemzeti Bank.

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In order to make this process understandable, we cite it as an indication that Hungarian banking history can be divided into several well defined periods, starting from its foundation in 1841 of the first independent Hungarian commercial bank. In the second half of the 19th century and at the time of the turn of the century more than a dozen significant financial institutions and many savings banks operated. There were 987 banks and savings banks in the country in the first year of the 20th century and their number reached 1,183 in 1905. Thus, the Hungarian banking system, completely corresponding to the European level of the age, was developed, which was made complete with the independent Magyar Nemzeti Bank, created in 1924. With such background, the need for joint representation of the interests of the financial institutions is clearly legitimately. The National Association of Financial Institutions (POE) was established in 1903, whereas the Association of Savings Banks and Banks (TÉBE) was founded in 1919, finally these were merged in 1928 under the name of TÉBE.

Let us take a big step to another major period: *"After World War II, in 1948 the financial institutions in Hungary were nationalised, and a Soviet-type, one-level, centralised banking system was established, as a result of this Magyar Nemzeti Bank performed commercial banking functions, too, whereas the National Savings Bank provided financial services for the population. We have to see that the number and quality of retail services was well behind the pre-1945 level and we cannot talk about securities or capital market services either. This system adapted perfectly to the system of central planning and the planned economy."*[1]

Thus, after 1948 the development of the Hungarian banking system, which started in 1841 and accelerated after 1867, was interrupted in a forced way for several decades. The next phase is already the banking history of the modern age.

The banking reform introduced in 1987 created the possibility of constructing a modern, two-tier banking system. A process lasting several years was started and, if we take into account the initial problems and pitfalls and the teething troubles of the system under development as well, the period when we can already talk about a real, operating two-tier banking system is 1994–95. The Hungarian Banking Association, which has a history of almost three decades, was established in February 1989, shortly after the banking reform. The first years of the two-tier banking system and the Hungarian Banking Association were characterised by consolidation, overcoming the teething troubles of the new banks. The political decision relating to the privatisation of the Hungarian banking system was made in 1994, first in our region. Except for some cases, the banks were taken over by strategic, financial investors. According to the international judgement of the

[1] *János Müller, Tamás Kovács, Levente Kovács: A Magyar Bankszövetség története [History of the Hungarian Banking Association] Tarsoly Kiadó, 2014:41.*

period, one of the best regulated and most stable banking systems was established in Hungary by the end of the 90s. The 2000s, all the way until the international financial crisis that broke out in 2008, represented peaceful development of Hungarian banks and the golden age of their history.

The period between 2009 and 2015, after the international financial crisis, precedes the new cycle described in the book. This is already the history of the recent past, with enormous burdens and ordeals. The consequences and results of this appear vividly in the first chapter where the author, Levente Kovács, secretary general of the Hungarian Banking Association, entitled it aptly as *"Financial sector in the grasp of mistrust".* For the assessment and professional evaluation, the chapter surveys the developments of the world economy influencing the operation of the banking sector and the developments of Hungarian and international prudential regulation. For the reader the part presenting the situation of the sector of the cycle behind us is probably the most important. It presents the serious inheritance of the years after the crisis and the difficulties of the sector stemming from the elimination of and accounting foreign exchange-based lending, the burdens stemming from the proportion of non-performing loans high in international comparison as well; the negative effect of special taxes and other burdens; and the burdens stemming from the legal decision. Meanwhile the ownership background and structure of the sector was transformed in this cycle, and Hungarian governance and ownership decreased to approximately 50 per cent, corresponding to the intents of the government.

"*The tax and other burdens of the Hungarian banking sector are unparalleled at the international level. Everybody has great expectations regarding the planned and started tax reduction, since the permanent and organic development of the national economy depends on this. However, we have to face the fact that despite the reduction of special bank taxes occurred until now, Hungary is still at the very beginning of the list in international comparison.*" – This is the author's characterisation relating to the situation that developed, then he establishes *"The Hungarian economy cannot be competitive without a competitive banking sector."*[2]

One of the first thoughts of the reader of the book may be why the past three years are identified by the authors as the change of the cycle. What is behind the indication "cycle changing years"? May one think on the period closing the consequences of the 2008 financial crisis or perhaps the coincidence that not only did the Banking Association had renewal of leadership in 2014, but there were parliamentary elections as well and the new government started its operation then and an economic policy turn could occur? These may also be possible and real alternatives.

[2] Cited book, p. 19.

However, reading the personal interviews, we can find a third description: When asked by the interviewer about the primacy of politics, Mihály Patai, president of the Banking Association and CEO of UniCredit Bank, says the following: "*We can talk about a world trend here as well. In the couple of decades before 2008 the power of supranational enterprises and financial organisations operated as a power significantly determining politics. This has changed everywhere as a result of the crisis, by today politics has regained its primacy. The level of regulation of the financial sector has increased and the clout of consumers has a much greater weight as well. Hungary is special in this area in as much as direction is exercised by a political elite that outlines its objectives much more distinctly than the average and the social problem of foreign currency lending has strengthened the amplitudes among which the processes have occurred."*

The next question and the answer to this was as follows: "*Looking at it from the chair of a bank leader, are these – political primacy, strong level of regulation, tough consumer protection – the additional costs of recovery from the crisis?* According to the answer of Mihály Patai, *"*this is different and more, this is a new cycle. (*highlighting by me: J.M.*) *In the following decade, perhaps decades, both the strong political hand and the same type of regulation and consumer clout will remain and will be critical in the operation of the banking system."*[3]

Thus, a new cycle has arrived, which can last for decades according to the president of the Banking Association. The reader cannot help asking whether the cycle changing will, with these properties, be advantageous or disadvantageous for the operation of the banks. Following the train of thought of the president, we can say that the answer to this question will be provided in many years or even decades.

The second method intended to present the cycle appears in the title and subtitle of the book: "*parallel biographies"* and *"Portraits from the Hungarian financial sector"*. It was an appropriate and good decision by the editors to present leaders of Hungarian banks and financial institutions in the framework of personal interviews, with some brief biographies in retrospect. I think and believe that the memories of the personalities determining today's banking history are at least as important for the researchers of the future as the documented archive materials. Thus, this book may become an interesting historical document with the passing of time.

The book presents and interviews 36 leaders of financial institutions. In and of themselves all are different, yet they have one common characteristic by all means, the love of the profession and the intent of building a successful future of their institution. As an example, we underline two brief quotes from two interviews.

