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Wage Inequality on the Hungarian Labour Market: Technological Change, Expansion in Higher Education and the Role of the Minimum Wage*

Álmos Telegdy

The paper examines the development of wage inequality in Hungary between 1994 and 2016, based on the theories that explain the labour market impact of information and communication technologies (*ICT*)*. The analysis is based on the Hungarian Wage Survey Database and uses the empirical methods in the literature to calculate the change of the employment shares and wages of various jobs. As in most countries, the Hungarian labour market became polarized, but this has not been accompanied with wage polarization. Rather, the increase of wages was inversely proportional with skill. The paper proposes two reasons for this behaviour: one is the large increase in the minimum wage, while the other the educational expansion which increased the labour supply of highly skilled workers.*

Journal of Economic Literature (JEL) codes: J31, J61, D31, R11

Keywords: wage inequality, wage dynamics, labour market polarisation

"Labor will become less and less important... More and more workers will be replaced by machines. I do not see that new industries can employ everybody who wants a job." (Wassily Leontief[1])

1. Introduction

Even though the Nobel laureate economist Leontief's prediction regarding the labour market took thirty years to materialise, something changed on the labour market in the early 1980s, and wage inequality started growing in most advanced countries. It was first documented in the US that between 1980 and 2009 high-

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

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The paper is a revised version of the chapter *"Effects of technological change on the labour market"* of the Magyar Nemzeti Bank's Growth Report (2017). The paper benefited from the comments of András Balatoni, Péter Gábriel and János Köllő, and the participants of the Szirák Labour Market Conference (2017). The study contains the views of the author alone, and not the Magyar Nemzeti Bank. Any mistakes are the author's own.

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[1] "Machines and Man", Scientific American, 1952, cited by Acemoglu and Restrepo 2016:1, http://www.nber.org/papers/w23285.pdf

wage workers' earnings increased much more than that of medium- and low-wage workers. The difference between the most highly skilled and the least skilled workers was dramatic: while the real wages of college or university graduates grew by around 60 per cent, those without a high school diploma saw a decrease in their wages in real terms (*Acemoglu – Autor 2011*). This surprised researchers and policymakers because inequality had been on the decline for a long time before that. *Goldin and Katz* (*2008*) use long time series to document that wage inequality in the United States exhibited a downward trend between the early 20th century and the 1970s. Wage inequality rose not only in the United States. *Katz and Autor* (*1999*) document the wage differences between low- and high-wage workers in 16 developed countries and conclude that inequality has mostly increased, although much less than measured in the United States.

An analysis of the changes in the past 30 years by occupation shows that there is a more complicated relationship between qualifications and wage growth than a simple linear correlation. Researchers have shown in several countries that the occupations that were in the upper or lower segment of the wage distribution in 1980 based on their average wage enjoyed much larger wage growth until 2005 than medium-wage occupations.[2] In parallel with the change in wages, the employment share of occupations also changed: high- or low-skilled jobs are increasingly present on the labour market, while the share of jobs that are traditionally performed by medium-skilled workers are on the decline.

This paper presents the theories that provide the most likely explanation for this major change. These attribute this significant reallocation on the labour market to the impact of information and communications technologies (ICT). The second half of the study documents the trends in wage inequality in Hungary during the previous two decades. This analysis is based on the Wage Survey Database that contains annual information from the early 1990s up until 2016 on the occupation, wage and other demographic features of Hungarian employees. Empirical methods from the literature are used to calculate how wages have changed across the various qualification and employment groups and document the increasing prominence or diminishing weight of employment groups on the labour market.

The results indicate that there are substantial differences in terms of labour market developments between the first half of the 1990s and the subsequent period. In the 1990s, high wages increased more than medium and low wages, and the share of high-skilled workers on the labour market dropped, probably due to the insufficient supply of graduate workers. By contrast, in the 2000s, labour market polarisation emerged: the proportion of the occupations with an average wage declined relative

[2] See the paper by *Autor and Dorn* (*2013*) on the United States, *Goos et al.* (*2009*) on 16 European countries and the *World Bank* (*2016*) on several developing countries.

to those with low and high wages. However, wages did not follow this trend, as the wage growth of occupations was inversely proportional to the initial wage level since the early 2000s. Therefore, wage inequality increased between 1994 and 2000, but there was a turnaround at the turn of the century, and inequality started to decrease. According to the calculations, in 2015 the wage difference between college or university graduates and those with at most a secondary school diploma was the same as in 1994.

Two changes can explain the drop in wage inequality. One is the minimum wage, which was substantially increased in 2001 and 2012, and boosted low wages. The second is the expansion in higher education, which bore fruit in 2000 and considerably increased the proportion of university and college graduates on the labour market. The first phenomenon raised low wages, while the second moderated the rise of high wages.

The next chapter presents the theories that explain the impact of ICT on the labour market. *Chapter 3* describes the database, and *Chapter 4* details the analysis. *Chapter 5* then attempts to provide some explanations as to why Hungary has different wage dynamics than the advanced economies. The analysis ends with a summary of the results.

2. Theoretical framework

Economic theory needs to explain two interrelated phenomena. Data from developed countries show that wage inequality started increasing in the 1980s such that better educated workers received larger premia. Later, typically in the 1990s, the labour market became polarised, i.e. the relative size and wages of both high- and low-paying occupations increased at a higher rate than of average-paying jobs. This chapter outlines the two theories that provide a simple market explanation for the two labour market developments.

2.1. Tinbergen's race between education and technology[3]

Wage changes are usually addressed in terms of employees' educational attainment on the basis of *Tinbergen's* (*1974*) model, which was first used by *Katz and Murphy* (*1992*) to explain the changes that took place in the 1980s. The model distinguishes two types of workers: the unskilled (those with at most a secondary school diploma) and the skilled (college or university graduates). The wage difference between the skilled and the unskilled is explained by the relative supply and demand of the two categories. The key assumption is that the two types of workers are imperfect substitutes in the production process. This is not an unrealistic hypothesis. High-skilled and low-skilled employees are employed together in firms, and at the level

[3] This chapter is based on a paper by *Acemoglu and Autor* (*2011*).

of the national economy a high-skilled employee needs various products and services for work, which are provided by secondary school graduates. Production is described by a constant elasticity of substitution (CES) production function, where the two factors are the amounts of skilled and unskilled labour:

$$Y = [(A_1N_1)^{(\sigma-1)/\sigma} + (A_2N_2)^{(\sigma-1)/\sigma}]^{\sigma/(\sigma-1)}. \quad (1)$$

In the expression above, the number of skilled (unskilled) workers is N_1 (N_2). A_1 and A_2 are technological parameters influencing the productivity of the factors, and σ is the elasticity of substitution between the two types of workers measuring how the change in relative wages influences the relative demand for the factors.

The wage premium of skilled workers rises if a technology is introduced that increases graduate employees' productivity (e.g. a computer will make a designer much more efficient than a machine operator). It will do so because the new technology and skilled employees are complements in the production process, therefore the productivity of skilled workers (A_1) increases (relative to the unskilled). This relative wage growth expands the graduate wage premium. Assuming that workers' wage equals their marginal product, the derivative of Expression (1) with respect to N_1 and N_2 yields the following relative wage equation:

$$\log(w_1/w_2) = (\sigma-1)/\sigma \log(A_1/A_2) - 1/\sigma \log(N_1/N_2). \quad (2)$$

In Expression (2), two factors influence the relative wage. The first is technology: if, for example, A_1 is greater than A_2, technology increases the productivity of skilled workers more than in the case of the unskilled. This boosts companies' demand for skilled workers, which lifts relative wages if $\sigma > 1$ (i.e. skilled and the unskilled workers are imperfect substitutes). From the supply side, the relative number of graduate workers decreases the wage premium, and the elasticity between relative wages and the relative number of workers equals the inverse of the elasticity of substitution. This generates the race between education and technological change. Educational expansion decreases, while advances in technology increase the wage difference between the skilled and the unskilled. If an economy is characterised by an expansion in higher education (as was the case in developed countries and the whole of Europe), the supply of graduate employees increases, which in turn hinders their wage growth. It follows from this that if production processes had remained unchanged, the steady increase in the supply of high-skilled employees should have caused the university wage premium to fall. As the very opposite happened, it is likely that technological change triggered far more substantial changes on the labour market in favour of skilled workers than what could have been counterbalanced by the expansion in higher education.

2.2. Labour market polarisation

The model discussed in the previous subchapter uses simple changes in supply and demand to provide an explanation for the increased wage inequality in the past decades and gives good predictions for the changes that occurred on the labour markets of developed countries in the 1980s. However, it cannot explain the labour market polarisation that has been happening since the 1990s, i.e. that occupations requiring average skills (typically jobs for factory workers) are losing ground to the occupations that involve low skills (mostly jobs in services performed by workers with at most a secondary school diploma) or high skills (which usually require a college or university degree).

Autor and Dorn (*2013*) supplement Tinbergen's theory to interpret labour market polarisation. To do so, they classify labour not only by skills but also by the type of tasks workers perform. The previous model's skilled–unskilled categorisation is expanded by dividing unskilled workers into two groups by the nature of their jobs, i.e. based on the amount of their routine tasks. In this context, a "routine task" will not be defined as one that is easy to carry out, but as one that can be broken down into steps that always need to be carried out in the same way and is repeated over time. The tasks of a factory worker recur often; similarly, an accountant's work is also repetitive and bound by well-defined rules. By contrast, a hairdresser or a cleaner (and many other people working in the service sector) encounter a different situation each time, although their work requires less expertise than that of a factory worker or an accountant. The tasks performed by such workers require either complex communication skills (e.g. in the case of a hairdresser or a beautician), or the recognition of complex, constantly changing patterns (e.g. a cleaner cleans rooms of various shapes and furniture). Those working in the service sector are generally found at the bottom of wage distribution, those in occupations comprising routine tasks in the middle, and graduate employees at the top.

Labour market changes are once again triggered by the impact of technology. Jobs requiring a degree are generally made more efficient as a result of ICT because they complement it in production: rapid communication and huge databases increase the efficiency of the work of managers, engineers and analysts. As ICT can perform repetitive routine tasks that are subject to rules, it can substitute routine workers and so the share of occupations carrying out such tasks is decreasing as ICT is becoming increasingly cheap. The tasks of those in the service sector are usually impossible to robotise, or only at a high cost. ICT has only recently become able to engage in effective communication and identify complex patterns (*Brynjolfsson – McAfee 2014*), therefore the productivity of low-skilled workers in services has not been affected directly by the introduction of ICT, and thus the new technology has

also had no direct impact on their wages.[4] However, these workers are not shielded from indirect labour market consequences. Since the people carrying out routine tasks are increasingly losing their jobs and are not skilled enough for graduate jobs, they also look for jobs in the lower segment of the labour market, thereby competing with employees who have already been providing services. However, this effect is counterbalanced by the increased demand for services, which is generated by high graduate wages and the fact that the prices of some products are falling (as they can be produced cheaper with ICT). Some of the additional income is spent on the services market, which produces a scale effect, increasing the demand for unskilled workers.

To summarize, two developments result from the spread of ICT. Robots are crowding out medium-skilled workers carrying out routine tasks (who tend to work in manufacturing or offices). In turn, increased productivity generates additional income, boosting demand for services and, consequently, the labour demand for the employees who provide those services. As the wages of skilled labour increase (since their skills complement the new technology well), the labour market becomes polarised: demand for both high-skilled and low-skilled workers increases, which entails a rise in their wages. By contrast, the share of employees carrying out routine tasks in the middle of the wage distribution decreases on the labour market, which also affects their wages.

2.3. Alternative explanations

Besides the spread of ICT, there are alternative explanations for the large increase in wage inequality. According to one, the answer lies in the changes to the labour market's institutional system. The clout of two major labour market institutions protecting workers in the United States has diminished: the minimum wage plunged, and the role of trade unions has weakened (*Card – DiNardo 2002*). These institutions could be truly important in the convergence of low wages; therefore, they may influence wage distribution. However, the labour market institutions have not changed in all countries, but wage inequality has grown everywhere.

The other explanation is the growing volume of trade between developing and developed countries, which triggers similar mechanisms in wage setting, i.e. it poaches the jobs from medium-skilled factory workers, and their wages become

[4] This will not be the case in the future because ICT will increasingly filter into the service market (see, for example, the rise of self-driving cars in recent years). ICT is likely to transform the whole labour market in the near future, and it is unclear how this realignment will end. Depending on the assumptions, there are different estimates about the percentage of jobs performed by robots in the future. The World Bank puts this figure at 57 per cent in 20 years (*World Bank 2016*), while *Arntz et al.* (*2016*) believe it to be merely 9 per cent.

lower as a result of the drop in demand.[5] However, *Baldwin* (*2016*) shows that this could not have taken place without advanced communication technologies. In other words, globalisation is also being driven by technological change. Moreover, the share of medium-skilled workers also decreased in relative terms on the labour markets of developing, heavily exporting countries (*World Bank 2016*).

3. Data

This paper uses the Wage Survey Database compiled by the Hungarian National Employment Office. The analysis only considers the wages of employees in firms, because public sector wages are not directly determined by labour market supply and demand. The database provides information on the age, gender, educational attainment, occupation and wages of corporate employees. The analysis covers the period between 1994 and 2016,[6] and the sample includes businesses employing at least 20 people.[7] The companies had to complete the survey for blue collar workers born on the 5th and 15th, and for white collar workers born on the 5th, 15th and 25th of any month. If nobody at the company was born on these dates, the firm was dropped from the sample for the given year. In 2002, the threshold under which companies had to provide data for all their workers was raised to 50. Since 2011, workers in a public work scheme can be distinguished in the database. As their wage is regulated by law, they are not included in the analysis.

The database provides information on the total number of blue and white collar workers at the company level, which was used to produce weights in order to offset the sampling differences between blue and which collar workers within the firm.

Wage is measured by the monthly wage paid in May, which includes the base salary, overtime pay, other regular pay (e.g. language allowance, management allowance) but does not include non-regular income. This item is measured by 1/12th of the non-regular pay from the previous year and is added to the wages in May. Nominal wages are deflated with the consumer price index. The occupations are reported based on the Hungarian Standard Classification of Occupations (FEOR), which follows the ISCO categorisation developed by the International Labour Organization.[8] The analysis uses 3-digit ISCO groups.

[5] *Autor et al.* (*2013*) find that in the US manufacturing employment has fallen to a greater extent in regions that were exposed to Chinese imports, and that the competition created by foreign trade is responsible for a quarter of the redundancies in manufacturing.

[6] Although the data are available since 1992, the first two years are not used because it would be very difficult to separate the effects of labour market liberalisation and the new technologies in the first turbulent years of the economic transition.

[7] In 1998, the database was supplemented with a random sample of smaller enterprises, but they are not included in this analysis to eliminate the effects of sample change.

[8] The classification of occupations changed in 2011, and the analysis harmonises the FEOR-93 (ISCO-88) and the FEOR-08 (ISCO-08) classification systems.

Table 1 shows the number of observations as well as the total population (which consists of the weighted sum of the sample). In the 1990s, the data have information on about 90,000–100,000 workers. In the 2000s, this figure increases to 110,000–130,000, or even higher (150,000–165,000) in certain years. Weighted figures are more stable at 1.2 million workers, with the exception of the first two years of the analysis, where the weighted number of elements is around 1.6 million.

Table 1
Number of observations

Year	Sample	Population
1994	110,839	1,614,968
1995	109,885	1,583,435
1996	92,334	1,269,581
1997	91,422	1,229,928
1998	90,915	1,224,671
1999	89,044	1,169,112
2000	95,003	1,183,126
2001	91,224	1,108,623
2002	108,273	1,225,899
2003	112,525	1,213,671
2004	124,797	1,252,526
2005	132,884	1,257,645
2006	154,610	1,415,760
2007	132,412	1,251,285
2008	137,527	1,237,964
2009	129,569	1,223,417
2010	132,488	1,257,558
2011	119,460	1,208,077
2012	135,791	1,199,017
2013	126,907	1,199,639
2014	130,106	1,190,233
2015	165,768	1,164,694
2016	143,654	1,235,613

Note: The table shows the weighted and the unweighted number of elements in the sample. Population: the individuals employed by companies with at least 20 workers and using double-entry bookkeeping.

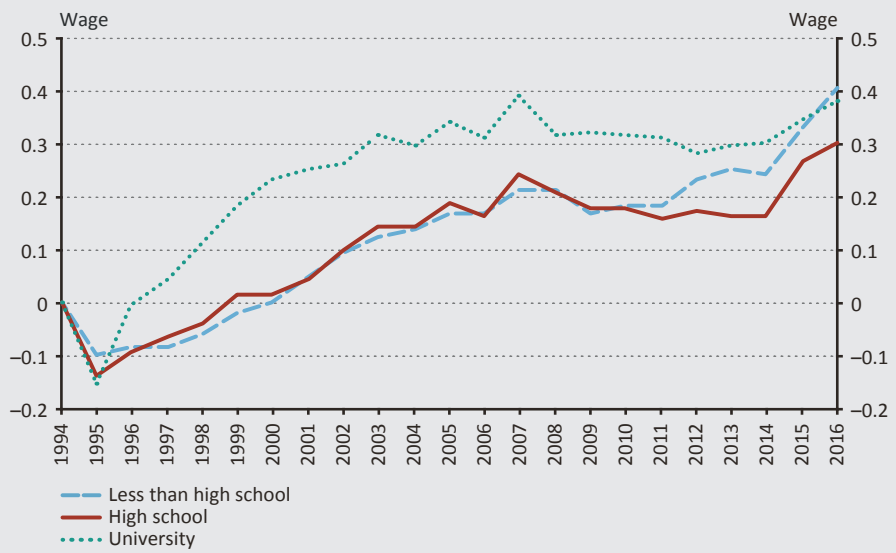
4. The evolution of wages and wage inequality in Hungary

Now we turn to the examination of the Hungarian labour market and show how wages changed in the past 20 years. First, we present the dynamics of wages and then we turn to testing whether the labour market has become polarised in Hungary as elsewhere. The end of the chapter seeks to provide answers to the phenomena described below.

4.1. Wage dynamics, 1994–2016

Figure 1 shows the annual growth rate of wages for three skill groups (those without a secondary school diploma, secondary school graduates and college and university graduates).[9] In the period studied, the wages of the low- and high-skilled increased at a similar pace, while those of the medium-skilled somewhat lagged behind. Wages increased steadily between 1995 and 2007, then stagnated for quite a few years on account of the crisis, and started growing again in the last years of the period. The wage advantage of university graduates was achieved until 2000. The wage growth was similar in the other two educational groups until 2009 when the wages of the low-skilled became persistently higher than those with a high school diploma.

Figure 1
Changes in earnings by educational attainment

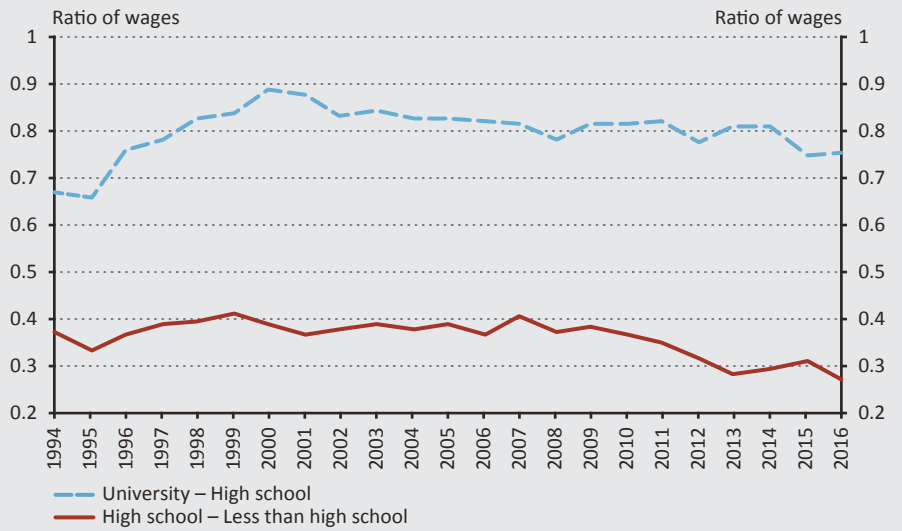


Note: N = 2,757,663. The figure shows the change of log income relative to 1994 for workers with less than high school, high school and university education. Nominal income is deflated with the consumer price index.

[9] Wages are logged and their growth is measured with log difference.

To summarise the development of wage differentials of workers with various levels of educational attainment, *Figure 2* presents the difference in average earnings by educational attainment. One line shows the wage premium of college and university graduates relative to secondary school graduates, while the other shows the difference between secondary school graduates and unskilled workers. The university wage premium increases sharply in the first six years of the analysis and then falls or stagnates in the subsequent period. The high school wage premium shows no substantial change in the first half of the period studied and then follows a steady downward trend from 2009.

Figure 2
Ratio of wages by educational attainment

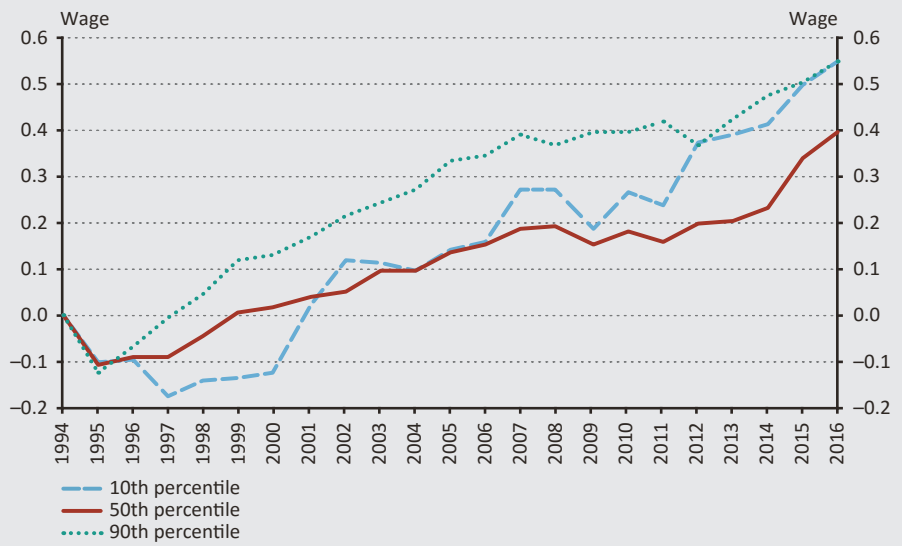


Note: N = 2,757,663. The figure shows the log wage difference between university graduates and high school graduates, and high school graduates and those with less than high school.

Not all university graduates perform high-skilled work, and not all low-skilled workers earn low wages. To obtain a more detailed understanding of the development of low, average and high wages in Hungary, workers are not classified based on their educational attainment but instead the wages of those in the 10th, 50th and 90th percentile of the wage distribution are tracked. *Figure 3* paints a slightly different picture of wage inequality than the wage differences between the education groups. The highest wages start diverging from average and low wages at the start of the period, and maintain their advantage until 2012. Average wages follow a similar path, but their annual growth rate is lower than in the case of high wages. Low wages first drop and then gradually rise, and over the whole period have the same growth as high wages.

Note that the wages here are gross figures, and, of course, net wage dynamics depend not only on wage levels but also on changes in the tax rates. In 2011, the rate of the personal income tax was changed, turning it from a progressive tax of 17 per cent for income of up to HUF 5 million and 32 per cent above that into a flat-rate 16-per cent tax. At the same time, the tax credit for low earners was phased out, thereby increasing the tax burden on their wages. The government also introduced the child tax allowance, which partly or completely offset the increased tax burden for low earners with children.[10] As a result of the tax changes, the tax burden of low earners increased in general, while that of high earners clearly dropped.[11] The steep rise in low wages at the end of the period may also partly reflect these changes. Because the net wages of high-wage workers grew substantially even if employers did not raise gross wages, employers probably mainly raised the wages of low earners where net wages declined.

Figure 3
Changes in wages at the 10th, 50th and 90th percentiles



Note: N = 2,757,663. The figure shows the change of log wages relative to 1994 for the 10th, 50th and 90th percentile of the wage distribution. Nominal income is deflated with the consumer price index.

[10] In 2011, the average monthly income was HUF 213,094, with a tax burden of HUF 32,000. The tax allowance was HUF 10,000 per child for one or two children and HUF 33,000 per child for three children.
[11] For the extent and effects of the tax changes, see *Szoboszlai et al.* (*2018*).