[3] Cited book, p. 235.

Replying to the question *what experiences were drawn after 2008 that can be used in the future as well*, Sándor Csányi, CEO of OTP Bank, summarised one of the main messages of the cycle after the crisis as follows: *One experience is that it is a wise thing if a bank pursues a conservative business. This risk-avoiding and calm behaviour has become the trademark and most important tradition of OTP. "This tradition obliges all of us. It is not by chance that OTP was last to join foreign currency lending. All along we have attempted to be in control of risks, we have paid attention to provisioning and stayed away from promising, but not appropriately established projects in the corporate market as well. The other experience is that the domestic financial culture and the financial knowledge of borrowers are very modest. Unfortunately, this risk has stayed with us even after the crisis and if it does not change significantly, we will not be protected against new and newer social landslides."*[4]

In the midst of all the events continuously surrounding the banking sector, the reader may not even notice that there are two characteristic features of the presented portraits of bank leaders which have been developed mainly in the cycle analysed in this book. One of these is that the number and proportion of bank leaders of foreign citizenship have decreased significantly. After the start of the bank privatisation (1995) and until the end of the last decade, at least half of the CEOs of banks were foreign citizens, their number was between 15 and 18. Indeed, their weight was so large that a Foreign Banker's Club existed and operated within the framework of the Banking Association. In the past two decades their activity has had a positive effect on the operation of the banking sector in Hungary. At the time of the writing of these lines, only five banks have a foreign leader. I read with interest the interviews prepared with them, I cite one of these. Claus Windheuser, CEO of Commerzbank, a German bank with a great history, is a dynamic, young leader, who has led the bank since the end of 2015. The question asked from him was as follows: "*Your arrival coincided with the perhaps most difficult period of the history of the two-level Hungarian banking system written since 1987. How do you see the situation and outlooks of the sector?"* Claus Windheuser replied as follows: *"The regulatory environment in both Hungary and the EU has and will become stricter. In the corporate business line, which is the primary activity of Commerzbank Zrt., market competition is increasingly keen and price competition and risk-assuming willingness are especially aggressive, similarly to the period before the financial crisis erupted in autumn 2008. Digitalisation represents an enormous challenge for everyone, I think that nobody can tell what the effect of this will be and what the banking sector will look like in ten years."*[5] Thus, the German banker, with fresh eyes, yet already in knowledge of the market, confirms that competition is intense

[4] Cited book, p. 187.
[5] Cited book, p. 67

in the area of corporate lending, which includes aggressive pricing and greater risk appetite as well.

Another typical characteristic of the parallel biographies is that the average age of the bank leaders has decreased significantly. Thus, in addition to the cycle change, a new generation has appeared, i.e. there has been a change of generation as well.

The Industries of the Future – Open Economies Have the Edge*

Blanka Kovács

Alec Ross:
The Industries of the Future
Simon & Schuster, London, 2016, 304 pp.
ISBN: 978-1-4711–5603-8

As Senior Advisor for Innovation to former US Secretary of State Hillary Clinton in 2009–2013, Alec Ross played a key role in the implementation of the projects "21st Century Statecraft" and "Civil Society 2.0". Since leaving the Department of State, he has travelled the world: visiting 41 countries, he has advised senior politicians and company executives on technology and innovation policy development. Published in 2016, *The Industries of the Future* is his debut work as an author.

In the first part of the book, he describes the technological and industrial changes that will radically transform the processes of the world economy and society in the next ten years. The key industries involved are robotics, genomics, cyber security, the digital transformation of the financial sector, and big data. In the second part, Ross enumerates the skills and economic policy measures that could facilitate adaptation at the levels of both the individual and society.

Scientists and researchers agree that the decades to come will be dominated by the development of robotics. The emergence of robots, which will have both winners and losers, is compared by the author to the internet revolution of twenty years ago. The impact of robots on jobs will vary by country. The countries currently leading the way in the development of robots, i.e. Japan, South Korea and Germany, will export the technology in the future. This is a major risk to countries with economies built on cheap labour. China's position should be monitored from this respect as well, particularly given the considerable sums the Chinese government is spending on the development of robotics as part of the Made in China 2025 programme, while it continues aggressive urbanisation to keep wages low.

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Ross believes that in the decades to come, genomics will have a greater impact on our lives than the internet, offering the potential to know who we actually are at a molecular level. Research in genomics is led by the United States, but China has been catching up fast in this field as well. The Beijing Genomics Institute is among the leading research institutes in the world and has more genetic engineering instruments than the United States. China is of the view that the economic dominance of the US is attributable to the latter's recognition and exploitation of the opportunities offered by the internet. The Chinese government has stated that genomics will be the next billion-dollar industry that is comparable to the internet, in which China wants to become the leader.

The third largest driver of transformation is the emergence of big data, which could radically change industries from healthcare to education. Currently it is the subject of an exciting debate whether this would lead to a more centralised arrangement in the world economy, and the tech companies of Silicon Valley will acquire entire industries or on the contrary, the transformation of big data into a mass product would facilitate the entry and rise of new companies throughout the world.

The emergence of the latest 'currency' of the 21st century will have an unforeseen impact on the financial system. The author argues that in the future only six currencies will be relevant: the dollar, the euro, the yen, the pound, the renminbi, and bitcoin. The spread of bitcoin is largely determined by financial stability and regulation in each country. In countries whose financial systems are not sufficiently sophisticated, such as Argentina, Iraq or Venezuela, there is greater receptiveness for alternative instruments like bitcoin, on which economists' opinions are divided. According to Paul Krugman, bitcoin contradicts the theories of both Adam Smith and Keynes and its use would plunge us back to the middle ages, when the unit of account was a precious metal, gold.

Throughout the book, the author underlines the importance of openness at both the government and corporate levels. Countries that are not led by control freaks and are making a shift towards a more open economic model could accommodate the industries that will shape the future. Ross offers the example of Estonia's economic model. In the early nineties, the Estonian government implemented economic reforms that created an innovation-friendly environment. For example, by 1998 all schools had been connected to the internet.

One of the most important and least recognised drivers of globalisation and growth is women's stronger social participation, which is expected to increase further in the future. Ross takes China's example to demonstrate the effect of equal rights for women on economic performance. In China, granting equal rights for women had already been a central effort under Mao's rule. Men and women were paid approximately the same wages, and women also received childcare allowances.

In 2013, 51 per cent of senior management positions were filled by women, and according to Alibaba founder Jack Ma, the performance of female employees largely contributed to the company's success.

Ross argues that the standard of education should be improved continually in order to respond to the challenges of the future. As the complexity of problems and the quantity of the data available is increasing, analytical skills are taking on an increasingly prominent role. That is why it will be appropriate for the next generation to master one or more computer programming languages in addition to foreign languages.

By way of criticism, it should be noted that the author's argument is based on the assumption that governments know the right direction and develop innovation. By contrast, the role of economic freedom, one of the prerequisites for innovation-based economy is completely neglected. Although the book is superficial in a number of respects, it is recommended reading, since Alec Ross interviewed the managers of companies that will play an important role in the future.

The End of Competitive Advantages – Keeping Corporate Strategy Moving*

Tamás Troján

Rita Gunther McGarth:
The end of competitive advantage – How to keep your strategy moving as fast as your business
Harvard Business Review Press 2013, 204 pp.
ISBN-13: 9781422191415

Rita Gunther McGarth is a professor at the Columbia Business School. She is an internationally acclaimed expert of creating strategy in uncertain and changing environments. In her book she is providing an answer, how to operate successful enterprises and remain profitable in the dynamically changing world, on the markets changing faster and faster, and with consumer demands becoming more and more individual. According to the author, in the world of changing or temporary competitive advantages, the continuous change of strategy is necessary in order to achieve the objective just mentioned.

Competitive advantage is the potential interpreted vis-à-vis competitors. According to *Porter*[1], the sustainability of a competitive advantage (idea, product, technology, service) is determined by five factors. These factors are: new entrants on the market, threat of substitution, bargaining position of buyers, bargaining position of suppliers, and competition among competitors in the sector.

We have to acknowledge that competitive advantages have never been truly permanently sustainable and today they are not so at all. The world of accelerated communication and developed IT technologies dictates an accelerating rhythm. We have to step from the world of sustainable competitive advantages to the world of changing or temporary competitive advantages.

Time supersedes every good idea increasingly faster. If someone sticks to a good idea, his thinking becomes easily static, and if he does not keep abreast of the constant changes, he will be bypassed and defeated just like the Maginot line

* The views expressed in this paper are those of the author(s) and do not necessarily reflect the offical view of the Magyar Nemzeti Bank.

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[1] Porter, M. E.: Versenystratégia [Competitive Advantage], Akadémiai Kiadó, Budapest, 1993.

was in 1940. Thus, the previously celebrated competitive advantage can become a dangerous trap.

In terms of its course of life, a classic industrial enterprise starts by founding on a good idea or good opportunity. In the run-up phase, the company obtains market share and customers, i.e. it grows gradually. In the phase of exploitation it attempts to maintain its favourable position, then finally comes the phase of decline.

In the phase of exploitation, but already in the run-up phase as well, competitors attempt to supplement (attack) the product with their own developments and technology; thereby, eroding the existing market advantage and profit. This occurs inevitably sooner than later, especially in today's accelerated digital and knowledge-based world. Market competition has accelerated by such an extent and has become so extensive and complex that it can be interpreted not as the rivalry of individual companies, but rather as an "arena" where everybody competes with everybody. The development of such a strategy or approach that holds its own even under such circumstances is necessary, i.e. it keeps pace in the market where competition is underway.

The rivalry of Kodak, Fuji Film and Sony is an example that is mentioned several times in the book. All three companies essentially dealt with roll film production and photography technology. The old type film roll and developing photography became very expensive by the 1980s and 1990s, mainly because of the significant increase in the world market price of silver (the most important raw material). It was Sony to first develop digital (sans-film) photography, getting hold of a considerable competitive advantage and endangering the company empires of the competitors which were based on the old, film developing technology. Kodak rejected the change, i.e. it declined the necessary changes, it tried to decrease its prices, but it went bankrupt in a couple of years. Fuji Film recognised the danger in time and fundamentally reformed its business in a couple of years, turning to printer technology, office automation and biotechnology and completely eliminating its old photo developing network. Thanks to this recognition and the quick reaction, Fuji Film did not get stock within its past and by today it has become a market leader in its new areas.

Thus, success-oriented management has to develop dynamic competitive advantages with which they are competitive in the world of changes, what is more they can be winners. However, openness, vigilance and quick recognition of opportunities are necessary for this, which makes continuous re-planning possible. Returning to the life cycle of companies, steps have to be made before the start of decline. This approach provides both dynamism and stability for the companies. The possibility of re-planning, change and modification has to be present in each life cycle of the company or product. Such companies use their resources flexibly,

have a stable vision of the future, which is adjusted to the continuous changes, and this is reached with varied tools. In addition to all of these, the cost of re-planning or the cost of a lot small re-planning is construed as small at the corporate level compared to the growth potential that can result from the development of a new competitive advantage.

The most typical difference between the theory of "old, i.e. sustainable" competitive advantages and the strategy built on changing competitive advantages is the motive of breaking away in time. The company has to be able to perceive the early warning signals indicating that the company or product will start to decline and it has to be exited in a planned and systematic way, i.e. separation from it, is necessary and the company must proceed on a new competitive path. Separation should not be experienced as a drama, rather the company must learn from it. It has to be planned and it has to be made regular. The sometimes hard decision of the separation (breaking away from a previously successful idea or product) has to be made when leadership is still less urged by time and there is still value in the given business.

What kind of change in thinking or attitude is necessary in order to acquire the above approach? What is the correct adaptation of the above thoughts at the managerial level? You should not remain on a wave for too long because sooner or later it will cast you ashore. You have to prepare for leaving the wave consciously and you have to feel the appropriate moment via the early warning signals. The possibility of re-planning, change and modification has to be present in all life cycles of the company or product. This approach has to be present continuously. Resources (stocks) do not have to be possessed and accumulated, since the utilisation of those is also uncertain; thus, only the access to resources has to be ensured. Development has to be a central element of corporate processes, which is well directed and is present continuously with the greatest degree of freedom. The best resources and the best people have to be allocated to this area.

Swiftness and determination have to dominate in the decision making of the leadership. Precision and good decisions are less important than the leadership reacting quickly and taking the necessary corrective measures. The most important information in the world of changing competitive advantages may be "making unsure", which may reveal risks, mistakes and dangers, questioning everything. All recommendations, reasoning, data and conclusions used have to be questioned. Sometimes even the motivation, the source of the idea and the basic principles have to be questioned as well; thus, the employees may learn thinking in an alternative way, and all these point to the direction of development.