4.2. Labour market polarisation

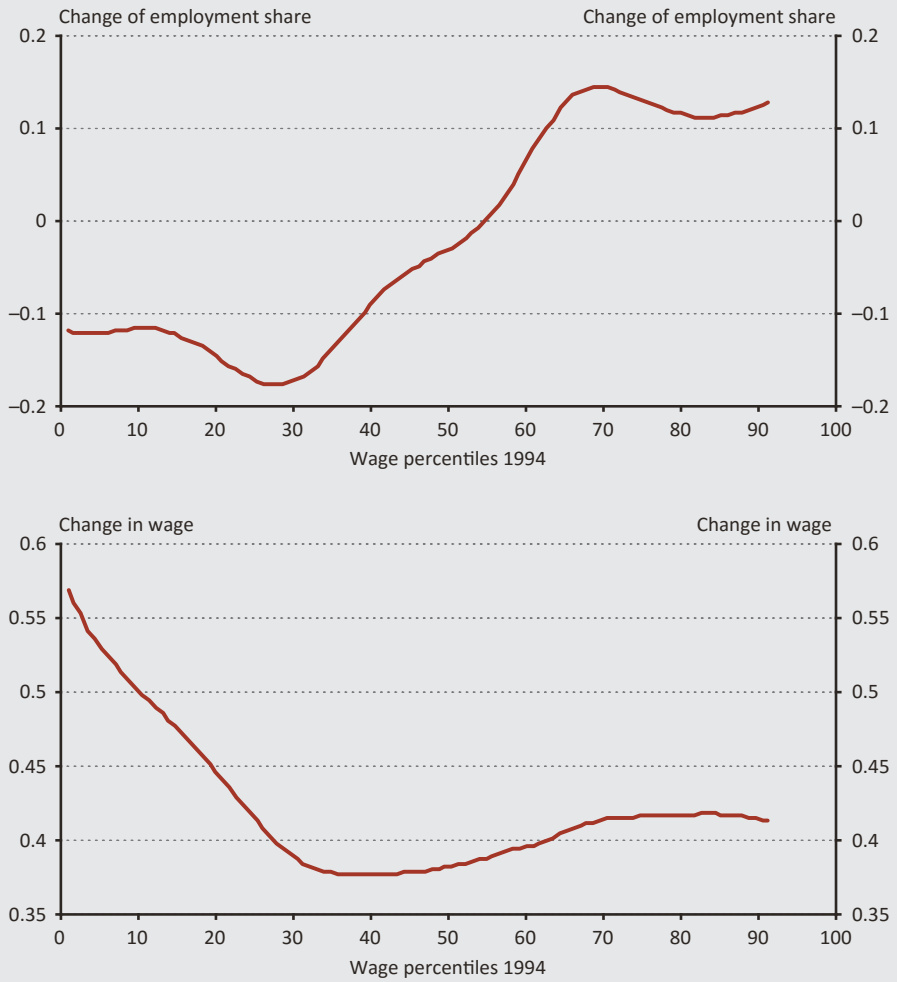
The previous chapter analysed wage changes by worker categories. Now we turn to how much wages and employment shares changed by occupations. In line with the literature (for example *Autor – Dorn 2013*), occupation categories are created by 3-digit ISCO codes. Approximately one hundred different occupations are used that had the same code in 1994 and 2016.[12] *Figure 4* displays the occupations arranged by the median wage in 1994 (horizontal axis), while the vertical axis shows the share of the given occupation within total employment and its median income growth between 1994 and 2016.[13] The figure shows that polarisation has also taken place on the Hungarian labour market. With respect to both the occupation shares and wages, medium-skilled workers lag the furthest behind, while the low- and high-skilled increased their proportion as well as their wage advantage. In contrast to the United States, in Hungary the largest wage growth can be observed in the case of low-skilled labour.

The dynamics of the average wages shown in *Figures 1–3* imply a change in the behaviour of the Hungarian labour market around 2000. Between 1994 and 2000, wage inequality increased (with high-earning employees earning even more and low-earners increasingly falling behind), whereas wage inequality decreased over the next 15 years, with wages of low earners catching up. We break down the period studied into two phases, and take a closer look at what happened on the labour market. *Figures 5* and *6* show the changes in employment shares and wage growth for the 1990s (1994–2000) and the 2000s (2000–2016).

In the 1990s, the share of the low-skilled increased the most while the proportion of the high-skilled declined (*Figure 5*), and therefore labour market polarisation was not observed. Wages became polarised to the extent that in the lowest-paying occupations wages rose at a slightly higher rate than around the 20th percentile; nevertheless, the most important phenomenon was that wages started increasing linearly from the 20th percentile upwards, proportional to the initial wage.[14] This behaviour is similar to the period between 1980 and 1990 in the United States when income increased linearly with education (*Katz – Murphy 1992*, *Autor et al. 2006*). This is described in the Tinbergen model, which was presented in the section *2.1*.

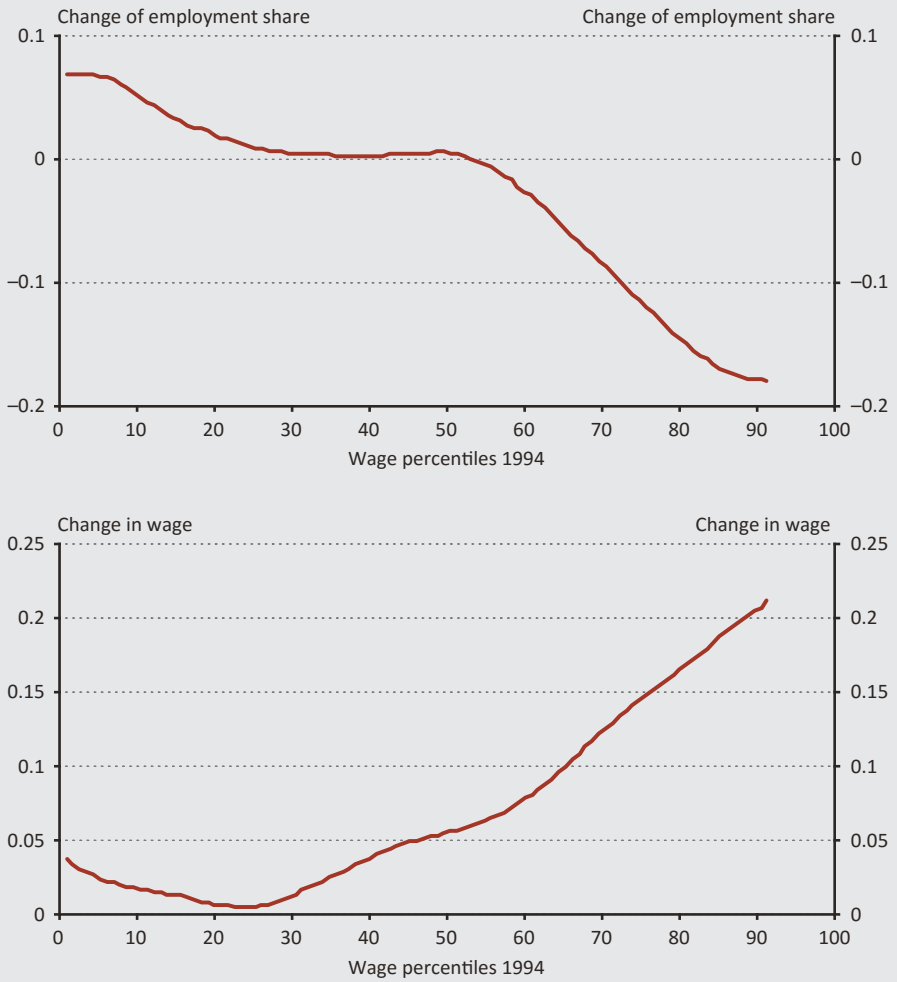
[12] Examples of such occupations are “heads of production units”, “financial and accounting professions”, “food industry occupations”, “cleaners”.
[13] The figure was prepared using locally weighted regression.
[14] *Kertesi and Köllő* (*2002*) reach similar conclusions with respect to wage growth in the 1990s.

Figure 4
Change in employment shares and wages, 1994–2016



Note: N = 2,757,663. The upper panel shows the change in the share of occupations in total employment between 1994 and 2016, as a function of where the average median wage of the occupations fell within the 1994 wage distribution. The lower panel shows the average wage growth of occupations between 1994 and 2016, as a function of where the average median wage of the occupations fell within the 1994 wage distribution. Occupations are defined at the level of 3-digit ISCO codes. Log wages are used. The figure was prepared using locally weighted regression.

Figure 5
Change in employment shares and wages, 1994–2000



Note: N = 2,757,663. The upper panel shows the change in the share of occupations in total employment between 1994 and 2000, as a function of where the average median wage of the occupations fell within the 1994 wage distribution. The lower panel shows the average wage growth of occupations between 1994 and 2000, as a function of where the average median wage of the occupations fell within the 1994 wage distribution. Occupations are defined at the level of 3-digit ISCO codes. Log wages are used. The figure was prepared using locally weighted regression.

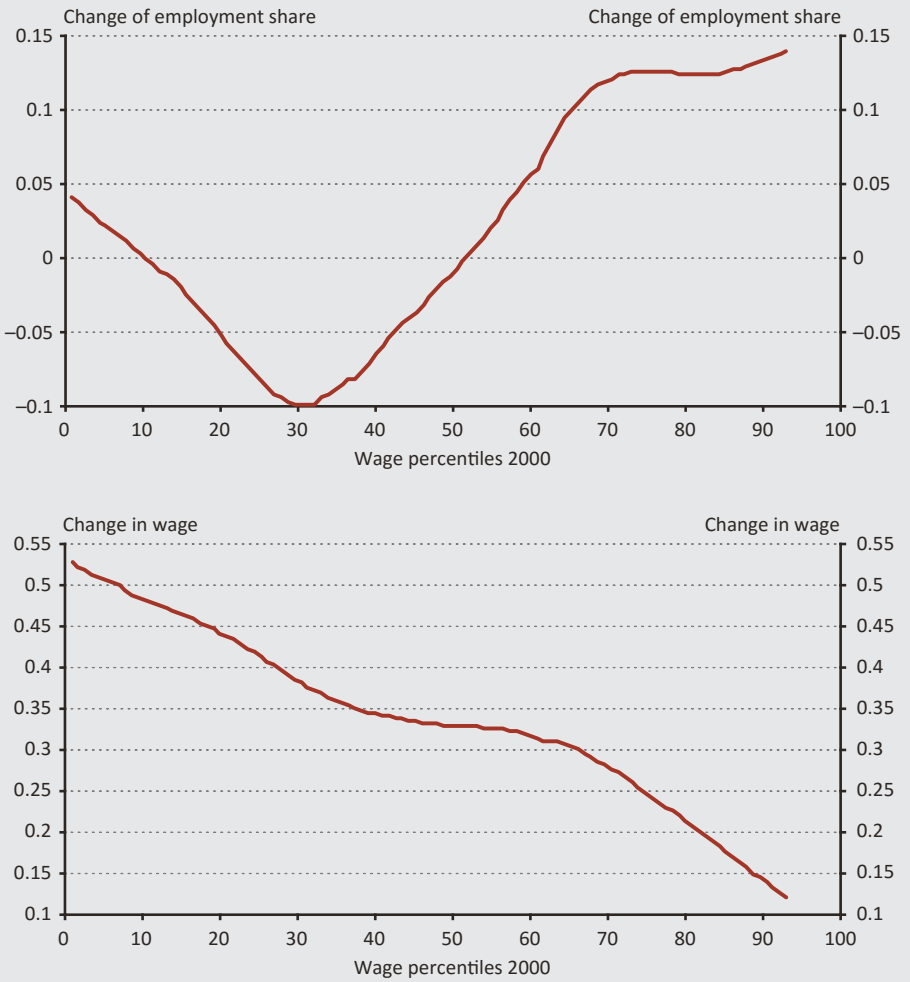
One surprising aspect in the figure is that the share of the high-skilled workers declines while their wages increase. *Commander and Köllő* (*2008*) examine the period 1997–2000 and find that the proportion of the low-skilled drops. If *Figure 5* were prepared for this period, it would yield similar results. Therefore, the low-skilled gained prominence before 1997, and a likely explanation for this can be found in business cycles. According to *Nagy* (*2000*), the unemployment rate peaked in 1993 (at 11.9 per cent). It steadily decreased over the subsequent years, standing at merely 7 per cent in 1999. However, the average unemployment rate conceals huge differences in terms of educational attainment. For the high-skilled, it was very low in 1993 (for example for males it was 3 per cent), and it declined by only 1.3 percentage points. By contrast, it tumbled from 15 per cent to 8.3 per cent for those with vocational training. The economic crisis that emerged in the early 1990s, just like the subsequent recovery, affected the chances of the low-skilled on the labour market much more, and *Figure 5* presumably reflects this. The high-skilled enjoyed almost full employment even at the trough of the business cycle, and growth for this group was probably halted by their supply: much more high-skilled workers were needed during the recovery than there were in Hungary, and the intense demand for such experts boosted their wages. However, there were many unemployed among low-skilled workers who could be employed without significantly increasing their wages.

Between 2000 and 2016, the wage and employment shares changed by occupation very differently than in the 1990s (*Figure 6*): the labour market became highly polarised, i.e. the share of both low- and high-skilled jobs increased dramatically at the expense of average earners. However, the behaviour of wages was completely different from that seen in the US, because their growth rate was inversely proportional to initial wages. The lower the initial wage, the higher the wage growth.[15] Therefore the Hungarian labour market became polarised without the polarisation of wages, and inequality declined at the same time.[16] The next subchapter seeks to provide an explanation for this behaviour.

[15] Underdeclared work may paint a more varied picture, as with that employees are officially paid the minimum wage while in reality their earnings are higher. Since the minimum wage was low at the beginning of the period, the income of low-earning employees is likely to have grown less in the period relative to high-skilled and high-earning employees, who were not affected, even indirectly, by changes in the minimum wage.

[16] One possible issue might be that the Great Recession was in the middle of the period under review, and *Figure 6* may reflect the effects of that. Nevertheless, this is not very likely. *Köllő* (*2011*) analyses the short-term impact of the crisis and finds that it did not affect inequality much.

Figure 6
Change in employment shares and wages, 2000–2016



Note: N = 2,757,663. The upper panel shows the change in the share of occupations in total employment between 2000 and 2016, as a function of where the average median wage of the occupations fell within the 2000 wage distribution. The lower panel shows the average wage growth of occupations between 2000 and 2016, as a function of where the average median wage of the occupations fell within the 2000 wage distribution. Occupations are defined at the level of 3-digit ISCO codes. Log wages are used. The figure was prepared using locally weighted regression.

Finally, let us consider how the presence of the large occupational groups changed on the labour market. The green bars in *Figure 7* show the changes in employment shares in the 1990s, while the blue bars show the changes in the 2000s among service workers, skilled labourers, retail staff, office staff, high-skilled occupations and managers.[17] In the 1990s, the share of skilled labourers is shown to have increased considerably, whereas the share of office staff and managers decreased. This coincides with the appearance of large multinational companies in Hungary, a majority of which operate in manufacturing. Conversely, in 2000–2016 there was a major increase in the share of high-skilled and service occupations, whereas that of skilled labourers dropped, which is consistent with the polarisation of the labour market.

Figure 7
Change in employment shares by large occupation groups, 1994–2000 and 2000–2016

Note: N = 2,757,663. The figure shows the change in the share of large occupation groups on the labour market in 1994–2000 and 2000–2016. The occupation groups comprise the following 2-digit ISCO codes: low-skilled services (90, 84, 52–53), skilled labourer (70, 81, 82, 83); retail worker (51–52), office staff (40), professional (20, 30), manager (10).

Polarisation of employment, therefore, took place in the 2000s, but it was not coupled with wage polarization, as wage growth was inversely proportional to the initial wage. Hungarian companies used the new production technologies, which transformed the composition of occupations: the share of routine jobs diminished. However, wages did not reflect the change in demand. In the following, an explanation is sought for why labour market polarisation occurred only in employment shares and not at the level of wages.

[17] The classification of occupation groups by ISCO codes is shown in the notes to the figure.

There are two possible mechanisms that influenced wage inequality after 2000. One is the rise in the minimum wage, while the other is the expansion in higher education. As can be seen in *Figure 8*, the minimum wage was low relative to average earnings in the 1990s (*Hungarian Central Statistical Office, website*). To address this, the government doubled the minimum wage in 2001–2002, after which it subsequently fell again relative to the average wage. However, it was raised again substantially between 2009 and 2012.[18] Comparing the changes in the minimum wage to wage growth in *Figures 1 and 2*, it is clear that the wages of the lowest earners increased significantly in these two periods. To see how much wages changed in the period when the minimum wage did not increase significantly, a wage polarisation figure is prepared for the period when the minimum wage did not rise (2002–2011). The wage of low-paying occupations lagged behind average-earning jobs in that period (*Figure 9*). Therefore, the considerable increase in the minimum wage contributed to the fact that earnings in low-wage occupations grew more than earnings in other jobs.

Figure 8
Ratio of the minimum wage and the average wage

Note: The figure shows the proportion of the minimum wage to gross average earnings in percentage terms.

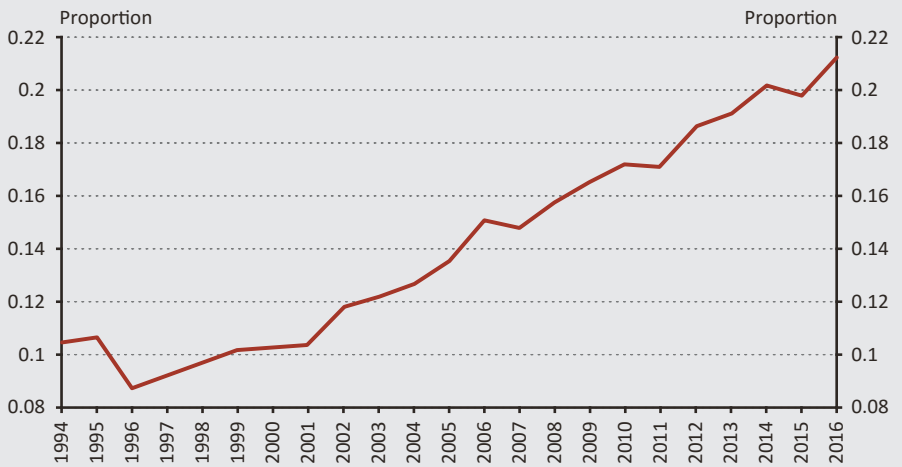
[18] The large number of studies that analyse the impact of the minimum wage on employment of the low-skilled find mostly zero or a small negative impact (*Card – Krueger 1995*), although some authors believe that the negative effects are not negligible (*Neumark et al. 2014*). In their analysis of the minimum wage increase of 2001–2002 in Hungary, *Harasztosi and Lindner* (*2017*) found no negative employment effects. The same change was also analysed by *Kertesi and Köllő* (*2003*), who, however, did find substantial short-term effects.

Figure 9
Wage growth, 2002–2011

Note: N = 2,757,663. The figure shows the average wage growth of occupations between 2002 and 2011, as a function of where the average median wage of the occupations fell within the 2002 wage distribution. Occupations are defined at the level of 3-digit ISCO codes. Log wages are used. The figure was prepared using locally weighted regression.

The other process reduced the growth rate of high wages. The expansion in higher education in Hungary took place at a very rapid rate and radically changed the share of workers on the labour market with a college or university degree. *Figure 10* shows the proportion of graduates on the labour market, which was 9–10 per cent at the beginning of the period studied. This did not change much in the 1990s, but the share of graduates doubled after 2000. According to a market model, relative wage growth (in this case the wage advantage of skilled workers relative to the unskilled) is determined by the size of supply and demand. In the following, we formalise this based on the methodology of *Autor et al.* (*1998*).

Figure 10
Expansion of higher education in Hungary



Note: N = 2,757,663. The figure shows the ratio of college and university graduates relative to all workers.

Two types of workers are used: the skilled (measured by the number of graduates) and the unskilled (those with at most a secondary school diploma). We note their numbers by N_1 and N_2, and their average wage by w_1 and w_2. The relative supply of graduates is:

$$S = \log(N_1/N_2). \tag{3}$$

To quantify relative demand, we assume a CES global production function, and the two types of workers produce the final product Q:

$$Q = [\alpha(A_1N_1)^{(\sigma-1)/\sigma} + (1-\alpha)(A_2N_2)^{(\sigma-1)/\sigma}]^{\sigma/(\sigma-1)}, \tag{4}$$

where α, A_1, A_2 are the parameters of the technology used, and σ is the elasticity of substitution between skilled and unskilled workers. If technological progress does not change the productivity of the two groups of workers, A_1/A_2 and α are stable. If the productivity of skilled workers increases relative to the unskilled, A_1/A_2 or α rises.

Assuming that workers' wage equals their marginal product, the derivative of the production function with respect to N_1 and N_2 yields the relative wage of skilled and unskilled workers:

$$\log(w_1/w_2) = 1/\sigma\,[D - \log(N_1/N_2)], \tag{5}$$

where $\log(N_1/N_2)$ equals the relative supply of the two worker categories, and D is a measure of relative demand, which depends solely on the technological parameters A_1, A_2, σ and α. The greater D is, the larger companies' relative demand for skilled workers. Equation (5) can be used to express relative demand:

$$D = \log [(w_1N_1)/(w_2N_2)] + (\sigma - 1) \log [w_1/w_2]. \quad (6)$$

Both the supply in Expression (3) and the demand determined in Expression (6) can be calculated based on the data. In line with the literature, σ is attributed a value of 1.4, but similar results are derived for other values (e.g. 1 and 2). *Table 2* shows the calculated relative wages as well as the changes in relative supply and demand for five-year periods as well as the 1990s and the 2000s.[19] The relative supply of skilled workers increased by merely 4.1 per cent relative to those with at most a secondary school diploma between 1995 and 2000. However, this trend changed in the 2000s when the students that enrolled to colleges and universities after the political transition entered the labour market. Relative supply increased by 33 log points in the next five-year period. Between 2005 and 2010, the growth rate of relative supply diminished somewhat, to 25 log points, and finally, in the last five-year period, it declined further, to 22 log points.

Demand followed a different path. In the 1990s, the relative demand for skilled workers increased dramatically (by 31 log points), however, this rate steadily declined in 2000–2015. It increased by 22–24 log points in the first two periods, and by 11 in the last.

The comparison of the relative demand and supply shows that relative demand grew much more than relative supply in the 1990s. However, after the turn of the millennium, the further expansion of demand could not offset the tremendous growth in supply, which is reflected in wage dynamics. The graduate wage premium spiked between 1995 and 2000 (by 19 log points), but it diminished steadily in the subsequent period, mostly when relative supply increased.

The table also presents relative demand and supply figures for the two large periods analysed in the previous section. Relative supply stagnated between 1995 and 2000, relative demand increased sharply in favour of skilled workers, and the relative wage expanded substantially. In 2000–2015, the opposite occurred. The large supply growth could not be offset by the increasing demand, which led to a 17-log point drop in the graduate wage premium. Over the whole period, the wage premium increased by merely 2 log points.

[19] The annual data exhibit large volatility, and therefore the amounts in the table equal the average of the given year and years directly preceding and following it ("2015" indicates the average of 2014–2016).

Table 2
Changes in relative supply, relative demand and relative wages

Period	Relative supply	Relative demand	Relative wage
1995–2000	0.041	0.309	0.191
2000–2005	0.325	0.240	–0.061
2005–2010	0.250	0.217	–0.024
2010–2015	0.227	0.105	–0.087
2000–2015	0.803	0.562	–0.172
1995–2015	0.840	0.872	0.019

Note: N = 2,757,663. The table presents the change in the relative supply, demand and wage difference between graduates and those working with at most a secondary school diploma for the period shown in Column 1. Relative supply equals the log difference between the number of skilled and unskilled workers. Relative demand follows from the maximisation of a CES production function, where the inputs are the number of skilled and unskilled workers (see Expression [6] in the text). The wage difference equals the log difference between the average wage of skilled and unskilled workers. The annual amounts equal the average of the given year and the years directly preceding and following it.