It may be painful, but very useful to project the world of changing competitive advantages to the own life of people. Our efficiency may increase, our decision making may become faster. We can use our resources more successfully for

the established and well-defined objectives. Our deficiencies, which have to be developed, can be explored. There can be many twists and changes during our career. The carrier is managed by the individual; thus, changes in workplaces become more frequent and likely as a result of the dynamic and efficient way of life. Ensuring career models is a question of the past, since companies also look for employees for the changing environment and changing tasks. The development of special competences may represent an advantage for the individual. You should not collapse after an incidental failure, instead you have to look for the next opportunity; moreover, it is worth preventing it with flexible re-planning and a separation executed at the right time.

Swiss Knife for Decision-Making*

Tamás Rózsás

David R. Henderson – Charles L. Hooper:
Making Great Decisions in Business and Life
USA: Chicago Park Press, 2007, 287 pp.
ISBN: 978-0-9768541-0-4

Who has not heard the argument that real life problems cannot be solved by models and methodology learnt in school or training, because such solutions only work in frame of educational programs in textbook examples and sterile environment? This argument often arises as an explanation or excuse for bad decisions, failed projects or inability to make decisions after or even before a decision is made, in order to exempt ourselves from the responsibility of decision making and the preparatory work or mental effort necessary to make good decisions.

The book of David R. Henderson and Charles L. Hooper targets people who would like to improve the quality of their decisions, instead of seeking preliminary or subsequent exemption from the mental effort and responsibility entailed with decision making. The book assists the reader in understanding how sensible and structured thinking helps in seeing the real, complex and non-sterile laboratory problems of life in such a manner that we can find the essence in those and we can apply those methods and models, which were discovered, distilled and clarified by people before us to useful and easier-to-teach theoretical models in the course of solving real problems that were otherwise similarly complex.

The most important message of the book is that conscious thinking and the correct approach assist in both capturing, understanding and solving the real problems of life. For this purpose, the authors also provide a simple, robust and applicable method to the readers. By dividing the process of decision-making to five steps, they assist in showing the route through which we can make good decisions even in real situations.

The first step is to consider what we want and what we need. Clarifying our own needs and expectations assists in avoiding traps later on. The next step is to make

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us aware of the typical traps, biases and distortions of human thinking, also in order to be able to avoid these. After this, we have to consider what the really important factors are in connection with the given decision-making situation. For example, where are the bottlenecks in a production or sales process? Taking these steps reveals what exactly we have to make the decision about and what values guide our decision-making; moreover, what are those factors that implicitly influence it and those factors the effect of which would be practical to eliminate. This is followed by the generation of alternative solutions and rethinking and considering the possible solutions. Only after these steps can we proceed to the comparison and evaluation of the individual alternatives and the selection of the best alternative.

Growth and development entail risks; thus, making good decisions involves the consideration of risks and conscious and prudent risk-taking as well. Risk means that things can turn out unfavourably for us despite our best efforts. Prudent risk-taking means that we examine in connection with the alternatives the extent of chance of unfavourable outcome and the extent of loss that we have to suffer if the unfavourable scenario occurs. It is also important in connection with the extent of the loss that the same extent of loss may mean something different in terms of its tolerability and subjective effect, which we have to take into account in relation to the decisions we make and the risk assessment. It is exactly in connection with risks that the book mentions whether the value of human life is indeed infinite? Our own decisions show that we do not consider as infinite even the value of our own life; thus, we usually make better decisions than otherwise. It is an interesting lesson that we can save or spare more lives with our decisions exactly by not considering the value of life as infinite.

Finally, it is an important message of the book that ethical behaviour is worth it, i.e. it is practical to strive for honesty and integrity in every case in our decisions, instead of cheating. Moreover, it is not only that it is more pleasant to live in a world where everyone is honest. Furthermore, it is not only that honest behaviour will have an effect on our environment as well and it will promote the improvement and development of the current standards of behaviour. Honest behaviour, simply, is worth the decision maker because this is the easiest way to earn money in the long term. Although in individual cases cheating might be worth it, but it has its price. The extent to which we will lose our subsequent potential business clients or partners is at least as significant as the temporary advantage we gain by cheating to their detriment. Thus, with unethical behaviour, whereas our short-term gain increases, our subsequent opportunities decrease.

Who do we recommend the book of David R. Henderson and Charles L. Hooper to? Briefly: to everyone. The authors make the process of decision-making and the description of the methods and logic applicable for the individual steps understandable with various different examples from both business life and our

everyday lives. Because of its easy-to-understand nature and cheerfulness, the book is especially suitable for introducing the unprofessional or inexperienced decision makers to the world of professional decisions. By organising the process of decision-making to a transparent, understandable and practical structure, to which it assigns a positive and effective approach, too, the book can say something new to the already experienced and professional decision makers as well.

Moreover, the methods presented in the book are simple and can be applied by anyone. For this reason, while decision makers and experts working with lots of data in corporate environments may miss the complex methods of analysis, the approach of the book can also be useful for them. However, the strength of the book, is not the decision supporting methods presented. The view and the approach of the authors to making the problems of the real life sensible and tangible for our decisions is much more important. This approach is especially important in Hungarian practice and Hungarian higher education, where the ability of the independent application of obtained knowledge to everyday situations is often missing, despite the strong theoretical foundations.

The approach of "*Making Great Decisions,*" therefore, is the missing link of Hungarian professional and academic life which makes the obtained or obtainable theoretical knowledge applicable in practice. In addition to the original English version, the book has been published in Korean and Japanese as well. In time, a Hungarian edition, assisting the decision makers of SMEs and shaping the approach of future Hungarian decision makers, could also contribute to the competitiveness of Hungary.

Globalisation, Development and Sustainability – Report on the 18th World Congress of the International Economic Association*

Miklós Losoncz – Ferenc Pongrácz – Gábor András Nick

The Eighteenth World Congress of the International Economic Association (IEA) was held in Mexico City from 19 to 23 June 2017. The association was founded in 1950 on the initiative of the Social Sciences Department of UNESCO with the purpose of strengthening personal relations among economists living in various parts of the world by organising scientific conferences and joint research programmes. It regularly discloses publications of international importance relating to current topics and reacting to them. The IEA is governed by a Council that meets triennially; its primary task is the supervision of the general policy of the Association and the election of the leaders for the subsequent cycle. As an acknowledgement of their research activity and result, the following former IEA presidents received Nobel Memorial Prize in Economic Sciences: Robert Merton Solow in 1987, Amartya Sen in 1998, and George Akerlof and Joseph E. Stiglitz in 2001. János Kornai, who is Member of the Hungarian Academy of Sciences and currently professor emeritus at Harvard University and Budapest Corvinus University was president of the IEA between 2002 and 2005.