5. Conclusions

This study analysed wage inequality in Hungary over the past 20 years. In the 1990s, Hungary mirrored the labour market wage changes in the United States ten years earlier. This changed in the next decade when the share of the various occupations varied as in developed countries: labour market polarisation occurred, i.e. the share of low-skilled and high-skilled jobs increased, while the proportion of medium-skilled jobs dropped. However, wages did not become polarised. The higher the wages in an occupation in 2000, the less they increased in the next 15 years. This can be attributed to two factors: first, the government raised the minimum wage twice during the period, thereby pushing up the earnings of the low-skilled. Second, the expansion in higher education in the 1990s, which bore fruit around 2000, increased the share of college and university graduates within the labour force, which had a negative impact on the graduate wage premium. As a result of the substantial increase in inequality in the 1990s and the balancing developments of the 2000s, wage inequality was unchanged over the whole period: in 2016 the graduate wage premium was close to what it had been in 1994.

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The Transparency of Credit Ratings – Reconstruction of Hungary's Sovereign Rating*

Gábor Hajnal – Nóra Szűcs

After the crisis that commenced in 2008, the observed procyclicality and the slow responses of the credit rating institutions to credit risk events cast strong doubts on the justification of the major role of the credit rating agencies in the financial markets and the reliability of their ratings. Therefore, this case study examines the extent to which the reconstruction of the foreign currency denominated debt ratings of Hungary, as a sovereign issuer, can be implemented accurately under the present transparency of the credit rating processes, i.e. to what degree the indicative rating range, obtained on the basis of the credit rating agencies' methodology, explains the actual credit rating. Using the publicly available methodological documentation of Moody's, Standard and Poor's and Fitch Ratings, we performed the model calculation of Hungary's credit rating at the three institutions. Although the level of transparency of the three rating agencies has improved, ratings for Hungary could only be reconstructed with some uncertainty. Major progress could only be achieved if the rating agencies calculated the input indicators of the model from known data sources with known calculation at all times.

Journal of Economic Literature (JEL) codes: F34, G15, G24

Keywords: credit rating agency, sovereign credit rating, credit rating methodology

1. Introduction

Structured credit products, which were downgraded after the financial crisis that erupted in 2008, and the downgrading of sovereign issuers facing severe funding difficulties as a result of the crisis brought the activity of the credit rating agencies into the focus of experts. With regard to the development of the crisis, many questioned the justification of the major role of credit rating agencies in the market, as well as the reliability of their ratings (*Benmelech – Dlugosz 2009; Crotty 2009; White 2010;*

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

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Iyengar 2012). In December 2008, structured products accounted for roughly 35 per cent of the US bond market, with a magnitude of USD 10^{13}, more than half of which received AAA rating from Moody's; then one third of them was shortly subject to significant downgrading (*Benmelech – Dlugosz 2009*). Such events signalled that this was a complex problem. On the one hand, it was known already before the crisis that the business model of the rating agencies generates conflicts of interest, where the rated entity is the user of the rating service, i.e. the source of the rating agency's revenues (*O'Sullivan et al. 2012*). At the same time, the crisis made it clear: the models of the rating agencies also contain methodological errors *(Utzig 2010).* With a view to improving the quality of the credit ratings and mitigating the uncertainties surrounding the activity of the rating agencies, the regulatory authorities significantly expanded the regulation of the sector (*IMF 2010*; *European Council 2009, 2011*). Owing to these regulatory efforts, the credit rating agencies have rendered their decision-making processes more transparent and published more detailed methodologies than before. In addition, in the rating action reports accompanying their credit rating decisions, they publish several pieces of information that reveal the criteria and economic developments they consider upon the classification of issuers.

This paper, as a case study focusing on Hungary, examines the accuracy – with the present transparency of the credit rating processes – of the reconstruction of the ratings of Hungary, as a sovereign issuer, i.e. to what extent the indicative rating range, obtained on the basis of the credit rating agencies' methodological documentation, explains the actual credit rating. Due to length constraints, emphasising the character of a case study, we perform the analysis only for one of Hungary's ratings, i.e. for foreign currency-denominated debt. This choice ensures the comparison of our conclusions with similar results in the Hungarian technical literature. (See later in more detail the comments on the 2016 work of *Ligeti – Szőrfi*.)

To answer the research question, on the one hand we review in detail the publicly available methodological documentation of the three dominant credit rating agencies, i.e. Moody's, Standard and Poor's, and Fitch Ratings, and then, based on the methodological documentation, we examine the accuracy of the possible modelling of Hungary's sovereign debt rating at the three institutions. In addition, the research takes account of the credit rating reports published following the respective review by the institutions, the information content of which also contributes to the more accurate model calculation of the real credit ratings. We performed the reconstruction of the model calculation for all three institutions for the date of the latest available credit rating review, which was 4 November 2016 in the case of Moody's, 16 February 2018 in the case of S&P and 9 March 2018 in the case of Fitch. This paper solely examines the extent to which the ratings are reconstructible accurately, and we do not examine the "correctness" and forecasting capacity of the models. Beyond length constraints, such an analysis would be limited

by the fact that the possibility of reconstructing the model of the three rating agencies – as is seen later – remains still limited.

The colleagues of the Magyar Nemzeti Bank have already dealt with the methodological issues of the credit ratings and the reconstruction thereof with regard to Hungary within the framework of a series of technical articles; however, since then more detailed methodological documentation has been published, which calls for a repeated analysis and facilitates the understanding of the credit rating agencies' decision-making processes even more accurately. This is particularly true for the methodological documentation of Fitch Ratings, which had not yet published a methodology suitable for reconstruction at the time when the earlier papers were written; however, the present description is already detailed enough for us to attempt a reproduction of the rating. In addition to the foregoing, we deem it important to emphasise that this paper relies substantially on the results of the relevant research published earlier.

In the following, we first briefly describe the role of credit rating institutions in the financial markets, and then review the preliminaries of our research in the literature. Thereafter, we describe the general methodology of the credit rating of sovereign issuers, followed by a review of the three rating agencies' methodologies. Finally, we model the calculation of Hungary's credit rating at the three institutions. The paper is closed with a summary and conclusion.

2. Functions of the credit rating agencies in the financial markets

In its October 2010 "Global Financial Stability Report", the International Monetary Fund (IMF) paid special attention to the issues of credit rating institutions affecting financial stability, and – with reference to the relevant international literature – discussed the fundamental functions of credit rating agencies in detail. According to the IMF paper, credit rating agencies have essentially three functions in the financial markets: (1) to provide information on the entities they rate; (2) to encourage borrowers to take corrective measures; and (3) to provide issuers with certificates (*IMF 2010*). In the following paragraphs, we briefly review the performance of these three functions.

In the case of external financing, e.g. borrowing, there is an information asymmetry between the party in need of financing and the party that provides the financing. The party providing the external financing does not know in full the potential success of the project and activity to be financed, or the efforts of the party raising the capital as to whether it focuses on the maximisation of the full value of the project or only on its private benefit. This information asymmetry gives way to moral hazard, i.e. the financed project owner becomes inclined to maximise its own utility in the absence of proper incentives. Accordingly, in a lending situation, credit rationing can be observed:

projects with positive net present value are either not implemented at all, or they are implemented in a smaller than optimal volume (*Tirole 2006*).

The rather complex risk appearing in a lending situation is generally referred to as credit risk. *Jorion* (*1999*) refers to it as the risk when the borrower fails to fulfil the interest due and/or principal instalment in part or in full, or does not fulfil on the due date. He also considers it to the part of the credit risk when the probability of these events increases. MNB Recommendation 1/2017 states as follows: "Credit risk is a risk, jeopardising the profitability and capital position, arising from partial or complete non-fulfilment (or from fulfilment not in compliance with the conditions of the contract) of the contracting parties' obligation, i.e. from the partial or complete non-fulfilment of (on-balance sheet or off-balance sheet) obligations outstanding vis-à-vis the financial institution." (*MNB 2017:3*). Of the credit risk types detailed in the MNB Recommendation, sovereign risk[1] is the one that is forecasted by the rating agencies' sovereign models. Non-fulfilment by sovereign issuers is closely related to the notion of sovereign default, a topic which we only mention briefly due to length constraints. For example, *Vidovics-Dancs* (*2013, 2014, 2015*) deals with this topic in her papers. We only cite one definition of sovereign default by the author: "sovereign default is usually defined as the failure of a sovereign state to discharge its payment obligations related to its credit liability or discharging it not in accordance with the original conditions, and thereby causing a loss to the lender" (*Vidovics-Dancs 2014:264*). This definition corresponds to the definitions used in the international literature, but more importantly it also corresponds to the approach of Fitch, S&P and Moody's.

This is the point where the credit rating agencies have a role in a lending situation. The market assumes that the rating agencies usually have an informational advantage compared to an average investor in the assessment of the payment ability and payment willingness of the inspected issuer, and of its credit risk resulting from these two parameters (*Melnick 2008*). Since the rating agencies primarily measure the relative risk of the non-fulfilment of the borrowers' financial obligations, their primary role in the financial markets is to provide accurate and reliable information, thereby mitigating the informational asymmetry existing at the two ends of the credit relation (*IMF 2010; Ligeti – Szőrfi 2016*). Elimination of the informational asymmetry is mutually advantageous for lenders and borrowers: lenders can invest with a more accurate knowledge of the credit risk, while borrowers can raise funds at lower costs (*Fennel – Medvedev 2011; Ligeti – Szőrfi 2016*). Thus, the information provided by the rating agencies may also increase the number of potential borrowers, which contributes to the establishment of liquid markets (*IMF 2010*). All of this leads to a decrease in credit rationing, the projects not financed

[1] "it is a sub-type of country risk, and means the risk arising from the default of the country vis-à-vis which the financial organisation has an exposure" (*MNB 2017:3*)

or financed at higher cost earlier can be implemented or realised at lower cost, i.e. the activity of the rating agencies also enhances social welfare (*Tirole 2006*).

Another major role of the rating agencies manifests itself in a kind of monitoring activity; with this they motivate the borrower to perform adjustments with a view to preventing downgrading (*IMF 2010; Ligeti – Szőrfi 2016*). The means of this include the warnings related to potential downgrading, communicated in the credit rating review. A positive credit rating assessment is of crucial importance, because a potential downgrade may generate additional negative impacts for the borrowers, since most institutional investors are not allowed by regulations to keep low-graded securities in their portfolio (*IMF 2010*).

Although the positive effects of the rating agencies' monitoring activity are unquestionable, potential downgrades may entail spillover effects, which can also destabilise financial markets (*IMF 2010*). This problem stems from the rating agencies' third basic function, i.e. from the issue of certificates, since rating categories have now become integral parts of a number of regulatory requirements and financial contracts (*IMF 2010*; *Ligeti – Szőrfi 2016*). *Utzig* (*2010*) also emphasises that the use of credit ratings for regulatory purposes makes a huge contribution to the procyclical effect of ratings.

However, the rating agencies perform the aforementioned functions in the knowledge of the occasionally contradictory requirements of the stakeholders. The most evident requirement is that the models of the rating agencies should be representative of the issuer and the securities, and provide a good forecast of credit risk events. In addition to the precise description of the credit risk related to the issuer/securities, stability is also an issue: how "sensitive" a good model should be to the momentary, potentially temporary, changes in the circumstances of the rated entity. Timeliness is also in important issue, but perhaps it can be handled better than the previous one. Accordingly, accuracy, stability and timeliness are all justified requirements concerning the ratings; however, from time to time they can only be enforced at the expense of each other (*Ligeti – Szőrfi 2016*). Let us consider market participants' expectations with regard to the stability of the ratings, as an example. The stability of ratings may be a realistic requirement of investors making decisions on the basis of such ratings, since it would be expensive to restructure their portfolio upon each minor market movement. The institutions in charge of the oversight of the market, traditionally also deem the stability of the ratings to be advantageous, since a rating that responds quickly to negative market movements puts additional pressure on the market. The interest of the issuers in a stable rating is self-evident; for them each change in the rating means a new price negotiation with the providers of external finance. In addition, if the rating changes too often, it also questions the reliability of the rating agency. Based on all of these motivations, the stability of the ratings may be an acceptable objective for all stakeholders. Thus, this simple example also illustrates well that even under normal market circumstances, rating

agencies face a number of expectations, pondering which they have to perform, as far as possible, objective rating over and over again (*Melnick 2008*).

However, after the 2007–2008 crisis, investors started to voice their concerns more loudly that the rating agencies follow market changes too slowly – many of them blamed this for "surprises" such as the Enron case, which had not been forecasted by any downgrade. With a view to ensuring the stability of the ratings, the rating agencies used the through-the-cycle approach, putting more emphasis on the long-term components of the credit risk. In addition, they also treated the migration of the rated issuers and securities prudently. All of this resulted in severe underestimation of the short-term credit risk (*Melnick 2008*).

Compared to the ordinary condition of the markets, the crisis focused attention on additional problems inherent in the system. The moral hazard faced by the rating agencies was also previously known, and its role in the fact that the rating did not reflect the true financial situation – e.g. in the case of Enron – was not insignificant. *O'Sullivan et al.* (*2012*) report that the business model of the rating agencies fundamentally changed in the 1970s. Previously, the revenue of rating agencies came solely from investors for performing specific ratings. However, starting from the 1970s issuers could also apply for rating – as a paid service – for the securities they intended to issue. Since a better rating means cheaper financing, for which it is worthwhile to pay a higher fee to the rating agency, moral hazard appeared in the rating situation (*O'Sullivan et al. 2012*). This moral hazard is particularly strong for rating agencies facing fierce competition in their own market, if a substantial portion of their revenues is concentrated at a small number of issuers. This is exactly what happened in the case of the ill-famed mortgage structure products in the crisis (*Langohr – Langohr 2010*).

Thus, it is understandable that the regulation of rating agencies and oversight of their activity became a requirement of market participants after the crisis, the results of which we have already mentioned (*IMF 2010; European Council 2009, 2011*). The transparency of the rating methodology bears special importance in strengthening investor confidence. In this paper, we examine the transparency of the methodology by assessing the degree to which the methodological documentation of the rating agencies make it possible to reproduce the classification and specific rating determined by the agencies. Naturally, transparency helps the users of the ratings in assessing the "correctness" of the models – regardless of whether we talk about the "correctness" of accuracy, stability or timeliness – but the transparency criterion we have selected, i.e. the possibility of accurate reconstruction of specific ratings, does not characterise any of these criteria.

In the literature, the antecedents related most closely to our paper are the results of *Ligeti – Szőrfi* (*2016*). They measure transparency in a more detailed manner than this paper; in addition to the reconstructibility of the specific classification, they also

examine the reconstructibility of the model itself. The criteria of the authors include: "the extent to which the indicators considered are explicitly explained; availability of scales applied for the evaluation of the indicators; availability of the weighting assigned to individual dimensions; the extent to which the values calculated for individual indicators are available; availability of an indication by the agency regarding the current evaluation of individual dimensions." (*Ligeti – Szőrfi 2016:20*). Based on the methodological documentation available in 2016, they performed an analysis for several countries, including Hungary. They obtained the following results: in the case of S&P, they clearly managed to reproduce the indicative rating range, whereas when using the Moody's documentation supplementary assumptions had to be made. In the case of Fitch, the published methodology included no information on the weighting and scales, and thus the authors did not even attempt to make an estimate.

Apart from the work of co-authors *Ligeti – Szőrfi* (*2016*), we find literature relevant for our paper mainly in respect of sovereign credit rating models. Very rich literature is available on the topic of quantitative economic variables explaining the ratings. Typically, the indicators with explanatory power include GDP per capita, real GDP growth, the level of external debt, the level of government debt, the fiscal balance, GDP growth, inflation, foreign exchange reserves, economic development and the number of years elapsed since the last default (*Bruha et al. 2017; Afonso et al. 2011*). In several cases, the authors also test the forecasting power of these models, i.e. they also calculate the future ratings (revised rating) with their models. This trend in the technical literature can be observed both before and after the crisis, e.g. Afonso published several papers on this topic (*Afonso 2003; Afonso et al. 2012; Afonso et al. 2011*) and the earlier work of *Bissoondoyal-Bheenick* (*2005*) is also available. The paper written at the beginning of 2017 by the colleagues of the European Central Bank also mentions that since the rating agencies do not publish their models, a large part of the technical literature focuses on the construction of models, which return a rating identical to that issued by the rating agencies. The authors of the paper cite several research studies – from Bruha et al., through the work of Mora in 2006[2] to Gaillard's[3] results in 2014 – as examples (*Bruha et al. 2017*).

3. The methodology of sovereign credit rating

Since *Ligeti – Szőrfi* (*2016*) have already analysed the methodological issues of the rating agencies in detail, upon describing the methodology of sovereign credit rating, we partially rely on the information content of the cited research. Our objective is that this paper should be the partial continuation of the Ligeti–Szőrfi paper, and thus – similarly to them – by the sovereign credit rating of Hungary we also mean the credit risk rating of the long-term, foreign currency-denominated

[2] Mora, N. (2006): *Sovereign credit ratings: Guilty beyond reasonable doubt?* Journal of Banking & Finance, 30(7): pp. 2041–2062.
[3] Gaillard, N. (2014): *What Is the Value of Sovereign Ratings?* German Economic Review, 15(1): pp. 208–224.

debt of Hungary (as an issuer) (*Ligeti – Szőrfi 2016*), but we limit the analysis to Hungary and do not extend it to the debt of other European countries.

A sovereign credit rating is essentially an opinion formulated on the loan repayment capacity and willingness of the respective state (*IMF 2010*). A sovereign state can be deemed insolvent if it is unable to discharge its principal or interest payment obligations towards the investors on the due date (*IMF 2010*). Credit rating agencies rank the default risk on a scale, where the sovereign states allocated to the same category show similar credit risk (*Ligeti – Szőrfi 2016*). The credit risk classifications of the three largest rating agencies are illustrated by *Figure 1*. As shown, the sovereign issuers with the best rating receive three "As", while those with the worst rating receive a "D" rating on the credit rating scale. In addition, the rating agencies indicate the probability of modifying the current rating by the negative, stable and positive outlook and the watch list categories (*Ligeti – Szőrfi 2016*).

Figure 1
Credit rating classifications used by Fitch Ratings, Standard &Poor's and Moody's

Fitch Ratings	Standard &Poor's	Moody's
AAA	AAA	Aaa
AA+	AA+	Aa1
AA	AA	Aa2
AA–	AA–	Aa3
A+	A+	A1
A	A	A2
A–	A–	A3
BBB+	BBB+	Baa1
BBB	BBB	Baa2
BBB–	BBB–	Baa3
BB+	BB+	Ba1
BB	BB	Ba2
BB–	BB–	Ba3
B+	B+	B1
B	B	B2
B–	B–	B3
CCC+	CCC+	Caa1
CCC	CCC	Caa2
CCC–	CCC–	Caa3
CC	CC	Ca
C	C	C
D	D	D

Source: Moody's (2016a), Fitch (2017a), S&P (2017a)

The rating framework for the riskiness of the sovereign issuers is provided by the model detailed in the methodological documentation of the credit rating agencies. The big three rating agencies typically allocate the indicators considered for the purposes of sovereign rating to four or five groups of variables, i.e. dimensions. Most of the dimensions group distinct variables which are similar in terms of magnitude at all three rating agencies. All three institutions use the macro economy and general government dimensions, while institutional efficiency is used in the model of two actors, i.e. Moody's and S&P. External balance indicators are used by two rating agencies (Fitch and S&P). S&P, contrary to the other two institutions, assesses the effectiveness and flexibility of the sovereigns' monetary policy in a separate dimension. Moody's and Fitch created a separate dimension for event risk and structural features, respectively.

The assessment of the individual dimensions is based on certain key variables, which are not necessarily identical at the three institutions, and then the model may modify the initial score returned by the assessment by considering additional variables. The indicators examined by the rating agencies essentially capture identical economic processes; however, their calculation methodology and weighting within the dimension vary by institution. Furthermore, in respect of the credit ratings it should be noted that although the actual credit ratings usually fall within the indicative rating level obtained by applying the methodological model, the rating committee may decide, from time to time, on a rating other than that proposed by the model (*Ligeti – Szőrfi 2016*).

Another important factor related to the credit rating methodology is that the institutions, with a view to avoiding procyclicality, consider multi-year averages for certain variables, obtained on the basis of historic, current year and forecast values (*IMF 2010*; *Ligeti – Szőrfi 2016*). This calculation method ensures that the ratings reflect the fundamental process of the economy rather than responding to fluctuations in business cycles (*IMF 2010*; *Ligeti – Szőrfi 2016*).

4. Special features in the methodology of the three rating agencies

In the following part of the paper, we discuss the special features of the methodological documentation of Moody's, S&P and Fitch, and present the content of the latest methodological documentation of all three institutions, prevailing at the time of writing this paper.

4.1. Special features of the Moody's methodology

Moody's assesses sovereign credit risk in four dimensions. The variables considered in these four dimensions are presented in *Annex 1* at the end of the paper. The Moody's model, in line with the general credit rating methodology, fine-tunes the initial scores obtained on the basis of the key variables by considering additional

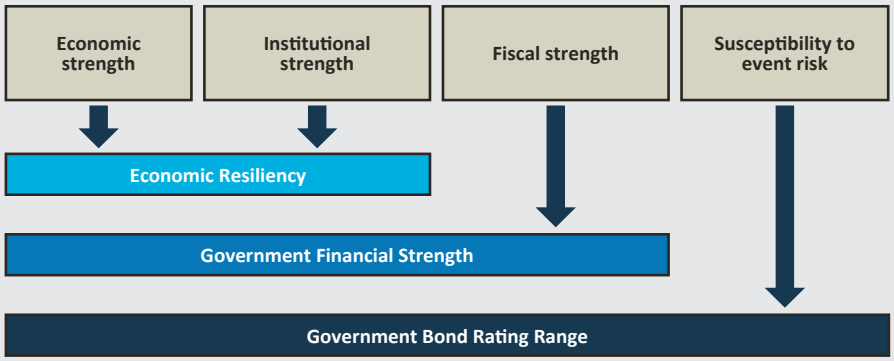
variables. The prevailing methodology of the institution contains almost all information necessary for accurate model calculation: the variables determining the basic score of the individual dimension, their weight within the dimension and the scales underlying the assessment are all known. At the same time, transparency is not full, since there is no evaluation scale for certain indicators modifying the initial score of the individual dimensions, and some individual variables are not expressed by a specific indicator. Examples of these include the indicator measuring the strength of the banking sector (BCA), which is a multi-component indicator of Moody's, partially reflecting its subjective value judgement (*Moody's 2016a*).

The evaluation of three of the four dimensions is performed on the basis of 5 to 6 key variables, depending on the dimension, and then the model modifies the results obtained using additional variables. The score of the fourth dimension – susceptibility to event risk – is generated using twelve key variables and is not influenced by additional variables. Most of the indicators considered by Moody's are quantitative: for some of these the model calculates the ten-year average of historic and forecast values, but there are also less quantifiable variables, particularly in the dimensions institutional strength and susceptibility to event risk (*Moody's 2016a*).

The individual variables are evaluated on specific scales ranging from 1 to 15, based on which the methodology of the institution allocates the variables to fifteen different categories. The category classifications are from "VH+" representing the highest grade, to "VL–" being the lowest one. Following categorisation, the methodology of Moody's allocates a midpoint to each variable suitable for its category. The weighting of the variables within the dimension is performed in accordance with the midpoint obtained on the basis of the categorisation. This ensures that the variables belonging to the same category take the same value upon weighting. Naturally, the weighting of the variables may differ, depending on their importance within the dimension. The model aggregates the values obtained through the weighting within each dimension, as a result of which the scores of the dimensions are obtained. Thereafter, the model ranks the scores of the dimension – similarly to the evaluation of the individual variables – on a scale from 1 to 15, based on which it allocates each dimension to one of the fifteen categories (*Moody's 2016a*).

After the allocation of the individual dimensions to categories, the model combines the four dimensions in the following way and sequence (*Figure 2*): The model first aggregates the economic strength and institutional strength dimensions, applying a symmetric weighting for the two. Combining the two dimensions results in the economic resiliency profile. In the next step, the model combines the economic resiliency profile with the fiscal strength dimension, resulting in the government financial strength profile. As the last step, the government financial strength profile, obtained from the aggregation of the previous three dimensions, and the susceptibility to event risk dimension are combined, which designates the midpoint of the three-notch rating range proposed by the model (*Moody's 2016a*).

Figure 2
Schematic chart of the aggregation of the dimensions included in the Moody's methodology



Source: Based on Moody's (2016a)

Another special methodological feature of Moody's is that the assessment of external balance developments is performed in a special manner. In addition to the indicators capturing external vulnerability, in this dimension (susceptibility to event risk), Moody's also considers indicators capturing political risk, the liquidity position of the general government and the vulnerability of the banking sector. The score of the dimension is also determined in a different way than usual: the final score of the variable group is obtained based on the evaluation of the indicators of the area deemed to represent the highest risk of the four tested areas, i.e. the one with the highest score (*Moody's 2016a*).

4.2. Special features of the Standard & Poor's methodology

S&P assesses sovereign credit risk using five dimensions. The variables considered in the five dimensions are included in *Annex 2* at the end of the paper. The evaluation of three of the five dimensions – economic, fiscal and external assessment – is performed on the basis of well quantifiable data, while the model evaluates the other two dimensions – institutional and monetary policy assessment – typically on the basis of qualitative information (*S&P 2017a*). Reconstruction of the latter dimensions is substantially facilitated by the fact that in its latest credit rating reports the institution also discloses the score of the individual dimensions, and thus the score values of the dimensions can be determined accurately by also considering the textual description in the report.

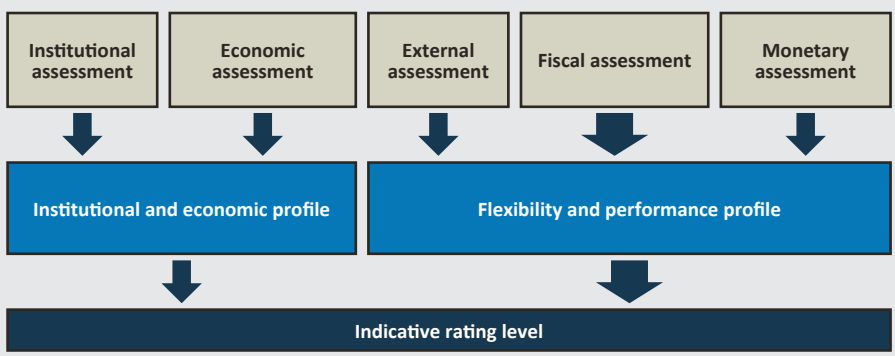
In the case of the economic, fiscal and external dimensions, the institution's methodology contains the variables that determine the initial score of the dimensions, as well as the scales underlying the evaluation, which are of great help for the precise reconstruction of the evaluation of the dimensions. The evaluation of the institutional dimension is performed entirely on a subjective basis:

neither the methodology of the institution nor the credit rating reports specify any indicators that substantiate the score for this dimension. The methodology divides the evaluation of the monetary policy dimension into two parts: it assesses the exchange rate regime pursued by the sovereign issuer on the one hand, and the credibility and effectiveness of its monetary policy on the other (*S&P 2017a*).

S&P evaluates all of the key variables on an individual scale from 1 to 6. The score of the five dimensions is obtained on the basis of the score of the variable belonging to the individual dimensions. Subsequently, considering additional criteria, the S&P model can modify the initial scores obtained on the basis of the key variables by a maximum of two or three scores, depending on the dimension. The methodological documentation contains the modifying factors considered within the individual dimensions, as well as the conditions to be fulfilled to ensure that the amended model returns the originally obtained score. For example, one of the areas underlying the evaluation of the fiscal dimension is evaluated one score lower, if a predetermined level is exceeded by at least two of the foreign currency ratios for government debt, the government securities holding of non-residents, the sovereign exposure of the banking sector or the volatility of the debt service profile parameters (*S&P 2017a*).

In the case of S&P (*Figure 3*), the process of combining the dimensions is simpler than at Moody's. As a first step, the model combines the score of the institutional and economic dimensions, the arithmetic average of which designates the score of the institutional and economic profile. In the next step, the model calculates the average of the scores of the fiscal, external and monetary policy dimensions, thereby obtaining the flexibility and performance profile. As the last step, the model takes the arithmetic average of the two profiles, which designates the midpoint of the three-notch rating range (*S&P 2017a*).

Figure 3
Schematic chart of the aggregation of the dimensions included in the S&P methodology



Source: Based on S&P (2017a)

4.3. Special features of the Fitch Ratings methodology

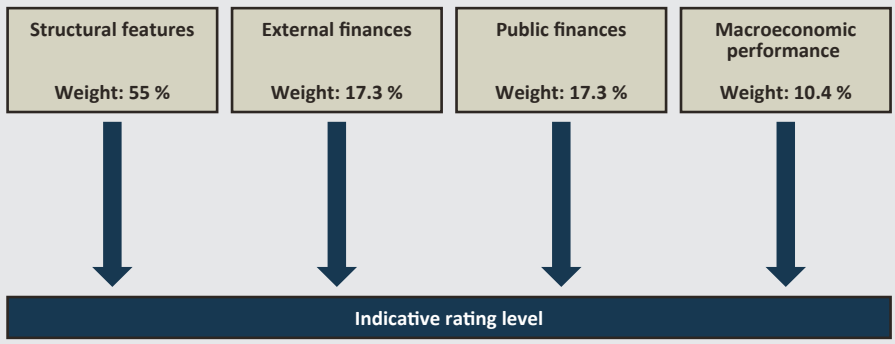
Similarly to Moody's, Fitch also evaluates the sovereign credit risk using four dimensions (*Annex 3*). In contrast to the other two dominant rating agencies, Fitch uses a multivariate regression model for the sovereign rating rather than predefined scales, based on which the methodology allocates weights to the individual variables (*Fitch 2017a*). The weights are defined objectively, solely on the basis of the regression model's coefficients, which also means that the institution regularly reviews the weights allocated to the variables and modifies them as necessary. The weights show what percentage of the variance of the rating is explained by the variance of the respective group of variables.

According to Fitch's latest analytical framework, the model rating is influenced to the highest degree (55 per cent) by the dimension containing the structural features of the economy. The second most important dimension is the group of variables capturing the external balance (external finances) and general government (public finance) developments, each with a weight of 17.3 per cent. This is followed by the dimension including the indicators describing macroeconomic performance, with a weight of 10.4 per cent. For half of the variables grouped within the dimensions, the model considers the average of the data calculated for the current year, the value of the previous year and the value estimated for the next year, but the institution does not publish regular information on the estimated data in its credit rating reports (*Fitch 2017a*). This means that when reconstructing the model calculations, we can rely on assumptions, at the most, in determining these values.

In the interests of making the rating calculated by the model more accurate, from time to time the institution also considers less quantifiable variables (qualitative overlay), which – based on a comparison with sovereign issuers with identical credit ratings (peer analysis) – may upgrade or the downgrade the rating of the sovereign issuer under review by as many as three grades (*Fitch 2017a*). In the report on the respective review, Fitch regularly mentions the modifying factors considered for the purpose of the rating, which may help reconstruct the model calculation more accurately.

The credit rating methodology of Fitch also differs from the analytical framework of the other two institutions in the sense that the model does not create different profiles after determining the scores of the individual groups of variables. The scores of the groups of variables are obtained as the sum of the product of the variables included therein and the regression coefficient belonging to them. Fitch also publishes the constant value of the regression model (intercept term). Accordingly, the rating is obtained as result of the published regression model (*Figure 4*), while the scores of the individual dimensions quantify the degree to which they contribute to the credit rating (*Fitch 2017a*).

Figure 4
Dimensions included in the Fitch methodology and their weights



Source: Based on Fitch (2017a)

5. Reconstruction of the model calculations of the three rating agencies

In the next part, we reconstruct the model calculations of the three credit rating agencies for Hungary. In all three cases, the reconstruction is performed for the date[4] of the latest available credit rating decision, in accordance with the methodological documentation valid at the time of the review. The values of the indicators used for the purpose of the model calculation are included, as mentioned before, in *Annexes 1, 2* and *3*.

Before presenting the results, it should be noted that the potential difference between the ratings obtained on the basis of the reconstruction of the model calculations and the real ratings maintained by the credit rating agencies may be attributable to three factors. On the one hand, the methodological documentations presented in the previous section are not fully transparent at any of the institutions. On the other hand, two of the three rating agencies do not publish information on all of data they consider, and thus the different result may be also attributable to the difference in the input data used. Naturally, for the purpose of the model calculation, we used the data sources specified in the methodological documentation whenever possible. Finally, in the methodological documentation, all three rating agencies point out that the rating committee may also approve a rating that differs somewhat from the result calculated by the model, and we were not able to take this into consideration based on the available information in the case of all institutions.

In an ideal case, reconstruction of the ratings is based on the knowledge of the methodologies, and the sources and accurate calculation of the used indicators.

[4] At the time of writing this paper, the date of the latest available credit rating review was 4 November 2016 in the case of Moody's, 16 February 2018 in the case of S&P and 9 March 2018 in the case of Fitch.

However, this higher level reconstruction – to a different degree at each institution – is not feasible: as shown in *Annexes 1* to *3*, there are some input data at each rating agency which cannot be determined from external sources independent of the institution. Thus, in this paper, we can attempt the reconstruction only at a lower level from the outset: i.e. the question is whether we can obtain the rating maintained by the institution by combining the publicly available inputs with the inputs included in the institution's reports, and by following the methodology. In the following, in several cases, it was found that even this methodological transparency is prejudiced or the preliminary result is overruled by the rating committee.

5.1. Reconstruction of the Moody's model calculation

Upon the assessment of the individual variables, Moody's uses the data and estimates of the International Monetary Fund (IMF), the European Commission (EC), the World Bank (WB), the Bank for International Settlements (BIS) and the national statistical offices (*Moody's 2015),* and thus we tried to use the same sources. At the same time, in the case of defining the values of certain indicators we were only able to rely on the Moody's credit rating report (*Annex 1*).

As presented in the previous section, Moody's assesses sovereign issuers using four groups of variables in the dimensions: economic strength, institutional strength, fiscal strength and susceptibility to event risk. We describe the result of the model calculation using these four dimensions and the evaluation of the profiles created from the dimensions.

In its credit rating report, Moody's allocated a "moderate level" classification to the rating of the economic resiliency profile, resulting from the combination of the economic strength and institutional strength dimensions (*Moody's 2016b*), which on the scale of fifteen under the Moody's analytical framework corresponds to one of the "M–", "M" or "M+" category classifications (*Moody's 2015*). Based on the methodological steps presented in the previous section, for the economic strength dimension, the determinant variables of which take the values indicated in *Annex 1*, our calculations returned a rating of "M", while for the institutional strength dimension we calculated a value of "H", and thus the economic resiliency profile created from the two dimensions was rated "H–", which differs from the "moderate level" rating included in the report.

As mentioned before, one of the reasons for the difference between Moody's results and our calculations could be that Moody's attached a different value to one or several variables determining the dimension as compared to the one presented in *Annex 1.* Thus, reconstruction of the input data presumably was not fully successful in the case of the first two dimensions. There may be an explanation for the reconstruction of the methodology, according to which Moody's believes, for example, that the qualitative indicators underlying the evaluation of institutional

strength[5] do not always provide a true view on the institutional and political situation of the sovereign issuers, and thus the rating committee may disregard those, as necessary (*Moody's 2015*). However, in this case we deem this unlikely, since the institution makes no reference whatsoever to this in the report on the upgrading.

According to our calculations, based on the key indicators, Moody's calculated a value of "H–" for the fiscal strength dimension, which received a negative adjustment of two categories[6] due to the level of the foreign currency ratio of government debt, and thus finally the dimension may have been rated "M". Accordingly, based on our calculations, the government financial strength profile, created by the aggregation of the economic resiliency profile and the fiscal strength dimension, received a rating of "M+".

According to our calculations, within the susceptibility to event risk dimension, the highest aggregated score was achieved by the indicators in the banking sector vulnerability area – i.e. the indicator measuring the strength of the banking sector (BCA), the total assets of banks as a percentage of GDP, and the loan-to-deposit ratio (*see Annex 1)* – and thus, due to the special definition of the dimension's score, the dimension's rating of "M+" was designated on the basis of the score for this area. The result of the aggregation of the government financial strength profile and the susceptibility to event risk dimension shows that upon the upgrading on 4 November 2016 the Moody's methodology designated the ranges of "Ba2" and "Baa3", and the "Ba1" range midpoint (*Figure 5*), which is one notch lower than the actual rating of "Baa3" maintained by the rating agency (*Moody's 2016b*).

Figure 5
Reconstruction of the November 2016 review by Moody's

Institutional strength	Economic strength			Economic Resiliency	Fiscal strength			
	M+	M	M–		M+	M	M–	
VH–	H	H	H–	H+	H	H	H	
H+	H	H–	H–	H	H–	H–	H–	
H	H–	H–	M+	H–	H–	M+	M+	
H–	H–	M+	M+	M+	M+	M+	M	
M+	M+	M+	M	M	M	M	M	

Susceptibility to Event Risk	Government Financial Strength							
	H+	H	H–	M+	M	M–	L+	L
	Aa3–A2	A1–A3	A2–Baa1	A3–Baa2	Baa1–Baa3	Baa2–Ba1	Baa3–Ba2	Ba1–Ba3
M–	A2	A3	Baa1	Baa3	Ba1	Ba2	Ba3	B1
M	A2	A3	Baa1	Baa3	Ba1	Ba2	B1	B2
M+	A3	Baa1	Baa2	Ba1	Ba2	Ba3	B1	B2
H–	A3	Baa1	Baa2	Ba1	Ba2	Ba3	B2	B3
H	Baa1	Baa2	Baa3	Ba2	Ba3	B1	B2	B3

Source: Moody's (2015; 2016b) and own calculations

[5] World Bank Government Effectiveness Index, Rule of Law Index and Control of Corruption Index
[6] In the Moody's methodology, the foreign currency ratio of government debt is one way to amend the initial score obtained from the values of the key indicators; if its value is high, it may downgrade the dimension by as many as six measures.

Thus, the model calculation returned a result that differs from the actual rating maintained by the institution, which illustrates with regard to the testing of the Hungarian data that – based on the model and the available information – the credit ratings by Moody's can only be reconstructed with approximate accuracy for the time being. Nevertheless, we managed to obtain a rating for the Hungarian foreign currency-denominated government debt that falls within the indicative rating range by working with the input data estimated from the sources shown in *Annex 1*, in accordance with the methodological documentation. Since Moody's did not publish its estimation for all indicators used, the explanation of the difference between the actual rating and the reconstructed rating is not unambiguous: it can be explained both by the difference in the input data and the inadequacy of methodological transparency. It should also be noted that in addition to the methodological documentation of Moody's, we also relied on the information included in the credit rating report.[7]

5.2. Reconstruction of the model calculation by S&P

In its credit rating reports, S&P publishes most of the statistical data it takes into consideration for the purpose of the review, and thus, in contrast to the calculations for Moody's, we used the data included in the report for the model calculation (see: *Annex 2*). The reason for this is that for most of the variables taken into consideration, S&P uses its own estimates and forecasts for the next three years, and we lack sufficient information on the models used for the forecast.

S&P rates the sovereign issuers using five aspects: the institutional, economic, fiscal, external and monetary policy dimensions (*S&P 2017a*). We present the results of the model calculation using the assessment of the individual dimensions, as before.

The S&P report on the review reveals that the institution allocated a score of 4 to the institutional assessment (*S&P 2018*). As emphasised in the presentation of the special features of the methodology, S&P does not substantiate the assessment of the institutional dimension using specific indicators: it determines the value of the dimension based on the efficiency and stability of political decision-making and the functioning of checks and balances, relying on its own value judgement (*S&P 2017a*). In the report on the rating under review, S&P justified the relatively low score, among other things, by stating that in its opinion as a result of the institutional changes introduced since 2010, the system of checks and balances has weakened, which restricts the predictability of political decision-making, and the measures aimed at the restriction of mass media and non-governmental organisations resulted in increasing political centralisation (*S&P 2018*).

The initial score of the economic assessment is based on GDP per capita, estimated by S&P for the respective year in the amount of USD 15,500, which yields a score of 4 in the methodological documentation. In our opinion, the score of the dimension

[7] See, for example, the values of the indicators shown in *Annex 1*.

was not influenced by any modifying factor, and thus the score of the institutional and economic profile, generated from the two dimensions, was also 4.

S&P divides the fiscal assessment into two parts, i.e. fiscal performance and flexibility, and debt burden. The first is obtained based on the change in the GDP-proportionate net government debt, while the latter is obtained based on the ratio of the GDP-proportionate nominal government debt and the general government interest expenditures and revenues. The final score of the dimension is obtained as the arithmetic mean of the score of the two parts (*S&P 2017a*). S&P, corresponding to our own calculations, gave a score of 2 for the fiscal performance and flexibility based on the average change in the net government debt of 2.6 per cent. The prevailing score of 4 for the debt burden (*S&P 2018*) comes from average value of 65.1 per cent of the GDP-proportionate nominal government debt, and the average ratio of 6.2 per cent in the general government interest expenditure and revenues. Accordingly, the score for the two areas estimated on the basis of S&P's data corresponds to the prevailing scores, and based on the average of these two, the fiscal assessment may have received a score of 3.

The initial score of the external assessment is obtained as the ratio of gross external financing needs to the sum of the current account receipts plus usable official foreign exchange reserves, and as the ratio of the narrow net external debt to the current account receipts (*S&P 2017a*). Upon the review, based on the S&P data the first value was 96.3 per cent, while the ratio of the narrow net external debt to current account receipts took the average value of 17.9 per cent. Accordingly, based on our own calculations, the dimension received a score of 2, which corresponds to S&P's assessment (*S&P 2018).*

For the monetary policy assessment, S&P maintained the score of 4 (*S&P 2018*). The institution assesses this dimension on the basis of the sovereign issuer's exchange rate policy and the effectiveness of its monetary policy. The exchange rate policy, based on the categorisation of the IMF exchange rate regime, receives a score of 3 in the S&P guide. At the same time, for the assessment of the effectiveness of monetary policy, we relied on the information published by S&P in prior reviews (see e.g. *S&P 2017b*), since no distinct change has taken place in this area since the date of the last rating, and hence presumably S&P's opinion has not changed either. Based on these, the monetary policy effectiveness received a score of 4. All of this is also supported by the report on the February 2018 credit rating, where the rating agency explains that in its view the accumulated non-performing loan portfolio still curbs the effectiveness of Hungarian monetary policy transmission (*S&P 2018*).

The result of our model calculation was obtained as the combination of the input data included in S&P's reports, the textual assessment of a qualitative nature included in the previous reports and the methodological information related to the classification of the dimensions. The score of the flexibility and performance profile created from the score

calculated by us for the three dimensions (external assessment 2, fiscal assessment 3, monetary policy assessment 3.6) was 2.86, which – combining it with the institutional and economic profile score of 4 – designated the "BBB–" midpoint of the range (*Figure 6*). This corresponds to the February 2018 rating maintained by S&P (*S&P 2018*).

Figure 6
Reconstruction of the February 2018 rating by S&P

Flexibility and performance profile	Institutional and economic profile											
	Assessment	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
	1–1.7	aaa	aaa	aaa	aa+	aa	a+	a	a–	bbb+	N/A	N/A
	1.8–2.2	aaa	aaa	aa+	aa	aa–	a	a–	bbb+	bbb	bb+	bb–
	2.3–2.7	aaa	aa+	aa	aa–	a	a–	bbb+	bbb	bb+	bb	b+
	2.8–3.2	aa+	aa	aa–	a+	a–	bbb	bbb–	bb+	bb	bb–	b+
	3.3–3.7	aa	aa–	a+	a	bbb+	bbb–	bb+	bb	bb–	b+	b
	3.8–4.2	aa–	a+	a	bbb+	bbb	bb+	bb	bb–	b+	b	b
	4.3–4.7	a	a–	bbb+	bbb	bb+	bb	bb–	b+	b	b–	b–
	4.8–5.2	N/A	bbb	bbb–	bb+	bb	bb–	b+	b	b	b–	b–
	5.3–6	N/A	bb+	bb	bb–	b+	b	b	b–	b–	b–[3]	b–[3]

Source: S&P (2017; 2018) and own calculations

Based on the result, it can be stated that in the case of S&P, the available methodological documentation and the exact knowledge of part of the data considered by the institution renders the precise reconstruction of Hungary's credit rating possible. Accordingly, the published methodological documentation was transparent in the sense that we were able to reconstruct the Hungarian rating properly. At the same time, it was not possible to generate independent input data, and thus we made no attempt to perform an analysis assuming a higher degree of reconstructibility, making the calculation relying on our own data.

5.3. Reconstruction of the model calculation by Fitch

For the reconstruction of Fitch's model calculation, we made attempts, as in the case of Moody's, to use the data of institutions specified in the methodology, i.e. the International Monetary Fund (IMF), the World Bank (WB) and the national statistical offices. However, despite our efforts, for some of the indicators we were compelled to refer to the reports of Fitch, i.e. full reconstruction of the inputs cannot be achieved in the case of the third rating agency either (see: *Annex 3*).

As noted earlier in the presentation of the special features of the methodology, Fitch's credit rating model differs significantly from that of the other two rating agencies. Although in the past years Fitch has published more and more details on its credit rating methodology, the reproducibility of the model calculation without

the forecast values of certain variables is still questionable, since the institution does not publish the values used for all of the indicators taken into consideration.

At Fitch, the dimension with the highest weight is the group of variables capturing the structural features of the economy. The score of the dimension is obtained on the basis of the World Bank's governance indicators, GDP per capita, the world-GDP ratio, the number of years elapsed since the last default and the broad money supply (*Fitch 2017a*). The score of the dimension can be well estimated, since the institution defines the value of all indicators based on the latest available data, which can be accessed in the aforementioned statistical databases. Based on the weighting of the indicator's value, according to our calculations, the score of the dimension in March 2018 was 7.60, which – according to the credit rating report – was not influenced by any modifying factors.

One of the dimensions with the second highest importance is the group of variables capturing external balance developments (external finances). The score of the dimension is determined by the reserve currency flexibility, net external assets as a percentage of GDP, commodity dependence, external interest service, the sum of the current account balance and FDI inflow and foreign exchange reserves. It is more difficult to accurately estimate the score for this dimension, since in the case of three of the five variables it considers the average of data calculated for the current year, last year's data and the value estimated for the next year, which we cannot determine precisely in the absence of Fitch's forecasts[8] (*Fitch 2017a*). Based on the weighting, the dimension had a value of –0.09, which was reduced by the rating committee by further one notch, and thus, according to our calculations, the score of the dimension at the time of the current review may have been –1.09 (*Fitch 2018*).

The third dimension assessed by Fitch is the group of variables capturing the general government developments (public finances). The score for this dimension comes from the GDP-proportionate government debt, the foreign currency ratio of the government debt, the fiscal balance as a percentage of GDP and the ratio of interest service and general government revenues. Here as well, the estimation of the dimension's score was complicated by the fact that the value of all variables comes from the average of historic, current and forecast data. At the same time, in one of the background materials we managed to find approximate values for two of the four values (*Fitch 2017b*), which somewhat eased the calculations. Based on the weighting, according to our calculations, the public finances dimension acquired the value of –2.01, which, according to the report, was not modified by the committee (*Fitch 2018*).

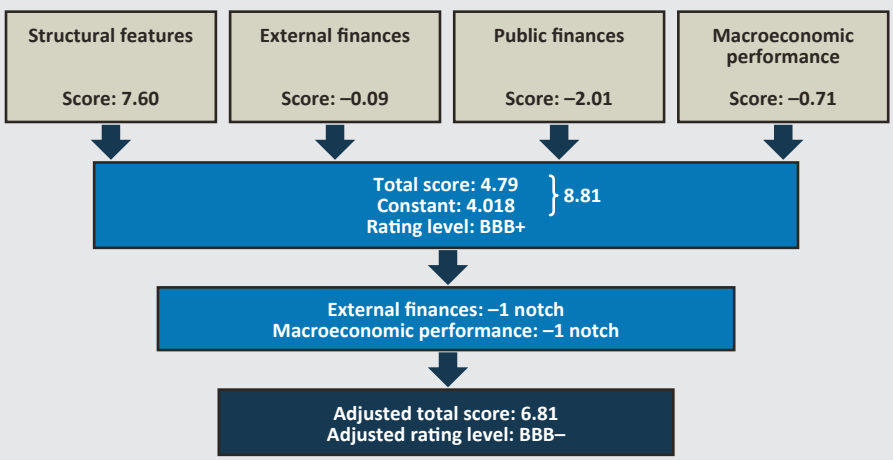
The fourth group of variables, with the lowest significance, is the dimension comprising the indicators describing macroeconomic performance. The variables primarily considered in this dimension include real GDP growth, real GDP volatility

[8] The calculation of the dimension's score was further complicated by the fact that no data were available for Hungary's external interest service values in the statistical databases defined in the analytical framework. Upon the weighting of the value, we calculated using the median of the countries with similar rating.

and inflation. The estimation of the score for the macroeconomic performance dimension was also complicated by the fact that in the case of two of the three indicators, Fitch also considers forecast values; however, the background material mentioned earlier once again helped us to determine the estimated value. According to our calculations, the initial score for the dimension at the time of the review may have been –0.71, reduced by the rating committee by further one notch, and thus the dimension had the final score of –1.71.