In a unique manner, all specific areas of economics (macro- and microeconomics, community, regional and international economics, etc.) and all their directions (classic, Keynesian, monetarist, alternative, etc.) are represented in both theoretical and empirical approaches at the world meetings held every three year.

Stemming from its holistic approach, the Association invites the following types of experts to common discussion: university lecturers and scientific researchers of individual countries, representatives of the non-academic sphere (central banks, state and government institutions) and dominant participants of the global market, most recently in the topics of globalisation, development and sustainability.

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* The views expressed in this paper are those of the author(s) and do not necessarily reflect the offical view of the Magyar Nemzeti Bank.

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More than 500 participants arrived from all over the world to the event in Mexico City in order to discuss in plenary and parallel sessions more than 400 reports that had been considered suitable for presentation by the scientific organising committee on the basis of the submitted abstracts.

The Hungarian Economic Association (HEA) is also a member of the International Economic Association and it was the host of the Fourth World Congress in Budapest between 19 and 24 August 1974 under the title "Global, regional and sectoral economic integration".

In its call for tender that appeared on 24 January 2017, the HEA announced a two-round report writing competition entitled "Growth and sustainability in Central and Eastern Europe" with the aim that the authors of the best papers present their research result in a separate parallel session at the World Congress of the International Economic Association in Mexico City. On the basis of the decision of the evaluation committee invited by the Board of the HEA and the decision of the Organising Committee of the World Congress of the IEA, the HEA was represented by the following participants: Dániel Palotai, chief economist of the Magyar Nemzeti Bank, vice president of the HEA and head of the Competitiveness Section of the HEA (title of his presentation: "Crisis management and economic recovery in Hungary"); Ferenc Pongrácz and Gábor András Nick (title of their presentation: "Innovation: key of sustainable growth in Hungary") and Miklós Losoncz (title of his presentation: "Sources of sustainable economic growth in the Central European region: the role of market integration"). The chairman of the parallel session entitled Growth and sustainability in Central and Eastern Europe was Gyula Pleschinger, president of the HEA elected in May 2017, and member of the Monetary Council of the Magyar Nemzeti Bank.

In addition to the IEA, the Mexican Centre for Research and Teaching in Economics (Centro de Investigación y Docencia Económicas – CIDE) also played an active role in organising the Eighteenth World Congress. The main objective of CIDE is to ensure the knowledge necessary for the development of the Mexican economy in the open and competitive world of today and to train and educate the new generation of leading officials.

The event was opened by *José Antonio Meade*, Minister of Finance of Mexico, whose presentation underlined the importance of the ideas appearing in the title of the conference (Globalisation, development and sustainability) in the daily life of Mexico.

Ildefonso Guajardo Villarreal, Minister of Economy of Mexico called globalisation as of extreme importance for Mexico. In addition to structural openness in terms of the ratio of foreign trade in GDP, trade policy openness is demonstrated by the fact that

Mexico has 46 free trade agreements. He acknowledged with concern the spread of protectionism in the world economy, with special regard to restrictive foreign trade and migration policy pursued by the US president elected last year. Since its establishment in 1995, Mexico has benefited much from NAFTA (North American Free Trade Agreement). He added that, on the one hand, NAFTA itself could not contribute to the development and the structural modernisation of the Mexican economy by itself, but only with the support of appropriate domestic economic policy. On the other hand, NAFTA, too, needs to be modernised, its provisions have to be adjusted to the new developments of the period passed since its foundation.

The greatest attention was received by the opening plenary presentation of the conference, which was held by *Joseph E. Stiglitz*. He tried to find answer to the question how adequately the currently applied economic models describe the changes that took place all over the world in terms of income and wealth inequalities.

Stiglitz thinks that two theoretical approaches are currently predominant. According to the first, an equilibrium status exists with respect to the distribution of wealth/income. What we currently experience is a transition from a previous equilibrium to a new one. If this approach is correct, the factors that are the driving forces of the changes have to be identified. According to the second school of thought, the permanently increasing income and wealth differences are inherent characteristics of capitalism and the period after World War II was exceptional; thus, the concentration of wealth that can be observed currently is a return to the "natural" functioning of capitalism.

In his presentation Stiglitz argued in favour of the first approach. Thus, according to him, an equilibrium status does exist. Of the alternative theories, he first referred to the model of Piketty, who supported the trend of increasing wealth inequalities by a large amount of empirical data. Accepting these figures, Stiglitz raised questions concerning the explanation of these changes. According to the model set up by Piketty, capitalists save almost their entire income and if their savings increase more rapidly than the whole economy, wealth inequalities grow as well. However, Stiglitz thinks that the assumptions of Piketty are not correct, since the savings rate cannot be greater than one (to put it differently: 100 per cent), whereas the growth rate of wealth is an endogenous variable, which depends on economic growth. In other words: the rate of growth of wealth cannot exceed that of GDP in the long run. Moreover, according to Stiglitz, it is important to distinguish the notions of capital and wealth. Although the measurement is not clear, the income statistics of the US and other developed economies indicate a decrease in the K/Y (capital/income) ratio.

After this he introduced some models discussing wealth differences. Their common characteristic is that in the long term they anticipate progress towards an equilibrium status in the distribution of wealth. In the models presented, equilibrium can be interpreted as the combined result of centripetal forces, i.e. those strengthening wealth equality, and centrifugal forces, i.e. those deepening wealth differences. According to Stiglitz, the explanation of the current trends needs to be found in the interaction of these forces. In this context, he mentioned the following major factors: the decrease of taxes on capital, with special regard to inheritance taxes and the regressive tax practice of the US; the lower quality of public education, the segregation of wealth, and the growing role of private schools; the increase in personal network capital; and the consideration of wealth differences in the partner choice for marriage. The move from the previous equilibrium is also explained by changes in capital markets, the increase in the role of the service sector and the financing of real estate market bubbles with loans.

Stiglitz stressed the paradox that increasing wealth inequality was recorded in a time period when the cost of capital was extremely low. The explanation for this may be the uneven distribution of knowledge: knowledge namely has become a scarce resource. With more knowledge, an investment portfolio of higher risk can be constructed with higher expected profits. Knowledge is a fixed cost and wealthier individuals can achieve higher yields at the same risk level. Finally, the value of insider information has increased as well. All of these factors lead to the concentration of wealth on the highest level of the income ladder.