As mentioned earlier, Fitch – in contrast to the other two rating agencies – creates no profiles after determining the score of the individual groups of variables; it simply adds up the scores obtained based on the weighting, and supplements it with the constant value of the regression model. Based on the model calculation described above, the sum of the dimensions' score was 4.79, while – according to the analytical framework of 2017 – the constant value was 4.018 (*Fitch 2017a*). Thus the result of our own model calculation, without considering the amendments specified in the reports, is a score of 8.81, which designates a rating of "BBB+". Of course, this does not correspond to the March 2018 rating of "BBB–" maintained by the institution. If we adjust our calculations with the amendments applied by the rating committee (–2 notches), the obtained final score of 6.81 is equivalent to the current "BBB–" rating (*Figure 7*).

Figure 7
Reconstruction of the March 2018 rating by Fitch



Source: Fitch (2017a; 2018) and own calculations

Although the reconstruction of the Fitch model calculations returned a result for Hungary different from the actual credit rating, when we examined the methodology and reconstructed the credit rating, we found that – in contrast to the finding of *Ligeti – Szőrfi* in 2016 – the new methodological documentation is already detailed

and transparent enough to allow for the modelling of the institution's credit rating with good approximation.

In our view, the above result was influenced by the following factors: On the one hand, the values given by Fitch to the indicators also including the estimates of the institution are not known, and, according to the methodological model, the weight of these is not determinant. We also saw that if we substitute the inputs in the model identically with the institution, our results correspond to the primary dimension values reported by Fitch. The additional differences are attributable to the fact that the rating committee adjusted the calculated dimension value on two occasions. We were able to verify this on the basis of the public data, because Fitch, in its latest report on Hungary's credit rating, disclosed whether the rating committee had changed the originally obtained score for any dimension. However, we do not know whether the institution will regularly publish this information in the future as well, in the absence of which the reconstruction attempt would be less assessable.

6. Conclusion

Based on the analyses related to Hungary's foreign currency-denominated debt, this paper illustrated the degree of accuracy to which, given the present transparency of the credit rating processes and methodological documentation, the ratings of sovereign issuers of the big three rating agencies can be reconstructed. With a view to answering our research questions, we provided a brief overview of the relevant domestic and international literature, and presented – along the IMF paper – the basic roles fulfilled by the credit rating agencies in the global financial system: they provide information on issuers, encourage borrowers to take corrective measures and provide the rated entities with certificates. However, their work is not free from methodological errors and moral hazard, as seen by market participants in 2008 during the crisis. As a response to this, the regulation of rating agencies and oversight of their activity appeared as a requirement of market participants after the crisis. Transparency also features among the regulatory requirements, which we discuss in detail in this paper.

We based our paper partially on a series of articles published by two Hungarian co-authors, who earlier analysed to what degree the credit rating steps can be modelled. The referenced papers report substantial results. However, the methodological documentation, more detailed than before, published by the rating agencies in recent years, allowed us to understand the rating agencies' decision-making processes more accurately and subject the latest methodological documentation to a review similar to that performed by *Ligeti – Szőrfi* (*2016*). However, in contrast to them, we performed our analysis for a single country, i.e. for Hungary, as a case study.

In order to answer our research question, we used the credit rating methodology of Moody's, S&P and Fitch, as well as the information included in the published reports. We always calculated the values of the indicators necessary for the credit rating models

from the sources specified by the rating agencies, whenever this was possible. Right at this point, we made a necessary compromise: full reconstructibility of the inputs was not feasible with any of the institutions. The weakest institution in this respect was S&P: in the case of S&P, in the vast majority of the cases, we used the inputs communicated by the institution, while in the case of the other two rating agencies, reconstruction of the inputs was much more successful. In the course of our model calculations, we found that – with the current level of transparency – the reconstruction of the credit rating of Hungary's foreign currency-denominated debt by S&P could be performed the most accurately. The result illustrates that upon using inputs corresponding to those of S&P, the published methodology is transparent enough to reconstruct each step of the model calculation correctly. The result of the model calculation performed for the review by Moody's showed that the ratings of the institution related to Hungary can be reconstructed only with approximate accuracy for the time being. The reason for the difference may be equally attributable to the deviation in the values of used variables or to the absence of methodological transparency. However, we have no information in this respect. Compared to the work of Ligeti-Szőrfi, the largest improvement was shown by the transparency of Fitch. The reconstructibility of the inputs ran into difficulties, and thus we also had to consider information included in the report for several variables, or the correct value of the variable was not clear (see: *Annex 3*). At the same time, the transparency of the model proved to be adequate according to the analyses performed for Hungary. If we adjust the result of our calculations for the amendments by the rating committee, we obtain the rating maintained by the institution.

In summary, it can be stated that the transparency of the three institutions has improved compared to what was presented in an earlier analysis performed by *Ligeti – Szőrfi* (*2016*). At the same time, major progress could only be achieved if the rating agencies calculated the input indicators of the model from known data sources with known calculation at all times. However, the functioning of the models can be sufficiently reconstructed to allow the decision-makers of sovereign issuers, economists and market participants to see when and how a change in the data related to a sovereign issuer may be integrated into the credit rating. However, at the current level of transparency, predicting rating actions – which was our initial future research direction – is not only hampered, for the time being, by the fact that the rating committee may amend the initial rating, but also by the identified uncertainties of the modelling and the input data. The conclusions we have drawn based on the present case study would be more generalisable if – similarly to *Ligeti – Szőrfi* (*2016*) – we performed the model calculations for several countries. Such a research would allow us to implement analyses – far beyond the scope of our present study – based on which we could shed light on whether there are sovereigns, and what characterises them, for which the model calculations can be performed more accurately. If the level of transparency was to improve further, it would also be an interesting research direction to explore whether considering the same data that is used by the institutions would lead to identical dimension scores and ratings at all times, or there are under/overvalued sovereigns.

Annexes

Annex 1: Variables taken into consideration for the purpose of Moody's model calculation and the source thereof

Moody's Investor Service			
Variable group	**Indicator**	**Value**	**Source**
Economic strength	Average real GDP growth (per cent)	2.0	IMF WEO
	Real GDP volatility (per cent)	3.1	IMF WEO
	WEF competitiveness index	4.3	WEF
	Nominal GDP (USD billions)	120.6	IMF WEO
	GDP per capita (PPP, USD)	26,275.3	IMF WEO
Fiscal strength	Government debt as a percentage of GDP (per cent)	74.7	Eurostat
	Government debt/government revenues (per cent)	157	Eurostat
	Interest servicing/government revenues (per cent)	7.3	Eurostat
	Interest servicing/GDP (per cent)	3.5	Eurostat
	Foreign currency ratio within government debt (per cent)	30	Government Debt Management Agency
Institutional strength	Government Effectiveness Index	0.491794795	World Bank
	Rule of Law Index	0.404108435	World Bank
	Control of Corruption Index	0.104408205	World Bank
	Inflation (per cent)	2.2	IMF WEO
	Volatility of inflation (per cent)	2.6	IMF WEO
Susceptibility to event risk	Internal politics risk	–	–
	Geopolitical risk	–	–
	Gross borrowing requirement/GDP (per cent)	23.2	Government Debt Management Agency, IMF
	Non-residents' government securities holdings (per cent)	47.8	Eurostat
	Implied credit rating based on market indices	Baa3	Moody's
	Total assets/GDP (per cent)	102	ECB
	Baseline Credit Assessment	b1	Moody's
	Loan-to-deposit ratio (per cent)	81	MNB
	Current account + FDI/GDP (per cent)	–1.1	World Bank
	External vulnerability index (per cent)	114	Moody's
	Net international investment position/GDP (per cent)	–64.4	Eurostat

Note: With the exception of average real GDP growth, the real GDP volatility and the volatility of inflation, the values of the individual indicators are always the latest data available at the time of the respective rating.

Annex 2: Variables taken into consideration for the purpose of Standard and Poor's model calculation and the source thereof

Standard and Poor's			
Variable group	**Indicator**	**Value**	**Source**
Economic assessment	GDP per capita (USD thousands)	15.5	S&P
External assessment	Gross external financing requirement/current account revenues + reserves (per cent)	96.3	S&P
	Narrow net external debt/current account receipts (per cent)	17.9	
	Status of the currency in international transactions	–	
Fiscal assessment	Net government debt as a percentage of GDP (per cent)	65.1	S&P
	Interest burden/government revenues (per cent)	6.2	
	Change in the government debt/GDP (per cent)	2.6	
Monetary assessment	Exchange rate regime	3	IMF
	Credibility and effectiveness of monetary policy	4	Previous S&P information

Note: With the exception of the exchange rate regime and the efficiency of the monetary policy, all indicators are the average of the value estimated by S&P for the respective year and the forecast for the next three years.

Annex 3: Variables taken into consideration for the purpose of the Fitch model calculation and the source thereof

Fitch Ratings			
Variable group	**Indicator**	**Value**	**Source**
Macroeconomic performance	Real GDP growth (per cent)	3.1	IMF WEO
	Real GDP volatility (per cent)	2.9	IMF WEO
	Inflation (per cent)	1.7	IMF WEO
Public finances	Government debt as a percentage of GDP (per cent)	72.8	IMF WEO
	Interest servicing/government revenues (per cent)	6.8	Eurostat
	Foreign currency ratio within government debt (per cent)	23.5	Government Debt Management Agency
	Fiscal balance as a percentage of GDP (per cent)	–2.1	Fitch, OECD
External finances	Net external assets/GDP (per cent)	2.5	World Bank
	Commodity dependence (per cent)	10	WTO, World Bank
	Current account + FDI/GDP (per cent)	5.1	Fitch
	Reserve currency flexibility	–	IMF
	External interest servicing (per cent)	4.3	Fitch
	Reserves/import (number of months)	2.6	World Bank
Structural features	Average of World Bank governance indicators	66.4	World Bank
	GDP per capita (percentile)	56.5	World Bank
	Share in global GDP (per cent)	0.2	World Bank
	Broad money supply/GDP (per cent)	60.1	World Bank

Note: The values of the indicators are not solely the latest data available at the time of the respective rating; in the Fitch model, in the case of certain indicators, multi-year averages or variances serve as input. In addition to the historic data, from time to time future estimated data are also necessary for the calculation of the indicators, where the model used by Fitch for the forecast is not known, just like the estimated forecasts.

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Developments in the GDP-GNI Gap in Hungary and the CEE Region*

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With the progress of globalisation, due to the cross-border movement of the factors of production, there is a gap between the output of the Hungarian economy and the primary income generated by production, allocable to residents. The GDP-GNI gap shows the difference between the performance of the domestic economy and the primary income allocable to the individual sectors of the economy, and it also provides useful information on the current burdens of the country's accumulated net foreign liabilities. This paper presents the factors that have influenced the changes in the GDP-GNI gap in recent years and examines how the income of the individual economic sectors has changed, breaking down the available data by industries and countries. We examine the correlation between the GDP-GNI gap and the development of the economy by analysing the international developments and regional trends, and then try to survey the trends that determine the domestic GDP-GNI gap over the short and long term. We find that, due to the anticipated growth in the income of foreign-owned companies, the GDP-GNI gap may increase over the short run, while its long-term trend depends significantly on whether the convergence of the Hungarian economy with the Western countries is implemented from external or internal funds.

Journal of Economic Literature (JEL) codes: E01, F41, F43

Keywords: gross national income, GDP-GNI gap, primary income balance

1. Introduction

In the past decades, an increasing demand has emerged in economics for macroeconomic indicators that can provide a more accurate picture of a nation's disposable income compared to the Gross Domestic Product (*GDP*), since this indicator does not provide a full view of households' income position, and social and economic welfare (*BEA 2015*). Several studies highlighted the fact that in decision-making it is not sufficient to analyse the output level, but – depending on the economic policy and social objective – various alternatives and supplements may

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

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be necessary (*Costanza et al. 2009*; *Stiglitz et al. 2008*). The increase in the mobility of capital and labour force intensified the need to use new economic indicators (*Capelli – Vaggi 2013*). The underlying reason for this was primarily the fact that, due to the intensive capital flows, the gap between the production performed in the territory of the respective country and the income of the economic agents is widening both in the developed and in the developing countries. As a result of this, the analyses focusing solely on GDP may show an incomplete picture as they are not sufficiently representative of the degree to which the resident economic agents share in the income generated in the territory of the country.

Policy-makers in Hungary have also long been concerned with the question of the volume of income effectively received by the domestic sectors from the gross product produced in Hungary and the volume of income leaving the country. Accordingly, it is also important to have a clear idea of the alternative indicators, supplementing the GDP and better capturing Hungary's income position. Such indicators include, among other things, the gross national income (GNI), which adjusts the GDP (the volume of income produced in the territory of the country in the reporting period) for the owners' profit transfers between the resident and non-resident sectors and for the current transfers, which are also stated under primary incomes. In this respect, GNI is a useful and easily accessible indicator, which is closely related to the non-macroeconomic indicators of quality of life (e.g. life expectancy at birth, children's school enrolment ratio) (*World Bank 2017*). In addition, gross national disposable income (GNDI) – less often used in the technical literature – is also a useful indicator, which in addition to GNI, also takes into account unilateral current transfers from abroad, stated under secondary incomes. However, secondary incomes also contain items (e.g. the contribution by the Hungarian state to the EU budget), which can only be interpreted together with the capital transfers falling outside the scope of the income categories to be examined by us, and thus this paper primarily focuses on the changes in GNI. At the same time, it should be noted that for this reason examination of the GNDI indicator – which is less wide-spread in economic literature but bears outstanding importance in terms of an economy's ultimate consumption, investment and saving and also considering capital transfers – may represent an interesting additional direction of research.

This analysis focuses on GNI, and on the GNI-GDP gap, since this indicator reflects the (primary) distribution of the incomes generated by the production of a national economy between residents and non-residents. While GNDI and adjusted GNDI include unilateral income transfers, GNI only considers (apart from wage incomes and current transfers) the interest and FDI income realised on the net outstanding foreign liabilities or assets. Due to this, GNI may be able to show the incomes from the activity of the economic agents much better, as it does not include the unilateral transfers – often one-off items – which may have an impact on the country's position vis-à-vis the non-resident sector. GNI – in addition to quantifying the current burdens of an economy's outstanding net foreign liabilities – also provides

information on the sustainability of the growth in debt and the factors impacting the dynamics of external debt (*Oblath 2011*). In this respect, it is particularly important to examine the developments in GNI and the GDP-GNI gap in small and open countries, similar to Hungary.

In emerging countries with high FDI stock, the GNI level typically falls short of the volume of GDP. In most cases, this is due to the profit of non-resident companies, which obviously does not form part of resident sectors' income. However, it should be noted that higher GDP growth than GNI growth (and thereby the widening of the GDP-GNI gap) also does not necessarily represent an unfavourable development for the economy – since it is possible that without the foreign investments which entail the outflow of profit the level of GNI would be even lower. It is important to bear in mind that this largely depends on the type of external funds, as well as on the absorption capacity of the host country (*Balatoni – Pitz 2012*). While in the case of investments realised from foreign direct investment the productivity of the host country may improve, in the case of foreign loans or portfolio investments no such positive externality can be expected. Accordingly, in Hungary, for example, FDI-type funds have proved to be the most favourable form of financing in past decades, despite the fact that based on the implied yields they can be regarded as more expensive funds than foreign loans or portfolio investments. In addition to the indirect, obvious impacts of FDI funds (rising investments, increase in tax revenues, job creation), the indirect effects (technology spillover, headway of suppliers in international markets) are also key to the developments in the host country's gross national income.

Ireland is also a good example of the magnitude of the impact that globalisation can exert on a country's economic indicators. The GDP growth observed in recent years in Ireland (e.g. 25 per cent in 2015) was mostly related to the free flow of capital linked to the country's favourable tax conditions, and thus it is not a coincidence that the employees of the Irish Statistical Office support the use of alternative indicator(s), other than GDP, for the measurement of economic performance[1] (*Stapel-Weber – Verrinder 2016*). The example of Ireland highlights the fact that it makes sense to know the GDP-GNI gap, capturing the difference between the income generated in the economy and the primary income allocable to the resident economic agents – the value of which is one of the highest in Ireland in an international comparison – and the underlying factors, more precisely. In addition, analysis of the GDP-GNI gap is also important in terms of examining the external vulnerability of a country, as it quantifies the expenses represented for an economy by the incomes paid on external liabilities.

[1] The proposed indicator sets out from GNI, also adjusted for the „impact of globalisation" (the minor difference between the official and the adjusted GNI index). They expect the new indicator to be more stable and less sensitive to shocks or one-off effects. Although the adjusted GNI moves away from GDP, this does not mean that the living conditions of Irish economic agents is worse – at the same time, the debt ratio calculated as a proportion of this is higher than the GDP-proportionate ratio, which may impact investors' perceptions of the economy or payments to or from the EU.

This paper primarily deals with the changes in the Hungarian GDP-GNI gap in recent years, as well as with the factors influencing that. In the first part, we make a brief overview of the exact definition of GNI and then examine the development in the GDP-GNI gap in Hungary. Thereafter, we focus on the breakdown, by industry and country, of the incomes related to foreign direct investment, which is particularly important for Hungary. This is followed by the presentation of the share of the household, corporate and public sectors in gross national income, and then by a review of the GDP-GNI gap in the neighbouring countries. We highlight the relationship between the indicator and economic development, and at the end of the paper we attempt to determine the anticipated path of the GDP-GNI gap in the coming years.

2. Definition of gross national income

Gross national income is an indicator calculated from GDP; however, while GDP is determined based on the regional status for statistical purposes, GNI is determined on the basis of the resident status for statistical purposes. The relation between the two indicators can be expressed by the following formula:

Gross National Income (*GNI*) *= Gross Domestic Product* (*GDP*)
+ Primary incomes of domestic residents received from abroad
– Primary incomes paid to foreign residents from home

Primary incomes include earned income, property income – within that FDI income (profit) and income from loans (interest) – and certain current transfers[2] (*HCSO 2009*)*:*

- *compensation of employees:* balance of the wage income received by Hungarian citizens temporarily working abroad (for less than one year) and by non-residents temporarily working in Hungary;
- *equity income:* the difference between the equity incomes of non-resident actors from Hungary and of resident actors from abroad, which shows the volume of income in net terms that is due to non-resident income holders on their direct investments;
- *interest payments*: balance of the debt service paid on residents' outstanding borrowing and debt securities (bonds, treasury bills, etc.). from the non-resident sector and the debt service received by resident actors on their loans granted and debt securities issued to the non-resident sector;
- *current transfer:* the largest part of the item stated in the balance of payments statistics under other primary income comes from the agricultural subsidies received from the European Union – in addition, the product and production taxes, subsidies and rental incomes are also stated here.

[2] Current transfers included in other primary incomes

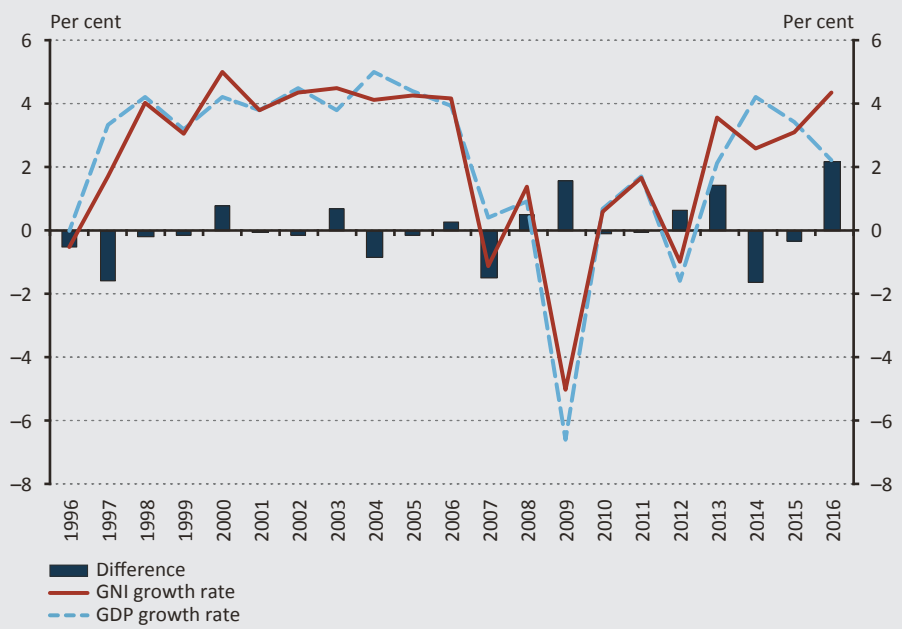
In the GNI indicator, of the factors adjusting GDP – the incomes and current transfers – the role of capital incomes (interest and equity income) is the most salient. This is due to the fact that compared to the current transfers they are of higher volume and were generated in relation to production, and thus they carry more useful information with regard to the economic position of a country.

3. GDP-GNI gap in Hungary

3.1. Developments in the GDP-GNI gap

In 2016, real GNI growth substantially exceeded the rise in GDP, and thus the real growth of GNI reached the pre-crisis level. Until 2013, the gap between the annual real growth in GDP and GNI was negligible, which meant that the growth rate in the real income of the resident and the non-resident economic agents acting in Hungary was similar. However, in the past years, the two indicators developed differently: the real growth in GNI dynamically rose, while the GDP growth rate gradually declined. Consequently, in 2016 real GNI growth – which exceeded GDP growth by roughly 2 percentage points – amounted to 4.3 per cent, and thus GNI reached the pre-crisis level (*Figure 1*).

Figure 1
Annual real growth of GDP and GNI



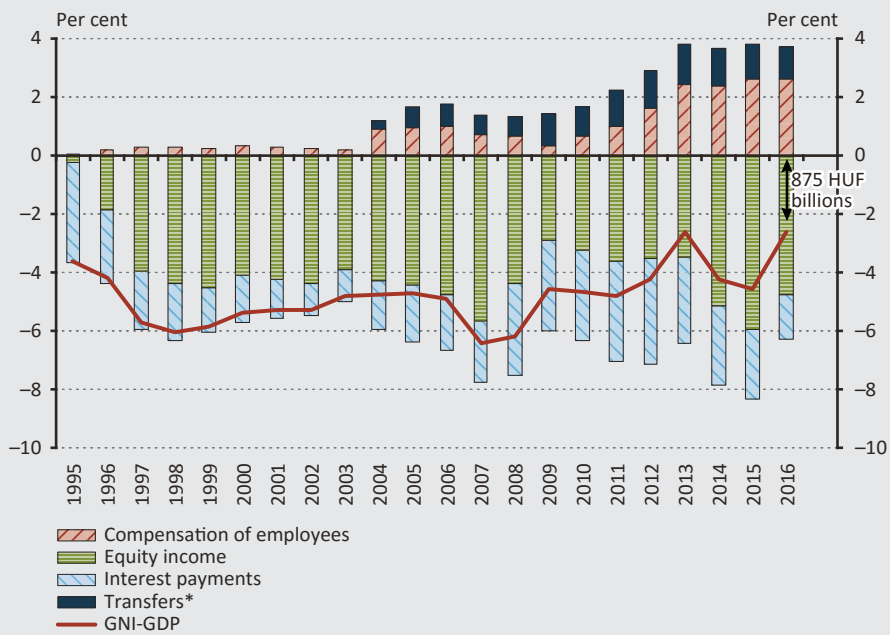
Note: In 2008, there was a methodological change in the recognition of FDI income (for more details, see Appendix 2).

Source: HCSO (2018)

In the pre-crisis period, the GDP-GNI gap was relatively stable, around 4–6 per cent of GDP. In Hungary, the GDP-GNI gap remained stable between the end of 1990s and 2006 which was mainly attributable to the profit of non-resident companies. In the mid-2000s – as a result joining the European Union – both the substantial rise in the compensation of employees and the inflow of transfers relevant for GNI contributed to the minor decrease in the GDP-GNI gap. At the same time, in the pre-crisis years, due to the simultaneous growth in equity incomes and interest expenses paid to the non-resident sector, the GDP-GNI gap reached a historic high, rising to above 6 per cent of GDP. In the years of the crisis, the interest expense paid to the non-resident sector on the swiftly mounting outstanding debt continued to increase, which pointed to widening of the GDP-GNI gap. However, this impact was more than counterbalanced by the decline in the profit of non-resident companies and the rise in current transfers from the EU.

After the crisis, as a result of the dynamically increasing compensation of employees and the decrease in interest expenses due to deleveraging, a trend decrease was observed in the GDP-GNI gap. The decrease in the gap was moderately restrained

Figure 2
Changes in the components of the GDP–GNI gap (as a percentage of GDP)



Note: In 2008, there was a methodological change in the recognition of FDI income (for more details, see Appendix 2).

** Transfers included among other primary incomes.*

Source: HCSO (2018), MNB (2018)

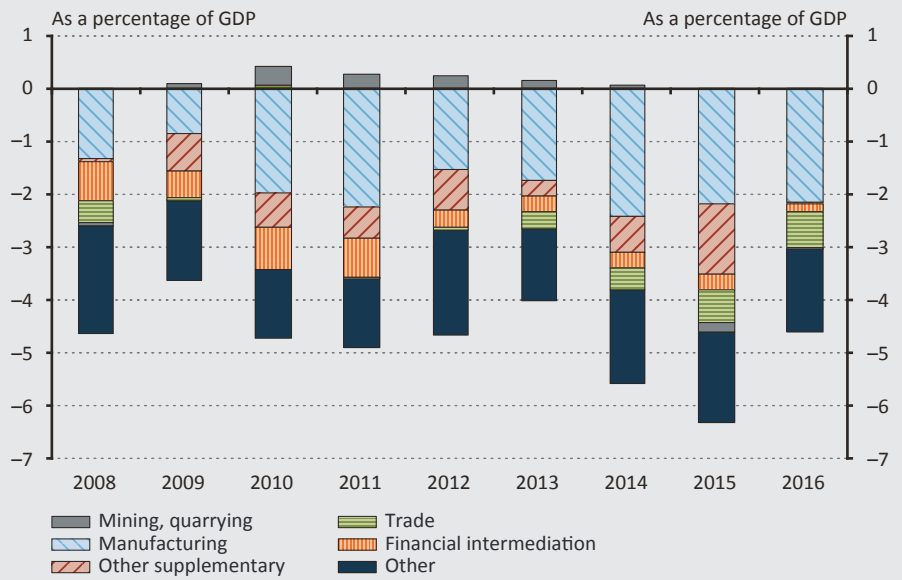
by the growth in the profit of non-resident companies, which approximated its pre-crisis level. In 2014–2015, the profit of non-resident companies operating in Hungary rose substantially due to a one-off item of a multinational company, which led to a surge in the GDP-GNI gap (*MNB 2016b*). After this, in 2016 there was a substantial decrease in the profit of the industry affecting the gap (*MNB 2017c*), and thus the gap narrowed to 2.4 per cent of GDP. The decrease was significantly supported by the declining interest expenses resulting from the decline in gross external debt and the implied interest rate thereof, as well as the more moderate – compared to the previous year's outlier – level of corporate profits (*Figure 2*).

3.2. Which industries determine the outflow of FDI incomes the most?

The GDP-GNI gap was determined primarily by the income of manufacturing (*car and pharmaceutical industry*) *and the other supplementary business services.* The income flows between GNI and GDP are fundamentally determined by the income of foreign-owned companies. This income is the ordinary business profit/loss of foreign direct investments operating in Hungary (accounting for almost 50 per cent of GDP in terms of the balance of investments). This indicator contains the total profit of the companies, which later on the companies pay out as dividend to the owner or reinvest in the Hungarian economy. However, it should be pointed out that – as emphasised in the paper by *Balatoni – Pitz* (*2012*) – the growth effect of working capital is substantial, and thus, despite the fact that the implied return on working capital exceeded that of the alternative sources of finance, on the whole the impact thereof on the gross national income may be positive.

Almost half of the FDI income is related to the manufacturing industries (*Figure 3*). The profit of the sector was attributable, among other things, to the rising income of vehicle manufacturing – as a result of the new factories built and the run-up of production – as well as to the increasing profit of drug manufacturing and the industries related to the manufacturing of electronic products. In addition, the dynamics in the income of non-resident companies between 2014 and 2016 were substantially influenced by the income of the other supplementary business services sector. A large part of this may be attributed to a single multinational corporation operating in Hungary, the profit of which substantially rose in 2014–2015, followed by a decline in 2016, which also had a material impact on the balance of FDI incomes (*MNB 2016b*).

Figure 3
Breakdown of the income balance related to foreign direct investments by sector



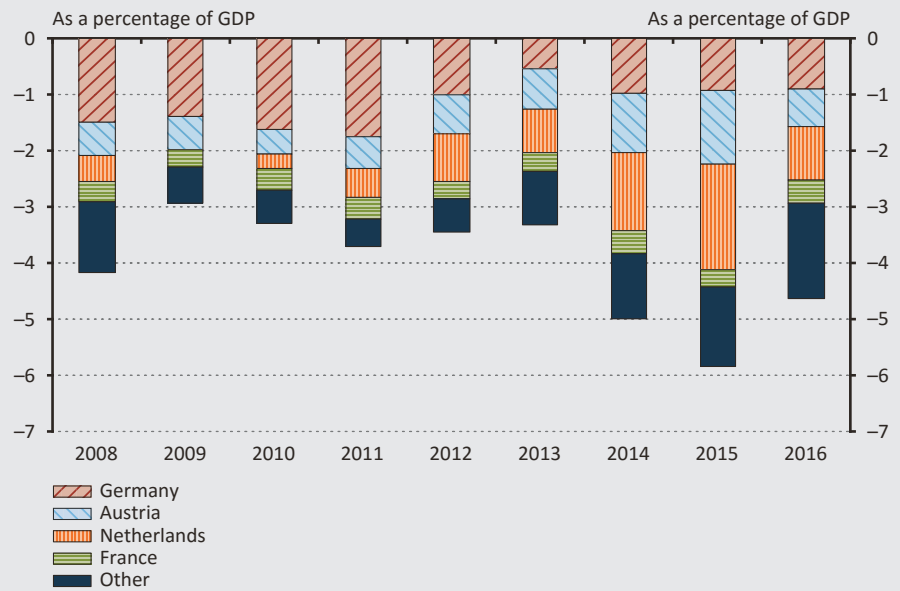
Note: In analysing the income of foreign-owned companies, the global production chains of multinational corporations and the incomes related to capital-in-transit transactions substantially distort both the income and expense sides – and thus to analyse corporate incomes we used the balances.

Source: MNB (2018)

3.3. Which countries benefited from the outflow of income?

In accordance with the source countries of the investments, the incomes from foreign direct investments, which are a key factor in the GDP-GNI gap, primarily flow to the euro area core countries. The GDP-GNI gap is determined by the income from foreign direct investments. Since a substantial part of the foreign direct investments comes to Hungary from EU core countries, most of the income is generated by subsidiaries from these countries. Until 2011, the largest volume of FDI income flowed to Germany, the most important source country of the FDI stock in Hungary (*Figure 4*). Thereafter, the incomes flowing to Austria and the Netherlands rose significantly, but in the case of the Dutch companies, the Netherlands is presumably not the ultimate source of the capital (due to corporate organisation and taxation reasons, several multinational companies regard the Netherlands as an interim station). The incomes from Dutch and Austrian foreign direct investments are also partly attributable to German investments (for more details, see *MNB 2016a*).

Figure 4
Breakdown of the income from direct equity investments by country



Note: Net of income related to intercompany loans.

Source: MNB (2018)

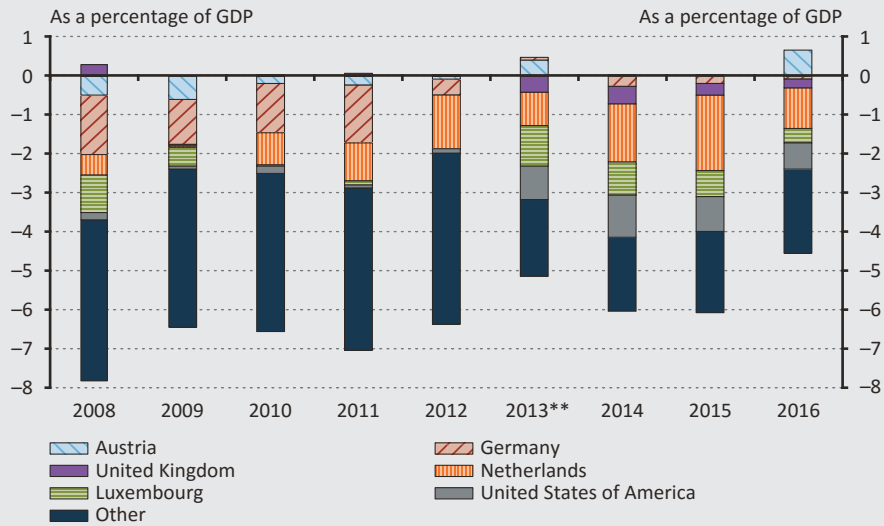
When examining the balance of the incomes constituting GNI in a breakdown by country, due to the incomes of employees temporarily working abroad, the income flow related to the German-speaking countries increases Hungarian GNI, while the United States plays a larger role in the financing of government debt (*Figure 5*). As regards the breakdown of the GDP-GNI gap by country (ignoring the other primary incomes,[3] which we usually state under current transfers), different dynamics were observed compared to income from foreign direct investments. Prior to 2012, the balance related to Germany and Austria reduced GNI. However, in 2012, with the easing of the German regulations related to foreign employment and the related rise in the compensation of employees, the volume of incomes transferred to Germany and Austria declined substantially. In this regard, it should be noted that *although wages increase the Hungarian GNI value, they are not transferred to Hungary in full,* as they also include the taxes and the consumption of those temporarily living abroad (*Csortos – Kóczián 2017*).

The role of the Netherlands is also outstanding in the total incomes, while the incomes transferred to the United States and Luxembourg show a decline between

[3] We do not examine these, since our country breakdown cannot be mapped in the same way as the other incomes; these income flows take place vis-à-vis the EU institutions.

2013 and 2016. This may be attributable to the fact that in recent years, due to the strengthening in household and bank financing, the government securities holdings of non-residents declined and the government's interest expenditure also fell as a result of the lower interest rates.

Figure 5
Breakdown of primary incomes* included in GNI

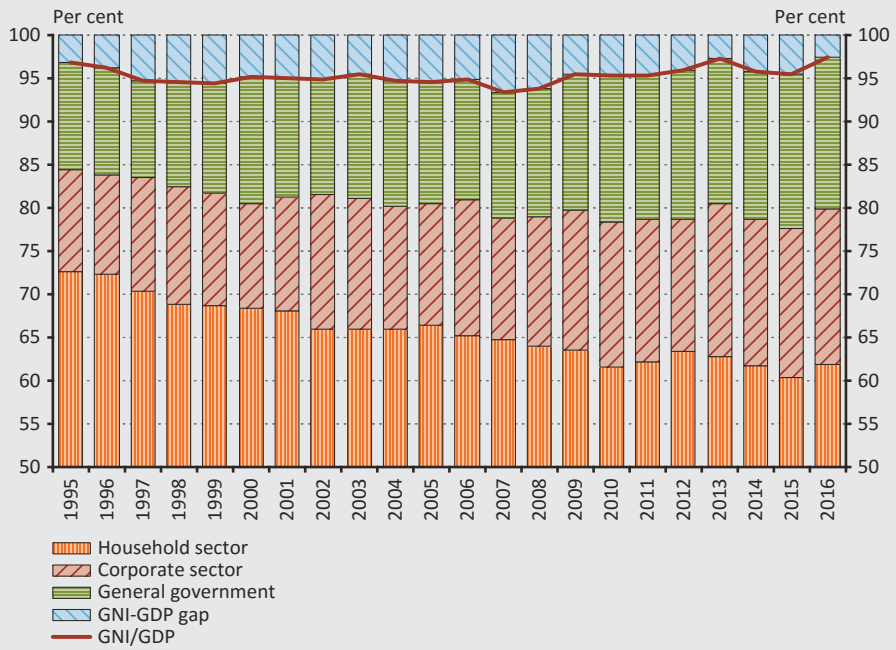


*Note: *Net of the income from international reserves and other primary incomes.*
***Before 2013, the country breakdown of incomes is not comprehensive.*
Source: MNB

3.4. Developments in the income of sectors

Since the outbreak of the crisis, the GDP-GNI gap has gradually declined, i.e. the income of resident actors falls short of the value of the income produced domestically (*GDP*) *to a smaller degree than 10 years ago.* As emphasised earlier, after the 2007 „peak", the GDP-GNI gap started to narrow, as a result of which it fell to HUF 875 billion by 2016. The narrowing of the GDP-GNI gap means that a larger volume of the income generated in 2016 remains with resident agents than before, as the volume of income flowing abroad declined. In the following, we try to identify how the generated income is distributed among the resident sectors, and – in connection with this – the income of which domestic sector has been augmented by the decline in the outflow of income abroad, observed in recent years. The breakdown by sectors (*Figure 6*) shows that in terms of domestic sectors the strongest growth was seen in corporate and government GNI, while there was a trend decrease in the GDP-proportionate primary incomes of households.

Figure 6
GNI as a percentage of GDP, and the breakdown thereof by sectors

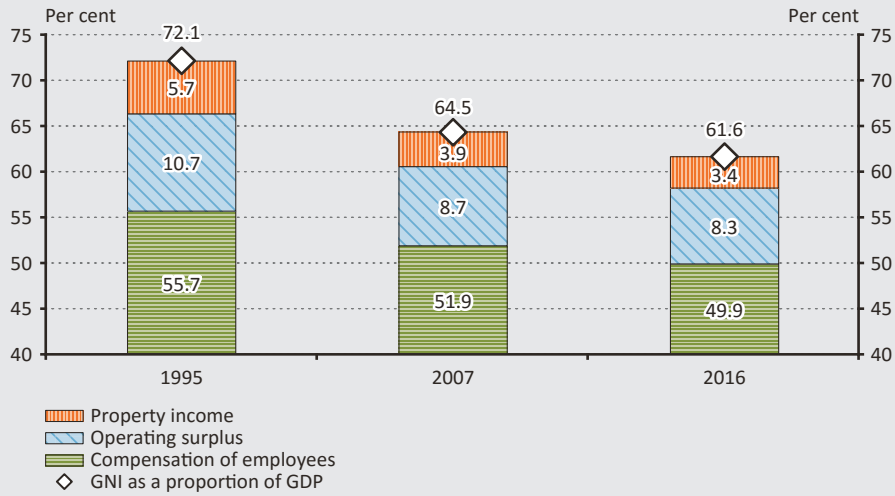


Source: HCSO (2018)

The share of households in GNI has gradually declined, which is mostly attributable to the decrease in the ratio of the compensation of employees (*Figure 7*). Household GNI decreased by 7.7 percentage points between 1995 and 2007, followed by a further decrease of 3 percentage points by 2016. The decomposition shows that a significant part of the decrease in the proportion seen since 1995 is attributable to the 6 percentage point decrease in the ratio of the compensation of employees, in addition to which the proportion of property incomes and the operating surplus of households also declined by 2 percentage points each. The decrease in *the GDP-proportionate value of the compensation of employees* can be compared with the decline in the wage share observed globally (*MNB 2017b*). Whether this indeed reduces the national economy's GDP-proportionate gross national income depends on whether the company employing the respective household is resident or non-resident. When non-resident companies benefit from the decline in the households' compensation of employees, GNI decreases and in parallel with that the GDP-GNI gap widens – which played a role in the developments between 1995 and 2007. However, when this income appears at resident companies in the form of higher operating surplus, GNI on the whole does not change, only the distribution thereof by sector – this was the case after 2007. A large part of the decline in *the share of*

property incomes is attributable to decreasing interest incomes – related to the low interest environment and the transformation of the pension system, while the *operating surplus* contains the value of the own home service, the developments in which are substantially influenced by housing market prices.

Figure 7
Decomposition of households' GNI* as a percentage of GDP



*Note: * The mixed income within household income was divided into compensation of employees and operating surplus in accordance with the proportions observed in the national economy.*

Source: HCSO (2018)

The government's GNI as a percentage of GDP rose from 13.9 per cent in 2001 to 17.6 per cent by 2016, which is primarily connected to the rise in consumption taxes (*Figure 8*). Consumption taxes (VAT, excise tax) account for a major portion of the government's primary income; these taxes decreased until 2006 and then started to rise significantly. In addition to higher income from consumption taxes, the government's revenue was also boosted by the introduction of a variety of sectoral taxes (e.g. public utility tax, advertising tax, financial transaction levy, telecommunication tax, etc.). Finally, the growth in primary income was also supported by the decrease in the government's interest expenditures.

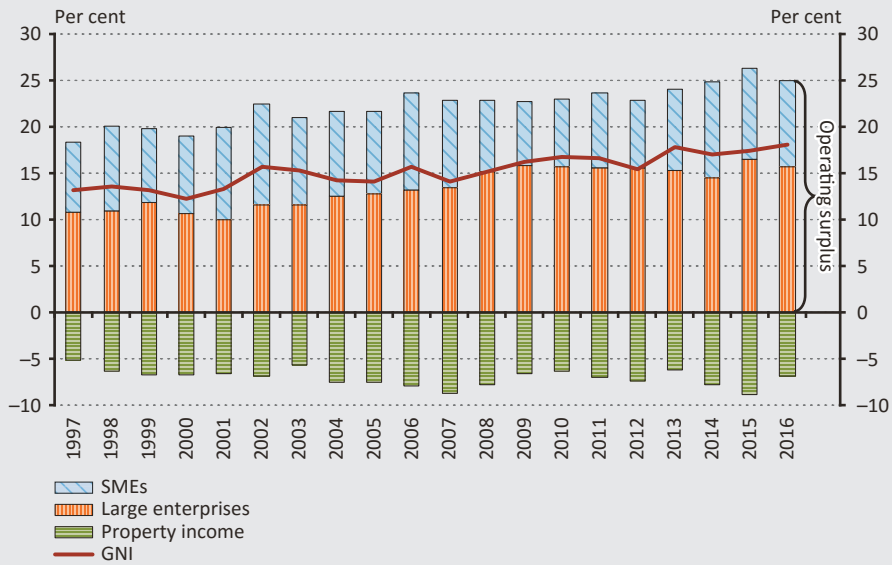
Figure 8
Developments in the government's GNI as a percentage of GDP

Source: HCSO (2018)

The rise in companies' GDP-proportionate primary incomes after the crisis is primarily attributable to the growth in the operating surplus, contributed to by SMEs to larger degree and by corporations to a smaller degree (*Figure 9*). Corporate GNI comprises the operating surplus and property income, with the latter including profit distribution to the resident and non-resident owners and the net interest expenditures. The operating surplus of corporations of various sizes rose to a similar degree until the outbreak of the financial crisis. In the years after the crisis, SMEs' income fell substantially, while the operating surplus of large companies continued to rise moderately. After 2012, the dynamic growth in SMEs' income outstripped that of the large companies; nevertheless, the gross operating surplus of the sub-sector still falls short of that of large companies.[4] The rise in the income of the corporate sector seen in recent years may be due to the fact that households' declining compensation of employees is manifested at resident companies through the rise in operating surplus, while the improving terms of trade resulting from the decline in oil prices also substantially improved the profitability of the sector. Since 2008, corporations' property income reduced the sector's GNI by 6–8 per cent of GDP, while after the crisis the decline in interest expenditures resulting from deleveraging was a major factor (the rise in 2014–2015 was more attributable to one-off factors).

[4] It is also worth bearing in mind that corporations' GDP-proportionate operating surplus in 2015 was distributed among roughly 1,500 companies in the case of large corporations and more than 400,000 companies in the case of SMEs – and thus major differences may exist in the income „per company".

Figure 9
Decomposition of the GNI of the entire (financial and non-financial) corporate sector



Note: The operating surplus of the national accounts was distributed between large corporations and SMEs based on the NTCA (tax authority) database. The 2015-2016 data are estimates based on developments in previous years.

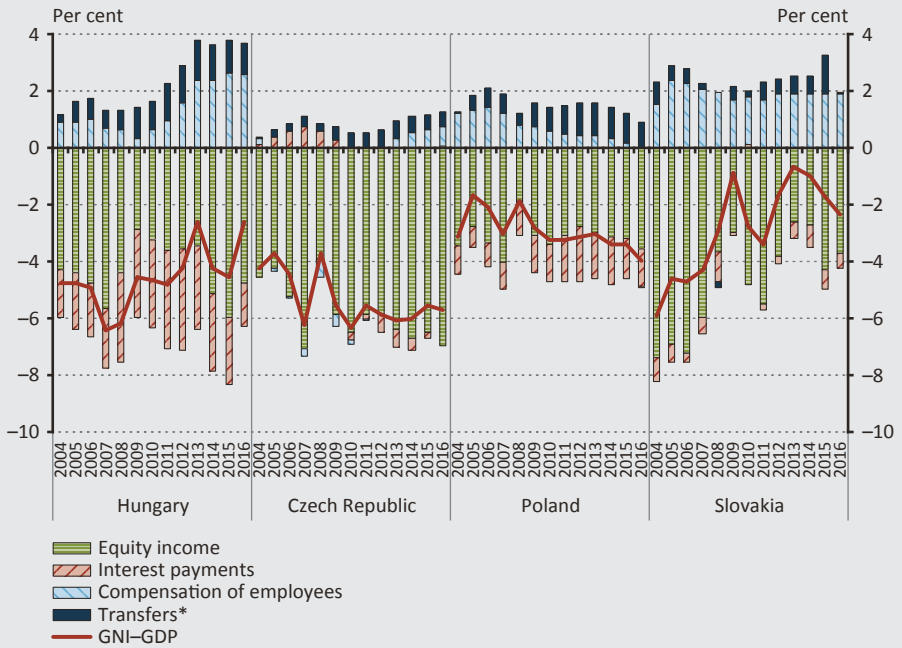
Source: HCSO (2018), MNB calculation based on the NTCA database, MNB (2018)

4. International review

In pre-crisis period, the Hungarian GDP-GNI gap was high by regional standards, but it has declined substantially in recent years and is now among the lowest in the region (*Figure 10*). In connection with the high outstanding external debt, the outflow of income was the highest in Hungary and in the Czech Republic in the pre-crisis years. However, whereas in the Czech Republic the outflow of income was attributable almost exclusively to non-resident companies, in Hungary the income balance deficit was also increased by the interest burdens of the mounting gross external debt, in addition to the profit. Although after the outbreak of the crisis the profit of non-resident companies declined significantly, increasing interest expenses kept the GDP-GNI gap wide in Hungary in particular. After the trough, it is a general phenomenon in the region that the outflow of equity income, in line with the rise in the profits of corporations, rose, with higher volatility observed in Slovakia and Hungary. With the continuously decreasing interest expenditures observed in recent years, the balance of the compensation of employees and transfer incomes[5] made a positive contribution to the rise in incomes in all countries of the region but reduced the GNI-GDP gap in Hungary the most.

[5] Transfers stated under other primary incomes.

Figure 10
Breakdown of the GDP-GNI gap by factors in the countries of the region (as a percentage of GDP)



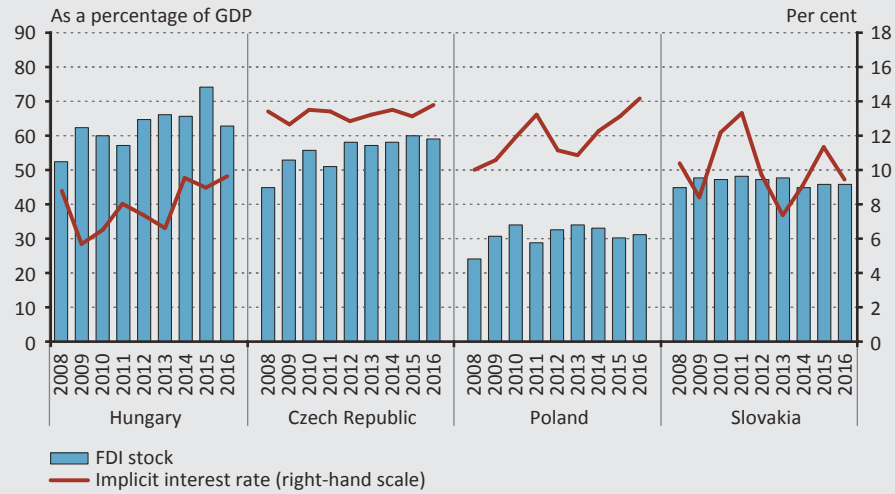
Note: In 2008, there was a methodological change in the recognition of Hungarian FDI income (for more details, see Appendix 2).