As a result, the growth rate of labour productivity exceeded that of labour incomes in the developed countries in a time period when interest rates tended to be zero and the aggregate indicators of the rate of return on capital did not decrease.

The most important message of the comments made after the presentation was that the presented analysis focused primarily on changes in developed economies. In this context, the opinion of *Lakner Milanovic* is worth mentioning who pointed out that income differences have increased in developed economies (primarily in favour of the upper one per cent), whereas in the less developed Asian economies a significant catching up of incomes took place relative to the most developed ones and reached a higher level.

Stiglitz dealt prominently with the importance of unequal distribution of knowledge. According to many experts, information has become the most important source of economic growth by now, while access to digital data is inconsistent and is not available to everyone. This leads to the emergence of new types of monopolies, which can explain to a significant extent the outstanding improvement of the wealth/income situation of the upper one per cent.

Following the guiding principle and cheerful atmosphere of his book "Phishing for Phools",[1] *George Akerlof*, who received Nobel Memorial Prize in Economic Sciences in 2001, examined the rational and irrational decisions of economics. Disputing the principle of invisible hand of Adam Smith, in his presentation he illustrated the double-faced nature of the market economy through everyday examples, shedding light on the tricks of market participants that are present continuously and trigger self-induced effects.

The presentations of the parallel sessions encompassed the following topics:

- The relationship between demography, urbanisation and productivity
- Globalisation
- Monetary and fiscal policies
- Migration issues and their economic impacts
- The relationship between international trade and competitiveness
- Macroeconomic externalities, networking
- Sustainability, environmental protection
- Impact of digitalisation, development trends
- Labour market issues
- Economic importance of small and medium-sized enterprises.

A great number of the rapporteurs presented case studies from the country they come from or its wider external environment; thus, the participants of the conference received authentic views of the selected topics from many parts of the world (Vietnam, Japan, Italy, etc.). Only Africa was underrepresented, whereas topics related to Mexico, Latin America and mainly the US dominated the discussions. In the spirit of the place, an entire day was devoted to the overview and analysis of the economic development problems in Latin America. Global issues and actual topics overshadowed the European Union almost completely and the problems of the Central and Eastern European countries received relatively modest attention as well.

The overwhelming part of the presentations delivered on both the plenary and the parallel sessions was built on economic models in line with mainstream international economics. Most of the presenters drew new scientific conclusions from their models. However, in many cases the conclusions were rather trivial with methodological rather than scientific value. It was a common characteristic of the reports relying on economic models that the authors laid great emphasis on the details of their models, which, in certain cases, pushed the economic contents into the background. However, the dominance of modelling as a research method

[1] Published in Hungarian: George A. Akerlof, Robert J. Shiller: Balekhalászat: A manipuláció és az átverés közgazdaságtana [Phishing for Phools: The Economics of Manipulation and Deception], HVG Könyvek, Budapest, 2016.

overshadowed qualitative analyses of synthesising nature to a significant degree. An example for an exception to this was the study of Jose Antonio Ocampo about reforming the global monetary "non-system".

The parallel sessions took place in an extremely open atmosphere and in interactive way, providing an opportunity for informal scientific discourses as well, in which IEA leaders, attending professors and PhD students were equal parties. The role played by Nobel Memorial Prize laureate Joseph E. Stiglitz was particularly remarkable. In addition to delivering the opening plenary presentation, he chaired many parallel sessions where his students, were also present as rapporteurs. Based on the presentations delivered at the Eighteenth World Congress of the International Economic Association the conclusion can be drawn that significant attention is being paid to issues such as globalisation, economic development and sustainability and the interrelationship among them in economic thinking.

What Can We Learn from the Large Banker Dynasties? – Report on the Annual Conference of EABH*

Pál Péter Kolozsi

EABH (European Association for Banking and Financial History), dealing with processing and presenting the history of the banking, financial and insurance sectors, organised its annual conference in Paris on 23 June 2017 with the title „*The legacy of the haute-banque in the world – from the 19th to the 21st century*". The presentations of the conference discussed the financial-historical development, golden age and decline of the 19th century family-held private banks („haute-banque"), with special regard to the French banking houses.

On the eve of the conference, *Jacques de Larosière*, ex-Managing Director of the International Monetary Fund (IMF), former Chairman of the French central bank, and Advisor to the Chairman of BNP Paribas, greeted the participants. He stated that there is no unambiguous definition of „haute-banque", but it is certain that these family-held banks were the primary embodiment of financial confidence, since these bankers were fully liable for the investments with their total assets. Rather than merging capital, specific persons joined forces, – pointed out Jacques de Larosière, winner of the MNB Lámfalussy Award of 2017, according to whom the "haute-banque" model is in sharp contrast with the modern banking system, whose primary challenge is exactly the creation of confidence. According to the famous French financial expert, although the family-held banking houses are certainly outdated, we can still learn from their examples today, with special regard to assuming liability by bankers, the conservative risk profile, and the importance of personal trust. What were the advantages, in terms of financial stability, of the fact that there was a close and permanent personal relationship between the banker and the client, in contrast with today's banking system where such relationships hardly exists? – Jacques de Larosière raised this open question and he mentioned that this area should also be examined by international organisations concerned in regulation.

Harold James (Princeton University), in his presentation, highlighted that the transformation of the financial system in the second half of the 19th century could provide useful experiences with respect to today's challenges, as well. He

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pointed out that similar to the aftermath of Prussia's defeat of France, there are also significant changes in the world economy today and the financial crisis, which erupted in 2008 was only a symptom of this. After the military defeat of France in 1871, the financial centre of the world was transferred from Paris to London and today the maritime region of the Pacific Ocean assumes the role of economic leadership from the Atlantic Ocean; we can learn a lot from the events of that age and one of this is certainly that we must prepare to face significant geopolitical risks, stated the lecturer.

Patrick de Villepin (BNP Paribas), in his lecture on the formation of BNP Paribas, emphasised that the financial crisis has considerably transformed the financial sector, which will never be the same as it used to be before the crisis. He stated that it cannot be excluded that the current years which seem as confusing, will later be regarded as the years of innovation.