**Transfers included among other primary incomes.*

Source: Eurostat (2018)

In Hungary, the underlying reason for the outflow of incomes on FDI liabilities is primarily the high FDI stock, while the implied return on working capital lags behind the regional level (*Figure 11*). Before the crisis, foreign direct investments in Hungary amounted to roughly 50 per cent of GDP, which was substantially higher than the regional average. By contrast, the implied return on FDI in Hungary lagged behind the value of 12–14 per cent observed in the neighbouring countries. It is also typical of the post-crisis period that the cost of the capital import is the lowest in Hungary – in addition to Slovakia – accompanied by the highest gross FDI stock in the region. While in Hungary the high outflow of FDI income is primarily attributable to the high FDI stock, in the Czech Republic both the stock and the rate of return on the working capital are high. Among the countries of the region, the gross FDI stock as a percentage of GDP is the lowest in Poland, which – despite the high implied yield – is not accompanied by major outflow of FDI income.

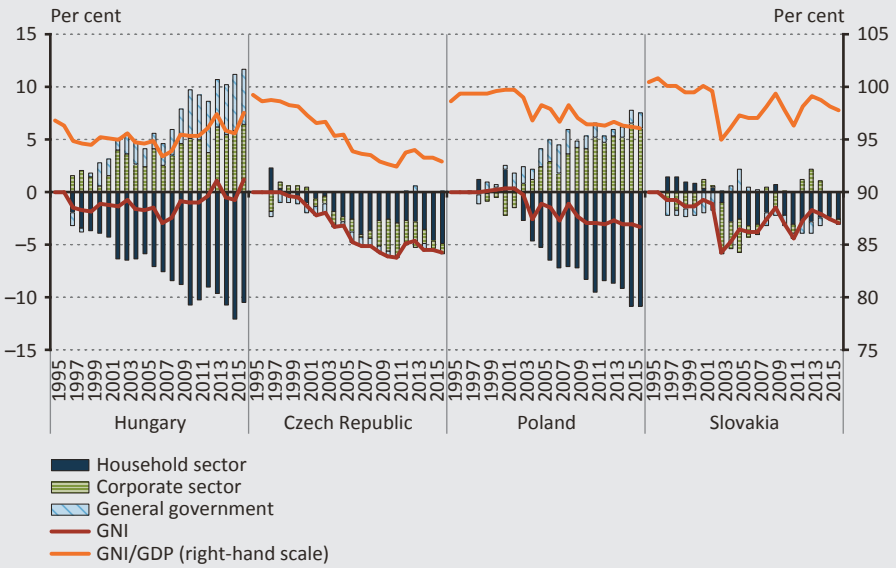
Figure 11
Foreign direct investment stock and implied yield in the countries of the region



Source: Eurostat (2018)

The income of households as a percentage of GDP declined in all countries of the region, albeit to different degrees, while the income of corporations and the government rose primarily in Hungary and in Poland (*Figure 12*). Since 1995, the GDP-proportionate income of Hungarian and Polish households declined by roughly 10 percentage points, which was primarily attributable to the decrease in the wage share, but in the past few years the fall in interest incomes also had a significant impact. The rise in the government's income as a percentage of GDP was mainly seen in Hungary, the drivers of which have been already been presented. The GDP-proportionate income of corporations – due to a change of opposite direction compared to households – rose by roughly 5 percentage points in Hungary and Poland. The growth in the weight of the enterprises' income within GDP may be attributable to the improving profitability. As a result of the processes, in the past twenty years the GDP-GNI gap narrowed substantially in Hungary, while it somewhat widened for the regional competitors.

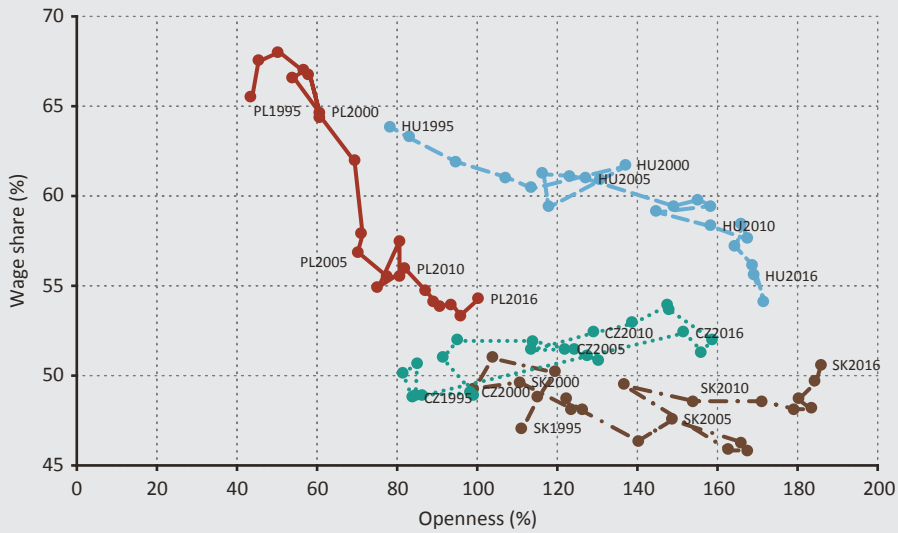
Figure 12
Breakdown of the GDP-GNI gap by sector



Note: Left-hand scale: change in the GDP-proportionate values, 1995=0
Source: Eurostat (2018)

The decline in the Hungarian and Polish household GNI may be partially attributable to the decrease in the wage share. There is more or less a consensus in the international technical literature that globalisation and the cross-border movement of products and services reduce the wage share. One reason for this is that the import-intensive sectors (manufacturing, commerce) must compete with countries with lower labour cost – and import competition encourages businesses to change over to capital-intensive production, thereby reducing the wage share. On the other hand, as a result of the decline in the wage share, businesses may use a smaller part of the earned income for employees and distribute the larger part thereof among owners. As regards the Visegrád countries, no such straightforward relation can be observed. While in the case of Hungary and Poland the increase in the openness of external trade – the sum of exports and import as a percentage of GDP – was accompanied by a decrease in the wage share, it remained more or less steady in the Czech Republic and Slovakia during the period under review. Accordingly, these processes may have made a major contribution to the fact that the decline in the GDP-proportionate household GNI was much larger than in the Czech Republic and Slovakia. At the same time, it should be noted that despite the fact that of the four countries, Poland can be regarded as the most closed economy, this is where the wage share declined to the largest degree. As a result of the developments and with varying degrees of economic openness, the wage shares in the countries of the region were at a similar level in 2016, around 50-55 per cent of GDP (*Figure 13*).

Figure 13
Wage share and openness to external trade



Source: AMECO (2017)

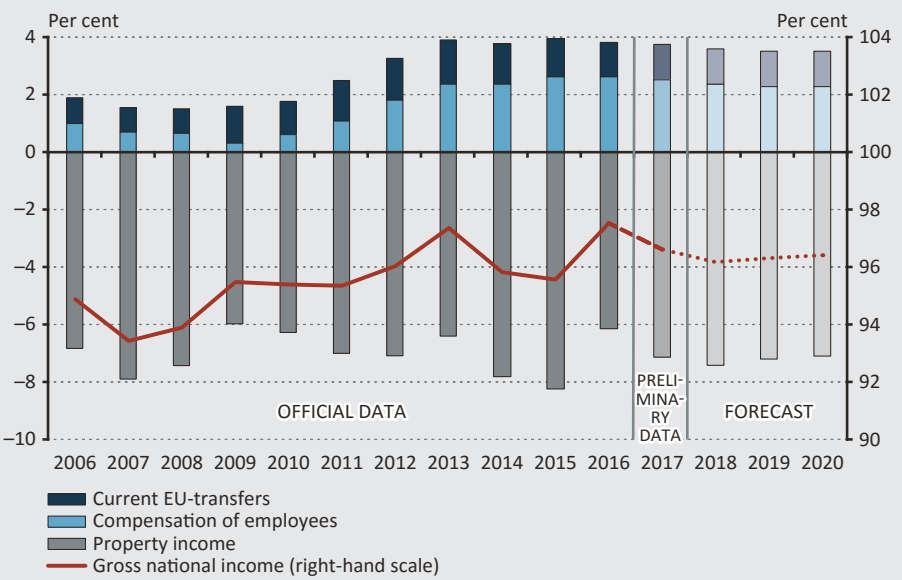
5. Anticipated developments in the GDP-GNI gap

5.1. GDP-GNI gap on the forecast horizon

Based on the preliminary data – mostly due to the rise in the profit of foreign-owned companies – the GDP-GNI gap widened in 2017. Although no official data are yet available for 2017, based on the available data, the increase in the primary income deficit may be accompanied by widening of the GDP-GNI gap. According to the preliminary data, the profit of foreign-owned companies rose, presumably due to economic growth and the decline in the corporate income tax, and this was accompanied by a decline in the compensation of employees due to the moderate decrease in the number of persons temporarily employed abroad (for less than 1 year). These two impacts were offset to some degree by the declining interest expenditure resulting from the continued decrease in external debt, which had the effect of the narrowing the GDP-GNI gap. According to the forecast in the Inflation Report, the decrease in the net interest expenditure paid to the non-resident sector is supported both by the continued decrease in net external debt and the low yield environment (*MNB 2017a*). The absorption of current EU transfers, stated under the primary incomes – the largest part of which comprises the area-based agricultural support received from the European Union – will steadily improve GNI in the next three years.

Looking ahead, over the short run, the rise in the FDI income of foreign-owned companies may be more or less offset by the decline in net interest expenditure, and thus the GNI-GDP gap may become stable (*Figure 14*). *Export performance is a key factor in the expected development of the income of foreign-owned companies.* Based on historic data, income on foreign direct investments shows significant co-movement with developments in the export performance of businesses (*MNB, 2017c*). The underlying reason for this is that the vast majority of foreign-owned companies produce mostly for export, and these companies play a major role in the development of the export performance of the economy. Accordingly, export performance is a determinant of the expected developments in the income from foreign direct investments, which – according to the Inflation Report (*MNB 2017a*) – is expected to expand further. At the same time, this process may be more or less offset in the coming years by the fact that – according to the net lending forecast in the Inflation Report – the volume of interest expenditure to be paid abroad may decline, in an environment of decreasing external debt and the current low level of interest rates.

Figure 14
GNI-GDP gap on the forecast horizon (as a percentage of GDP)



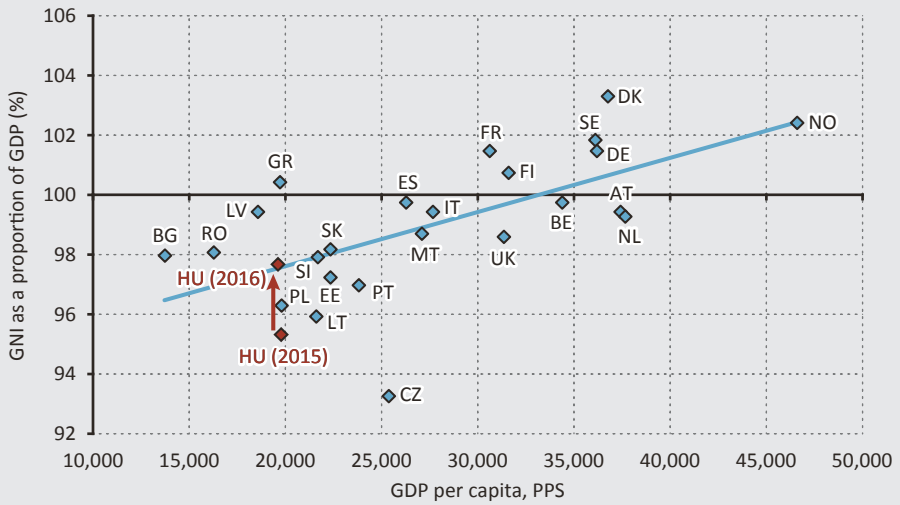
Source: HCSO (2018), MNB (2017a), own calculation

5.2. Developments in the GDP-GNI gap over the long run

Over the long term, in addition to external factors, the GDP-GNI gap will continue to be influenced primarily by the financing structure of the Hungarian economy. The area-based EU support represent a stable net inflow of income for Hungary over the longer run as well, while the outflow of income related to external debt may decline in parallel with the anticipated decrease in external debt. The return of Hungarian citizens working abroad to the Hungarian labour market (in line with the economic policy objectives) and the rise in the income of foreign employees working in Hungary (due to the increasing labour shortage in the economy) may reduce the net inflow of wage income, and thus have the effect of widening the GDP-GNI gap. The stock of foreign direct investments in Hungary is a condition which also substantially influences the volume of the outflow of FDI income, accounting for the largest part of the GDP-GNI gap. The long-term path of the GDP-GNI gap depends substantially on the financing structure of the Hungarian economy's convergence to the Western countries: if the investments supporting economic growth are financed from external liabilities, the GDP-GNI gap may widen, while it may narrow if they are financed from domestic savings.

There is a positive correlation between the level of development and changes in the GDP-GNI gap. In Europe, the GDP-GNI gap is typically smaller in the countries with higher GDP per capita: in the Western European and Scandinavian countries with the highest GDP per capita, GNI even exceeds GDP (*Figure 15).* This is primarily attributable to the fact that these countries are net lenders to the non-resident sector (*Lucas 1990*), while the net inflow of FDI income increases GNI. It should be noted that a positive net inflow of FDI income is possible not only in the case of a positive net international investment position, but also when the outstanding liabilities exceed foreign assets, if the return on foreign assets significantly exceeds the implied yield paid on the liabilities. In contrast to the aforementioned countries with positive primary balances, the Visegrád countries and the Baltic states – where financing from FDI is of significant degree – are net borrowers, with net outflows of income. It is worth highlighting the situation of the Czech Republic, where GNI falls short of GDP to a much larger degree than would be justified by its level of development, which is primarily attributable to the high profitability of the foreign-owned companies (the net interest expense is very low, as the foreign receivables of the Czech Republic even exceed its external debt).

Figure 15
Relation between the development and GNI as a percentage of GDP in 2015



Note: 1 PPS has the same purchasing power as on average 1 euro in the EU.
Source: Eurostat (2018)

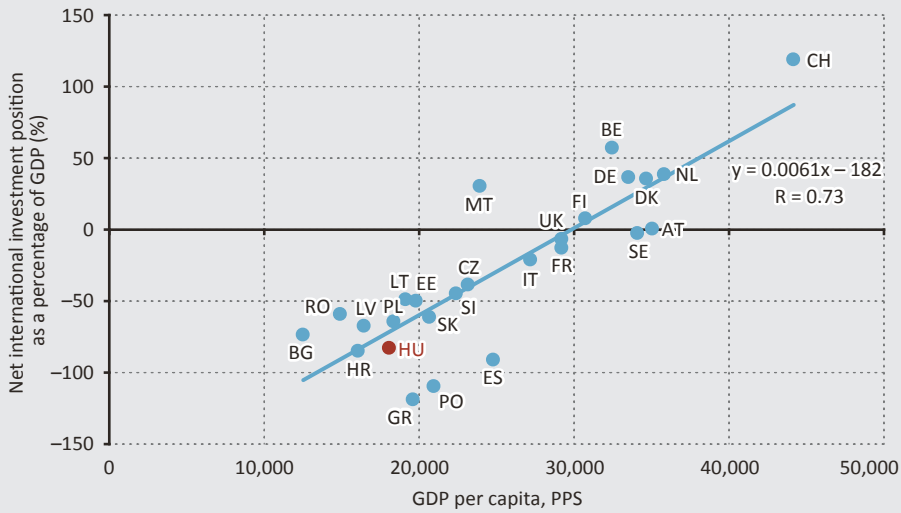
The net external assets of the developed Western economies are higher than those of the less developed countries (*Figure 16*)*, while the related income plays a decisive role in the development of GNI.* The international investment position, improving in parallel with the level of development, can be attributed to several factors (*Lane – Milesi-Ferretti 2002*).

- On the one hand, the domestic marginal product of capital will decrease in parallel with economic development, the profitability of the domestic investments will decrease, and thus investments abroad – with higher profitability – may gain ground. Accordingly, in countries with higher income, the volume of outward direct investments typically exceeds the FDI in the respective country, and the resulting net inflow of income increases GNI.

- On the other hand, the rise in household income – under the decline in the marginal utility of consumption – leads to a rise in savings, part of which flows abroad, thereby further increasing the stock of net foreign assets, and through that GNI.

- In addition, in the more developed countries, GNI may be higher due to the raising of external funds typically takes place from debt liabilities rather than by FDI, and the interest paid on it is usually lower than the profit on the capital invested. By contrast, in the emerging countries the possibility of debt financing is more limited, as foreign investors prefer equity investments, providing larger governance and information rights, in addition to the higher expected profit (*Komáromi 2008*).

Figure 16
Correlation between development and net external assets (average of 2010 – 2016)



Note: 1 PPS has the same purchasing power as on average 1 euro in the EU.
Source: Eurostat (2018)

Hungary's successful convergence to countries with higher income may result in narrowing of the GDP-GNI gap over the longer term. Hungary's net international investment position may improve in parallel with the rise in the development of the domestic economy (*Koroknai 2008*), which may reduce net outflow of income to the non-resident sector. In addition, improved competitiveness of the Hungarian economy may also support the rise of the income of Hungarian companies operating abroad, which – together with the financing of the Hungarian economy – may reduce the net outflow of FDI income and thereby also the GDP-GNI gap.

6. Summary

In the past decades, with the spread of globalisation, the gap between the output of the domestic economy and the income of residents has developed, and thus an increasing demand appeared in economics for macroeconomic indicators, which – as a supplement to the GDP indicator – can provide additional information on the distribution of incomes among the individual economic agents. Gross national income adjusts GDP for the balance of income from Hungary of residents living abroad and the income of domestic residents from abroad, and thus the departure thereof from GDP captures the difference of the domestic economic performance and incomes allocable to the domestic economic agents, and also provides useful information on the current burdens of the country's accumulated net outstanding foreign liabilities. In Hungary, prior to the crisis, the GDP-GNI gap was high in

a regional comparison, but after the crisis, it gradually decreased to the average of the region. This decline was the combined result of several factors: while the growth in the outflow of equity and foreign direct investment income (business profit) increased the GDP-GNI gap, the decline in interest expenditures resulting from the low yield environment and lower gross external debt, as well as the dynamic growth in the wage incomes from abroad – similarly to most of the countries in the region – reduced the GDP-GNI gap.

The income of foreign-owned companies operating in Hungary accounts for a large part of the GDP-GNI gap. The incomes from foreign direct investments, determining the GDP-GNI gap, are mostly related to manufacturing, and flow to the core countries of the euro area, and particularly to Germany and the Netherlands. The narrowing of the GDP-GNI gap – broken down by sectors – took place in conjunction with a rise in the GDP-proportionate income of the government and the corporate sector, while household income gradually declined. The underlying reasons for these developments were mainly the decrease in the wage share, observed internationally, the decline in interest expenditures and the rise in the government's tax revenues.

Looking ahead, the GDP-GNI gap is expected to increase moderately in the short run, as economic growth is still significant, and the cut in the corporate income tax may lead to a rise in the capital income of foreign-owned companies. In addition, domestic wage dynamics may support the return of Hungarian citizens working abroad to the Hungarian labour market, which – through the decline in the compensation of employees from abroad – in its own right suggests widening of the GDP-GNI gap, while the repatriation of Hungarian employees has a positive effect on growth over the long run. By contrast, the EU area aids represent a stable net inflow of income for Hungary over the longer term as well, in addition to which the interest expenditure linked to the decreasing external debt continues to help narrow the GDP-GNI gap. In the light of international experience, in parallel with the convergence of the Hungarian economy, the gap may narrow over the longer run, since in the more developed countries the GDP-GNI gap is typically smaller, which is attributable to the net international investor position, usually improving in parallel with the level of development. The long-term trend of the gap substantially depends on whether the convergence of the Hungarian economy to the Western countries is financed from external or domestic funds.

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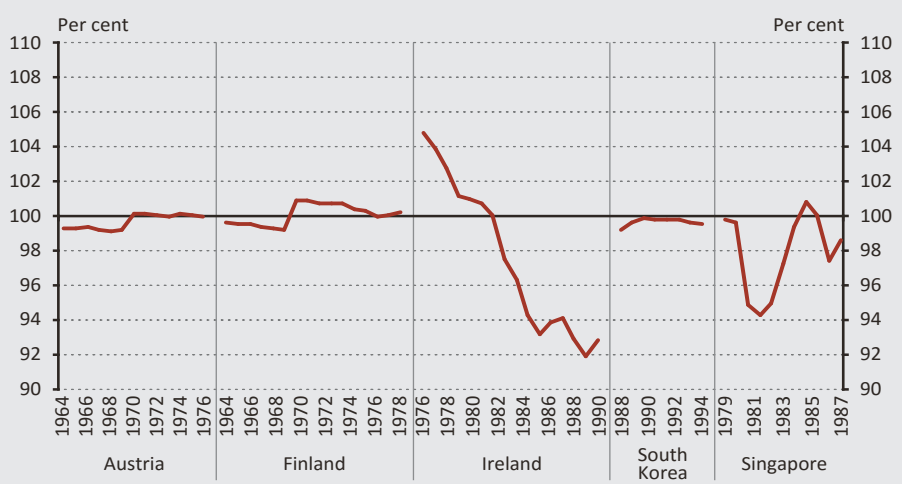
Appendix 1: Changes in the GDP-GNI gap of countries that successfully concluded the convergence process

At the end of the successful convergence period, the GDP-GNI gap typically closed (*Figure 17*). According to the experiences of the countries that successfully concluded the convergence process, the GDP-GNI gap gradually decreased during convergence:

- in Singapore, the FDI inflow was an important financing item throughout convergence, and a substantial part of the investments were realised from foreign direct investments. Accordingly, in the initial period of convergence, the GDP-GNI gap widened substantially. However, as a result of outward investments – primarily of debt type – characterising the years after the mid-1980s, this gap started to close.
- In Finland, the initially significant inflow of funds decelerated during convergence, which led to the closing of the GDP-GNI gap.
- In South Korea and Austria, there was hardly any gap between GNI and GDP, which may have been due to the negligible volume of net external financing.
- Ireland is an exception, as the FDI inflow attributable to the favourable tax system caused GDP to soar, also accompanied by a significant rise in debt liabilities. These factors together led to a large GDP-GNI gap, the narrowing of which took place only after the adjustment, commencing at the end of the 1980s and impacting the debt liabilities.

On the whole, it can be stated that in the countries that have concluded the convergence process successfully, the GDP-GNI gap usually decreased close to zero by the end of the convergence period.

Figure 17
GDP-GNI gap in the states that concluded convergence successfully

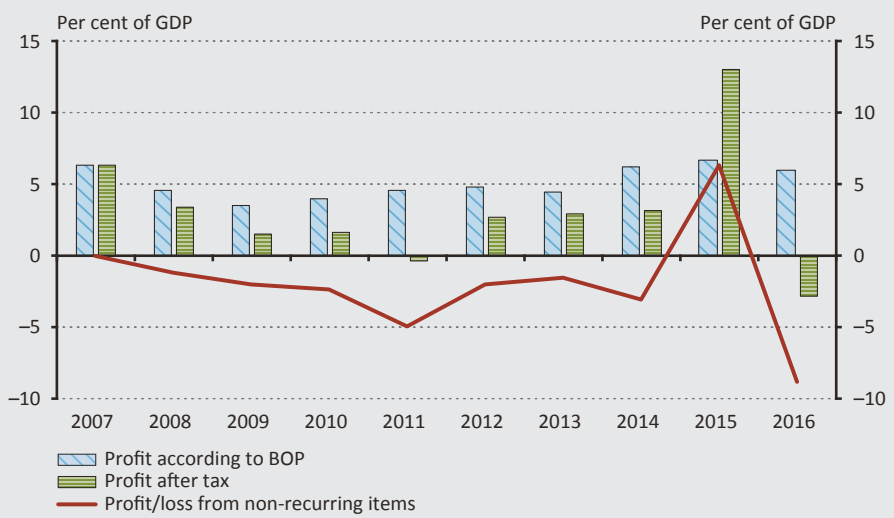


Source: World Bank

Appendix 2: What does the FDI income in GNI show?