Hugo Bänziger (Banque Lombard Odier, Chairman at EABH) focused his presentation on the introduction of the financial relationships between Geneva and Paris. He first pointed out that there are many downtown villas in the two cities which can be considered a spectacular inheritance of the family-held private banks and it well symbolises the links and similarities between the two cities. Many Protestant French people, as a result of religious intolerance, had escaped to Geneva in the second half of the 17th century and among them there were also industrialists and bankers who became successful later on. They typically arrived in the then independent city not as wealthy people, rather they achieved their wealth in Geneva from international trade, especially wool trade and textile industry innovations. The importance of trade is shown well by the fact that the banks they later founded were also primarily established for financing foreign trade. The banks in Geneva first achieved wealth because the French king, Louis XIV, who expelled the Protestants from France, financed his grandiose constructions and extremely costly wars, exactly with the assistance of the bankers of Geneva. Paradoxically, almost a hundred years later the demise of many banks in Geneva resulted exactly from their relationships with France, since France escaped its debt obligations by declaring state bankruptcy after the French Revolution; thus, the French government bonds held by the wealthy bankers lost their value. Consequently, it was then that the export-import banks founded by French Protestants started to develop.

Eric Bussière (University of Paris Sorbonne) presented the development of the French banking system, highlighting that the fight between family-held private banks and modern limited liability commercial banks („joint stock banks"), collecting deposits was decided by the French bank crisis of 1889, after this the „haute-banque" model permanently resigned its position to the commercial banks representing the foundation of today's banking system as well. In his presentation he highlighted that the large French commercial banks strengthened at the end of the 19th century and the first half of the 20th century and the outstanding figure

of this age was legendary banker Horace Finally, leader of Banque de Paris et des Pays-Bas (Paribas), who was born in Budapest in 1844.

The special lecturer of the conference was *Kwasi Kwarteng*, conservative British MP, who presented the development of British public finances between 1815 and 1844. In his presentation he outlined the international and intellectual environment in which family-held private banks flourished. This period, i.e. the first half of the 19th century, was the period of strict budgetary discipline and strong foreign exchanges. The general civilian mentality was described well by the character of Wilkins Micawber of Charles Dickens, for whom the only criterion of happiness is that his income should always exceed his expenses – stated Kwasi Kwarteng, according to whom if we read the life story, adventures, experiences and observations of David Copperfield, we can understand why the family-held private banks were so conservative and risk-averse.

Sabrina Sigel (Banque Lombard Odier), via the course of life of Henri Hentsch, one of the best-known bankers in Geneva and Paris, presented that one of the great challenges of banker families was inheritance and to hand over business management, namely the generations grown up in prosperity lost their interest in bankers' life in many cases.

Olivier Feiertag (Rouen University) analysed the connections between family-held private banks and central bank functions. The French central bank was founded in 1800 following the English model, its shareholders were private individuals and hence many people questioned the real independence of the bank, with special regard to the fact that a large part of the founders arrived from the world of family-held private banks. Moreover, the bank's reputation further diminished by the fact that these families (the most well-known of whom were the Mollet, Rothschild, David-Weill, Odier, Périer, Durand and Hottinguer families) held several leading positions in the bank. In addition to the personal link between the central bank and the family-held private banks, it is worth mentioning that, prior to the foundation of the French central bank, the family-held private banks were the banks of the state, since these banks financed the state expenditures not covered by taxes, with special regard to wars – highlighted Olivier Feiertag.

Lorans Tanatur Baruh (SALT Istanbul) presented the connections between family-held private banks and the real estate market via the example of the Camondo family, which implemented significant developments in Constantinople (Istanbul) and then moved its headquarters to Paris at around 1860–1870.

Nicolas Stoskopf (CRESAT Mulhouse) analysed the connections between family-held private banks and modern commercial banks and called attention to the fact that although the old banker families only participated to a limited extent in the

establishment of modern commercial and investment banks, yet they had an effect on the new banking model and culture. The examples of Stoskopf point out how the bankers of the old world were pushed out from the modern banking sector. He presented the Crédit Mobilier bank, founded in 1852, as a separate case, since this was founded by the Pereire family, which can be classified among modern bankers, in order to counterbalance the Rothschild family, another banker dynasty, and some industrial investors on the railway construction market. At the end of the 1860s, the large names – except for Rothschild – (the Hentsch, Paccard, and Bischofstein families) participated in the share quotations of Société Générale and Crédit Lyonnais, well-known currently as well, but they were completely left out from several large bank foundations (for example from the foundation of French regional banks; Comptoir national d'escompte de Paris, a predecessor bank of BNP Paribas; and Crédit foncier, which is active in real estate and mortgage financing currently as well). According to Stoskopf, the two bank cultures were very different from each other, whereas the representatives of the „haute-banque" were cosmopolitans, often arriving from religious-ethnical minorities and they constituted a homogeneous group in social and professional respects, meanwhile modern bankers were typically from the Catholic French community and they constituted a heterogeneous group in terms of their professional background (for example many of them were lawyers, few of them had family business background, etc.). Despite the difference, the old-style banker world had an impact on the new bankers but such impact was not always positive. Stoskopf points out that, although modern banks were operated in a joint stock company form, the banks' leaders did not change for decades, in several cases, similarly to the old banker dynasties, which often led to conflict of interests between the banks' leaders and the bank, in some cases to the utilisation of the banks' wealth for private purposes.

After the panel discussion about the current banking system and financial innovations, *Korinna Schönhärl* (Essen University) presented it via the investments of the D´Eichthal banker family in Greece that the "haute-banque" played not only a financial, but also a cultural intermediation role among the countries concerned. *Sabine Schneider* (University of Cambridge) presented the work of Gerson von Bleichröder, the German banker known as the banker of Bismarck, with special regard to the conversion to gold of the French reparations after the Prussian–French war in 1871, which can be considered as one of the largest financial transactions of the world in terms of proportion until now. In his presentation *David K. Thomson* (Sacred Heart University) outlined how the primarily German family-held private banks participated in financing the debt of the American civil war, and how they started the internationalisation (globalisation) of the capital markets with this involvement already in the 19th century.

In the closing section of the conference, *Laure Quennouëlle-Corre* (CNRS, Université de Paris Sorbonne) pointed out that there is almost a parallel between the former

„haute-banque" and the current asset management business line of modern banks; however, the business environment has been transformed to such a degree that banking of the past century would not have legitimacy today in asset management either. *Hubert Bonin* (Sciences Po Bordeaux) presented the fate of the French family-held private banks, highlighting that these banks have strong positions today as well in certain partial financial markets, mainly in the business of financial consulting and corporate mergers and acquisitions (M&A) – naturally only the ones that remained, since currently there are only two banking houses with a „haute-banque" background in France, the always completely global Rothschild & Cie Banque, and Lazard, which was French–American already upon its foundation.

In his closing presentation, *Youssef Cassis* (European University Institute) presented the institutional system of „haute-banque" at three levels. In an economic sense this expression indicates private banks held by families that primarily deal with trade financing, investment bank services (state and corporate bond issue) and the management of their own net wealth. At the social level these are wealthy bankers integrated organically to the elite of the specific country, despite the fact that they are often not the offspring of the given nation's majority. An important characteristic of these bankers is that they have outstanding international and political connections and they often work as consultants of the highest state circles. This is an exclusive club that has considerable power and influence and it has sole discretion on who may join their ranks, pointed out Youssef Cassis. The golden age of family-held private banks was different from country to country, in France, which can be considered as the homeland of „haute-banque", it was between 1830–1870; in London they had serious positions all the way until 1914; whereas, in the US, family-held private banks represented significant market power even in the beginning of the second half of the 20th century. By today practically all family-held private banks have either disappeared or have been acquired or have been transformed into modern financial groups; thereby, losing their former character.

Thus, today, the „haute-banque" as a type of bank has practically disappeared, yet we can learn from its example, namely the internal consistence of the business model, according to several lecturers of the conference. Bankers used to risk their own net wealth, but they also realised profit due to the owner from successful investments. Modern banks risk the money of depositors, hence it would follow logically that bankers should be paid employees. Inconsistency can occur if the bank's remuneration policy would encourage, bankers to make too risky investments with the money of the depositors and the banker can realise owner's income on a short term, yet in the longer term the banker is not committed to the bank and does not bear the consequences of his or her own decision postponed in time. Based on the 2008 crisis we have to say that recently this type of inconsistency has not been rare in the financial sector and this resulted in extreme risks undertaken by banks – which could certainly have not occurred in the case of the „haute-banques", which are less competitive and efficient in other regards.

Report on the (Our) Climate Affairs 2017 Conference*

Marcell László Tóth

The (Our) Climate Affairs 2017 conference was held on 25 May 2017 in Budapest within the framework of the National Sustainability Professional Day. The venue of the event held with the participation of approximately 300 people was the Ludovika Campus of the National University of Public Service (NKE). The following topics were discussed at the international scientific conference of the Cabinet of Sustainable Development Studies of the National University of Public Service (NKE FFTK): the consequences of climate change, adjustment and resilience to these and their connections to urban ecosystems of municipalities and cities.

The conference was opened by *András Patyi*, Rector of the National University of Public Service. He emphasised the fact that considerable rain had fallen in Budapest, a couple of days before the event, resulting in serious stoppages, and this makes the event aimed at dealing with climate change and vulnerability even more relevant and timely. The opening presentation was delivered by *Csaba Kőrösi*, director of the Environmental Sustainability Directorate of the Office of the President of the Republic, who was also the benefactor of the event; as an expert on the topic, who had previously worked at the UN, said that although the problems caused by climate change have been recognised, they must be managed and remedied together, not separately, since the most efficient approach is managing the entire system together. He is of the view that success can be achieved if the solutions and climate adaptation can be made marketable and in his opinion, this might be achievable.

In his presentation entitled "Climate change and water wars?", *András Szöllősi-Nagy*, who also has considerable UN experience, called attention to the importance of drinking water and its increasing future role. Namely, water is a precious treasure since we cannot live without it. The lack of this and the difficulties of access will cause social problems in the future and it is only up to us whether we'll solve these serious challenges with war or co-operation. According to an expert, who also works at the NKE, there is no hope if political leaders do not comply with the Paris Climate Agreement. He considers the sustainable development targets, designated

* The views expressed in this paper are those of the author(s) and do not necessarily reflect the offical view of the Magyar Nemzeti Bank.

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in connection with the agreement that became effective in 2016, as too ambitious, according to him the implementation of the section about water would be the most important, since this constitutes the foundation of several other objectives.

Charles J. Vörösmarty talked about the connection of climate change and urban development. The professor at the City University of New York called attention to the fact that since 2007 more than half of the population of the world lives in cities and this ratio will only increase. Moreover, cities will become vulnerable against the changes in climate in several respects. The expert, who has Hungarian ancestors as well, emphasised the challenges caused by permanent heat waves expected in the future and the increasing importance of water safety, too. He also said that we exhaust the resources of the Earth to a larger extent than they are capable of renewing. Currently the global ecological footprint is such that we would need one and a half planets for the sustainable way of life. It depends on our decisions made today whether one available Earth will be sufficient for our way of life in 2050, since if we do not change our habits and needs, we will require two and a half Earths, by the middle of the century, to maintain humanity.

The last plenary presentation was delivered by *Judit Bartholy*, who approached the topic from the side of meteorology. In relation to the greenhouse effect, she stated that the phenomenon in and of itself is essentially good; however the problem is that, as an impact of this, various harmful materials also remain in the atmosphere (the decay time of some of these is hundreds of years). The well-known researcher also talked about the Paris Agreement, according to which we would like to keep the increase of global average temperature under 2 degrees Celsius. The professor at ELTE said that there are areas in the world where increase has already exceeded this threshold. This is a clear proof that the extent and effects of climate change can be different in the various parts of the globe. For example, temperature, on average, increases everywhere and the level of precipitation also grows globally, meanwhile the annual average rainfall is less and less in Hungary, which causes significant damage in agriculture. More rainy days are expected in Hungary; however, the distribution of these will be uneven and we have to prepare for the increase in the number of very hot days as well.

After the plenary sessions of the conference, work has continued in two blocks in parallel, in a total of seven sections. These discussed the following topics: sustainable cities; water management of settlements; Sustainable Development Objectives and urban sustainability; food safety of settlements; urban ecosystems; anthropomorphic economy; and decarbonisation of cities; contributing to the exchange of experiences between the participants and broadening their horizons often with useful and visionary discussions.

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- Papers always begin with an abstract which should not exceed 800–1000 characters. In the abstract a brief summary is to be given in which the main hypotheses and points are highlighted.
- At the bottom of the title page a footnote is to be given. The footnote contains every necessary information related to the paper (acknowledgement, relevant information etc.). This is followed by the name of the institution and position the author works at, e-mail address in Hungarian and English.
- Journal of Economic Literature (JEL) classification numbers should be given (three at least).
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- 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!

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