In accordance with the statistical methodology, the income shown in the corporate sector is the result of corporations' normal operating items, which is typically higher than the corporations' profit after tax (*Figure 18*). In the post-crisis years, the after-tax profit of the corporate sector declined substantially, which was also influenced by one-off items (e.g. in the case of banks, the conversion of foreign currency loans at a preferential exchange rate, loan loss provisions). By contrast, the income of non-resident companies in the balance of payments, and thereby in the GDP-GNI gap, declined only slightly and remained positive in all years. The difference is attributable to the fact that the GNI-GDP gap, similarly to the balance of payments, reflects the profit/loss of corporations (including banks) under the current operating performance concept (COPC) rather than their profit after tax. This adjusted profit/loss item contains corporations' normal operating profit, and eliminates the impact of one-off, non-permanent profit/loss items, usually resulting from exchange rate fluctuations (*MNB 2014*). Between 2008 and 2014, the degree of this adjustment in the financial and non-financial corporate sector amounted to 2.4 per cent of GDP on average, while in 2015, a major one-off profit related to the international reorganisation of a multinational group, and in 2016 a loss of similar magnitude influenced the corporations' profit after tax. However, as these items cannot be deemed permanent, they are not reflected in the incomes of the balance of payments or in the GDP-GNI gap.

Figure 18
COPC profit and after-tax profit of foreign-owned companies



Source: MNB

In addition to the recognition for the purpose of statistics, the FDI incomes included in GNI are also influenced by the individual tax optimisation decisions of companies. If the income of corporations is reallocated among the individual countries already before taxation (e.g. a company pays licence fee to the parent company), it results – in addition to the growth in other items (typically imports) in the balance of payments – in a decrease in the income from profit. The law prescribes the use of arms' length prices for the settlement of the transactions between related companies, which in theory prevents abuses, but in the case of multinational companies, sales even at such arm's length prices may result in major reallocation of revenues. In the absence of aggregated data, it is not possible to quantify the magnitude and direction of the effect of these strategies on the domestic net outflow of FDI income, but it is worth highlighting the role of this in the changes in the GDP-GNI gap.

Although the entire corporate income reduces the value of GNI, this does not mean that the companies distributed this income to the owners, as a large part thereof was reinvested in the economy – however, this appears as external liability at the companies. Although the GDP-GNI includes the total corporate income, this does not mean that these incomes are transferred to the home country. The GDP-GNI gap only reflects the difference between the income holders. The generated income can be broken down further at the companies based on whether the owner thereof has distributed it as dividend (practically transferred to the home country) or reinvested it in the respective economy. That is, part of the corporate income reflected in the GDP-GNI gap does not effectively leave the economy, but the owners reinvest it and it finances the continued operation and investments of the company.

Remittances – First Results of a New Survey*

László Kajdi

With the surge in emigration, the level of support provided by Hungarians living and working abroad to the households remaining in the home country has come to the foreground both in Hungarian public discourse and scientific research. For the most part, the research focuses on the contribution of remittances to the economy of developing countries, and only a few studies address the role of these funds in the context of migration processes within the European Union. In the course of 2017, in cooperation with the Hungarian Central Statistical Office, the Magyar Nemzeti Bank conducted a survey on this subject under the title "Family Assistance". For the first time, as a supplement to macrostatistics-based estimates this survey provides an opportunity to glean information about the underlying factors of remittances and about the characteristics of the senders as well as the receiving households. Initial results indicate, among other things, that around one fifth of emigrants and more than 65,000 households in Hungary are affected by the phenomenon, and support from abroad is an important source of income for a significant portion of households.

Journal of Economic Literature (JEL) codes: F22, F24, J61, J68

Keywords: remittances, labour market flow, migration

1. Introduction

Research on remittances focuses primarily on the role of these funds in the economy of developing countries. Such transfers may entail a significant source of funds in times of an economic downturn in the recipient country, as the time profile of the volume of remittance-related capital inflows is far more balanced than for other sources, such as foreign direct investment. During the Eastern European enlargement of the European Union in 2004 and 2007, one of the main economic competitive advantages of the countries joining the Union was their cheap and relatively skilled workforce; consequently, with the free movement and employment of Eastern European workers, migration from this region to more developed Member States also intensified (*Blaskó – Gödri 2014*). Obviously, the motives of migration are not restricted solely to economic differences between

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

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the home and the host countries, but nor can the key role of these differences be debated. In particular, emigrants' intention to support their families at home with the higher wages earned abroad, i.e. to "remit home", may also be a major incentive.

It was not immediately after accession in 2004 that emigration from Hungary to Western European Member States and temporary employment began to surge. Although this process started relatively late compared to the rest of the countries in the region, with the migration surge observed in recent years the topic of the remittances of Hungarian citizens living and working abroad has gained increasing relevance. The assistance received may boost the standard of living and consumption of domestic households, which may somewhat offset the country's loss of human capital associated with migration. At the same time, with regard to remittances numerous problems may impede the understanding of the real situation. Indeed, the underlying basis of these problems, i.e. international migration, itself is a difficult-to-quantify socio-economic phenomenon involving various measurement problems, while due to the high percentage of informal capital flows and the data collection issues stemming from the sensitivity of such data, it is even harder to gain a clear understanding of the related flows of funds.

This study aims to facilitate a better understanding of the phenomenon of remittances by analysing the data of a detailed representative survey focusing specifically on remittances, which – to the best of our knowledge – is the first of its kind conducted in Hungary. Launched by the Magyar Nemzeti Bank (MNB) and conducted by the Hungarian Central Statistical Office (HCSO) in 2017, the "Family Assistance" survey collected empirical data to examine the sociodemographic features of the sender and the receiver sides as well as the characteristics of individual sending methods. The existing estimates relying on macro-level data can only provide aggregate information on the amount of remittances, while no data are available on the factors influencing the transfers. The research objective behind the survey was therefore to facilitate a better understanding of the underlying social processes. This study summarises the initial results of the survey. After providing an overview of the relevant international literature, we present the main trends and features identified in relation to remittances. This is followed by the data and estimates related to Hungarian migration and to the remittances of Hungarians living abroad. The third part is a brief description of the data content of the questionnaire-based survey forming the basis of the study, followed by a description of the characteristics of the receiving households and the senders. Finally, *Chapter 5* presents the conclusions drawn from the results.

2. Main features and trends of remittances

2.1. Remittances in the international literature

In most studies, the role of remittances is examined in relation to developing countries as this type of capital influx may play a considerable role in the economy of these countries. Among the positive features of remittances, the international literature notes that they represent a safe financial resource even when the economic performance of the home country deteriorates. Therefore, remittances also act as a stabilising force in economies that are more exposed to international impacts and exhibit much more volatile performance (*Mohapatra – Ratha 2010*; *World Bank 2016*). The surplus incomes provide the means for higher consumption among recipients compared to households not receiving remittances (*Juraev 2012*). In numerous countries, such as Mexico, the country's economy relies heavily on the support provided by citizens working abroad; in many cases, state programmes are launched to foster the more efficient utilisation of such transfers (*Soltész 2016*).

Among the migration theories, the new economics of labour migration is one of the most important concepts in relation to remittances (*Massey et al. 1998*). According to the theory, remittances should not be regarded merely as charity, but as a contractual arrangement between the emigrant and the non-migrating family members, in accordance with which the migrant compensates the initial migration costs covered by family assistance through remittances. This relationship can also be understood as a coinsurance between the two parties (migrants and non-migrants) (*Stark – Bloom 1985, Stark – Lucas 1988*). Numerous studies have also been published on the determinants of remittances. For example, the economic situation of the home and the host countries and the sender's disposable income (*Jiménez-Martin et al. 2007*), demographic factors such as the sender's gender or dependency ratios in the host and home country households, labour market characteristics, the sender's economic activity and occupation or, in the case of certain countries, features pertaining to the level of development of the cultural and payment infrastructure may influence the amount of the remittances. Relying on data from a nationwide, representative, questionnaire-based survey conducted in Mexico, a study by *Airola* (*2005*) suggests that the income of the receiving households was below the national average; in their case, household heads were more likely to be women, or elderly or less educated persons. Using the results of a representative, questionnaire-based survey, *Lopez et al.* (*2009*) found that among Latino households in the United States the likelihood of sending remittances is independent of the sender's disposable income, which only affects the amount of the remittances: Hispanic migrants tend to send (any amount of) money abroad at nearly the same rate whether they are high earners or low earners. According to a study analysing data from 14 remittance-specific, questionnaire-based household surveys covering 11 destination countries, more educated migrants are more likely

to remit (*Bollard et al. 2009*). Based on a survey processing the data of 60 countries (including Hungary), *Issahaku et al.* (*2017*) concluded that efficiently functioning bond markets subdue remittances in developed countries but promote them in developing countries.

With respect to Europe, it should be noted that the level of development of the payment infrastructure and European directives regulating cross-border payments help enable migrants working in Western Europe to send money home faster and cheaper (*Pemberton – Scullion 2012*). By contrast, in the case of payment flows from Russia to the post-Soviet republics, a substantial part of electronic payments is executed via cash transfer instead of bank transfer and accordingly, the transaction fees on cash transfer affect the remittance amounts significantly (*Kakhkharov et al. 2017*). Providing assistance to the households remaining in the home country has become increasingly important in Eastern European countries as well. This is partly because migration was typically only able to begin in earnest after the collapse of the socialist regime, from the early 1990s. In some cases, this subsequently intensified further following accession to the European Union and the free movement of labour afforded by the EU membership across Western Europe. This increased importance, i.e. the exponentially increasing economic role of remittances and the "dependency" of receiving countries, is presented in *Böröcz* (*2014*) with respect to post-socialist states. The author emphasises that the phenomenon of remittances cannot be explained merely by global inequalities in income levels in accordance with the classical "push-pull" migration theory, as remittance strategies and trajectories can differ in numerous regards even between states with approximately identical levels of per capita GDP. Examining macro data from Eastern European countries, *Schrooten* (*2005*) found that remittances are strongly influenced by the unemployment rate and the insufficiency of retail lending in the country of the receiving household. In their study examining six Eastern European states, *Meyer – Shera* (*2016*) observed a positive relationship between remittance flows and economic growth. In addition, as confirmed by Polish examples (*Krzyzowski – Mucha 2014*), remittances play a crucial role in taking care of older parents in "transnational" households. Moreover, drawing on data collected in a questionnaire-based survey in Moldova, *Pinger (2009*) noted that temporary migrants remit around 30 per cent more than their permanent counterparts. According to their research conducted in Macedonia, *Roberts et al.* (*2008*) found that the vast majority of remittance-receiving households have only one person from the family working abroad. 56 per cent of the senders are blue-collar workers, and more than 40 per cent transport the funds home physically in cash.

Drawing on household surveys to examine remittances raises a variety of special questions. For example, should we consider financial transfers only or other, non-financial assistance as well? Does the survey cover instances where several family

members make remittances? Can the data distinguish between temporary and permanent migrants? The way in which these questions are addressed may alter the results significantly (*Brown et al. 2014*).

2.2. Remittances and the current account

The clarification and precise definition of the concept of "remittances" are also required for the interpretation of the results of this survey. Firstly, it is important to clarify the concept of "resident" in the context of remittances and the current account. In statistical terms, "the resident status of an economic unit in a given country depends on the existence of the centre of predominant economic interest rather than on citizenship or nationality" (*MNB 2014:7*). From the perspective of the balance of payments, the sender's migration status is insignificant. The residence of the sender is basically determined by the duration of his stay abroad: being present for one year or more in a territory is sufficient to qualify as being a resident of that economy, whereas short trips to other economies – for work or other purposes – do not lead to a change of residence and the person continues to belong to the country of his previous household (*IMF 2009:276*). The concept of remittances as defined by *IMF* (*2009*) include cash and non-cash items irrespective of whether they flow through formal channels, such as via electronic wire, or through informal channels, such as being carried across borders personally to the receiving household.

In the balance of payments, there are essentially two items which are linked to remittances. The income of workers living abroad temporarily (compensation of employees) is recorded on the primary income account. This item includes the gross income of short-term workers, i.e. in addition to remittances, taxes and social contributions and the sender's costs of subsistence are also presented here. The remittances of long-term workers[1] are considered secondary income; in other words, they entail a relationship between a resident and a non-resident. However, personal transfers embody a broader concept, irrespective of whether the income originated from work or from another source. The two categories, supplemented by household-to-household capital transfers, constitute personal remittances (*IMF 2009:274*).

There was a need to clarify the above because, on the one hand, various surveys often use different categories and definitions. On the other hand, information can be gleaned from the "Family Assistance" survey for all sub-categories, i.e. senders can be distinguished according to the countries in which they are residents, transfers in cash and in kind can be separated, and the channel through which cash transfers flow can be identified. In addition, the survey presents remittances in net terms: in other words, as regards the incomes of workers living temporarily abroad, there is no need to make separate estimates for wage costs and the amount sent. This

[1] Personal transfers, which replaced the "workers remittances" line of BPM5.

provides the means for comparability between the survey results and the data presented in the individual lines of the balance of payments. The remittance-related concepts included in balance of payments statistics (e.g. compensation of employees, transfers) and recent developments therein were presented in detail by *Csortos – Kóczián* (*2017*).

2.3. Migration and remittances in the case of Hungary

As a consequence of the Eastern European enlargement of the European Union, emigration from Eastern European countries to Western Europe gradually intensified as barriers to employment abroad were removed in the host countries. Hungary joined this process relatively late, and the emigration of Hungarian citizens only started in earnest after the opening of the German and Austrian labour markets from 2011. As a result of the increasing labour absorption capacity of the destination countries and the 2008 crisis, around 100,000 Hungarian citizens may have emigrated annually based on mirror statistics. It should be noted, however, that the same data indicate a significant degree of remigration: in the case of Austria and Germany around one half of the migrants are shown as persons returning to the home country. Migrants often neglect to register their departure from the home country with the authorities and accordingly, official statistics are often biased. Using the immigration statistics of destination countries – i.e. mirror statistics – may yield more realistic data. Eurostat data supplemented with census data indicate that around 330,000 Hungarians lived abroad in 2014 (*Blaskó – Gödri 2014*).

Based on the 2011 Population Census, 143,000 persons reported to have lived abroad for at least one year; 70,000 reported to have stayed abroad for less than a year and another 27,000 persons commuted daily to their foreign employment from their Hungarian residence. The vast majority of the latter (22,500) found employment in Austria (*HCSO 2015*). It is important to remember, however, that the census cannot provide any data in cases where the entire household emigrated abroad.

Numerous research projects have attempted to estimate the number of emigrants, such as *Kapitány – Rohr* (*2014*), where the authors estimated the number of Hungarian citizens living abroad at 335,000 based on the data of "The Turning Points of the Life Course" survey. Similarly, according to the estimate of the "Hungarians Abroad" research of the SEEMIG project[2] which focuses on the migration processes of the Eastern European region, around 350,000 persons lived abroad at the beginning of 2013 (*HCSO – SEEMIG 2014*). Based on the latter survey's representative data on emigrants, the young, 20–39 age group is significantly over-represented among the Hungarians living abroad relative to the Hungarian resident population; moreover, the number of persons with higher education is significantly

[2] SEEMIG – Managing Migration in South East Europe transnational cooperation project.

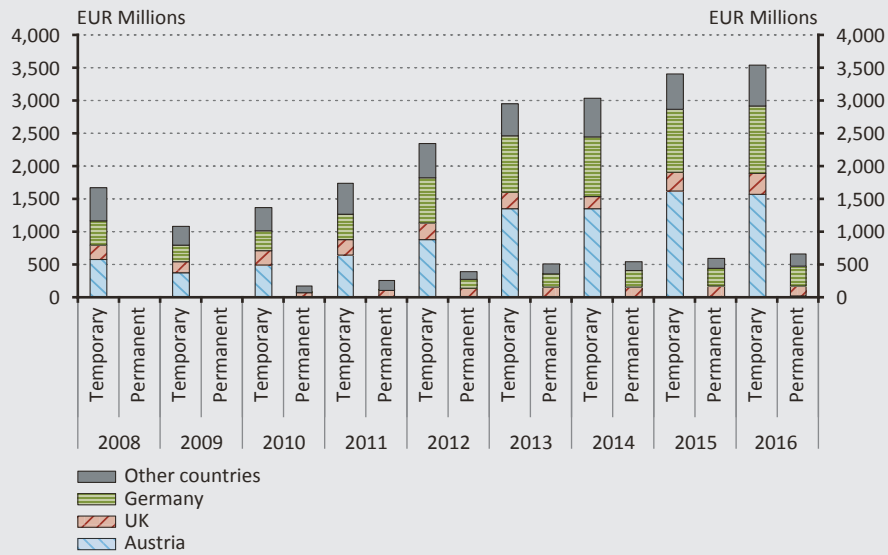
higher in this age group. As regards destination countries, the United Kingdom is primarily hosting unmarried young persons with university or college degrees, whereas the most predominant immigrant group in Germany primarily comprises skilled male workers (*Blaskó – Gödri 2014*). Research by *Bodnár – Szabó* (*2014*) on Hungarian cross-border commuters found that commuters tend to be younger relative to the Hungarian population. They mainly comprise persons with secondary qualifications; however, they typically find employment in positions that require lower qualifications than what they hold.

The methodology of the compilation of macrostatistics on workers' remittances to Hungary from income earned abroad as presented in the balance of payments was described in detail in a study by *Bujnóczki* (*2017*). As regards the number of Hungarian residents working temporarily abroad, the data of the Hungarian LFS[3] are used. Next, gross average earnings are defined based on Eurostat data – in the case of Austria, the United Kingdom, Germany and Italy by economic sectors – and, multiplied by the number of employees for the estimation of the total sum of wage amounts. These figures are then adjusted by a 0.9 multiplier, assuming that Hungarian employees earn less than the average wages prevailing in the given countries. In order to estimate the personal transfers of Hungarian employees working abroad on a long-term basis, Eurostat employee numbers (number of Hungarian citizens in the population data of foreign countries) are utilised, from which the LFS's figures on short-term employment abroad are deducted. For each country reviewed, first the estimated tax and contribution payments and then the EU-wide average consumption expenditures are deducted from the gross average wage data calculated as described above. Half of the resulting per capita savings are considered as remittances, and this amount is then multiplied by the number of employees. In summary, the amounts shown in the relevant lines of the balance of payments refer to the amounts available to remit (for example, employees working temporarily abroad do not necessarily send their entire earnings home), whereas respondents of the Family Assistance Survey provided information on the specific amounts sent home as remittances.

Based on the balance of payments data on incomes transferred by Hungarian citizens living abroad, in the case of temporary workers ("Compensation of employees for workers in temporary employment abroad") the two most important destination countries are Austria and Germany (*Figure 1*): these countries accounted for nearly three fourths of the total amount of around EUR 3.5 billion (approximately HUF 1,050 billion) in 2016. The transfers of employees working permanently abroad have increased continuously since the crisis and by 2016 they amounted to EUR 700 million (around HUF 210 billion) (*Csortos – Kóczián 2017*).

[3] Labour Force Survey, the most extensive ongoing household survey conducted by the HCSO.

Figure 1
Compensation of employees for Hungarians in temporary employment abroad and personal transfers of employees working permanently abroad according to the balance of payments, 2008–2016



Source: Eurostat[4]

3. Data applied

The MNB signed a contract with the HCSO in 2017 to conduct a questionnaire-based survey entitled "Family Assistance" on the subject of remittances, in the framework of which 3,029 households were contacted for data collection. Data collection lasted from 1 May to 6 June 2017; the base period was the year 2016. Random sampling was applied using the HCSO's address register for statistical purposes, and a stratified, multi-step sampling procedure was used for the data collection. The survey is nationally representative of private households; the observation unit was the range of Hungarian private households. After the questionnaire had been designed, the questions and the wording of the questions were finetuned further in the framework of five cognitive tests. The main topics covered by the questionnaire included, in essence, the key features of the receiving households and household heads, the amount and method of the remittances, and the sociodemographic characteristics and living conditions of the senders.[4]

By 12 May 2017 at the latest, the enumerators notified the affected households, in the context of which households were requested to participate in the survey,

[4] *Personal transfers and compensation of employees*, Eurostat. http://ec.europa.eu/eurostat/web/products-datasets/-/bop_rem6. Downloaded: 13 December 2017.

received an information sheet on the option of filling out the questionnaire online, and received the contact information of the enumerators. After the initial notification the respondent households had an opportunity to complete the questionnaire in the first two weeks of May 2017 using the online portal developed specifically for this purpose (CAWI). If the allotted time had passed without appreciable responses, the enumerators either visited the households for a personal interview (CAPI), or collected the data over the phone (CATI) by no later than 6 June. Finally, during the data collection 1,325 households reported to be recipients of assistance from abroad. With respect to the individual data collection methodologies it was observed that the vast majority of successful answers (1,223) were collected during personal interviews. Only 39 households opted for completing the questionnaire online, and 63 interviews were conducted over the phone. Although face-to-face interviews are more resource-intensive, presumably, they contributed greatly to the fact that a relatively high percentage of the respondents replied even to questions involving fairly sensitive (e.g. income) data. Moreover, the improvement observed in data quality can be partly attributed to the special advance training of the enumerators and the helpful advice they could thus provide to respondents during the completion of the questionnaires.

4. Results

4.1. Characteristics of receiving households

Extrapolating the survey data, we find that assistance from abroad reached a total of 67,548 Hungarian households; in other words, at least 1.6 per cent of the 4 million households[5] recorded in Hungary is affected (if the entire household is residing abroad even for a period of less than a year, contacting them may become problematic, which may lead to a slight bias – underestimation – in the results).[6] Two-person households represented the greatest share (34.5%) in receiving households, but the percentage of single-person and three-person households was also considerable (24.1% and 22.1%, respectively). A comparison between the number of household members and the data of the 2016 Microcensus (*HCSO 2017*) reveals that there is no significant difference between the data on receiving households and the data on the households encompassing the entire Hungarian population. Of all receiving households 4,453 households reported to have also received assistance from a second person, whereas only 239 households indicated a third sender as well. Half of the households (33,736 cases) received assistance solely from Hungarian

[5] Number of households, characteristics of persons by income-earning activity, age group and educational attainment of reference person and by age structure of household members. HCSO Stadat 2.2.3.7. http://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_zhc024a.html. Downloaded: 1 December 2017.

[6] For the purposes of the data collection the HCSO applied – in full compliance with data protection rules – targeted sampling; consequently, it achieved a high response rate of over 40 per cent. Therefore, even though the percentage of those indicating remittances in the sample is high, projected to the total population this results in a lower ratio.

residents; i.e. persons only temporarily staying abroad, while in the rest of the cases at least one person among the senders stayed permanently abroad.

The data collection also yielded detailed information on household heads. According to the survey, regarding the age composition and the role played within the household, household heads are predominantly members of the older generation. 50 per cent of all household heads are above 55 compared to the 34.8 per cent share observed in this age group within all Hungarian households.[7] As regards their roles within the household, half of the household heads (50.58 per cent) are either married or have common law partners, while 30 per cent of them are single. With respect to the latter category, the difference observed between the number of single-person households and the number of single household heads (16,286 vs 20,149) can be basically attributed to the differences in their definitions: a person may consider himself single, but the sender of the assistance is a Hungarian resident, i.e. he/she is taken into account as a member of the household in addition to the household head. The age composition leads us to conclude that the more mobile, young and middle-aged children are more likely to support their elderly parents, and this will also be confirmed by the additional data presented below. Half of the household heads (50.28%) are male, and this proportion does not change materially with age. Moreover, nearly all of them (99.6%) are Hungarian citizens. The percentage of persons with primary, secondary and tertiary education (14%, 60% and 26%, respectively) corresponds to the proportions observed with respect to all Hungarian households.[8]

The graphic examination of the per capita income of households shows that a strongly right-skewed, nearly lognormal distribution can be hypothesised *(Annex, Figure 7)*; the average is HUF 100,000 and due to the low non-response rate (total answers regarding income: n=1,291) the results can be considered sufficiently robust. Compared to data pertaining to the total Hungarian population,[9] no significant difference can be observed between per capita net incomes by the age group and education of household heads among receiving households.

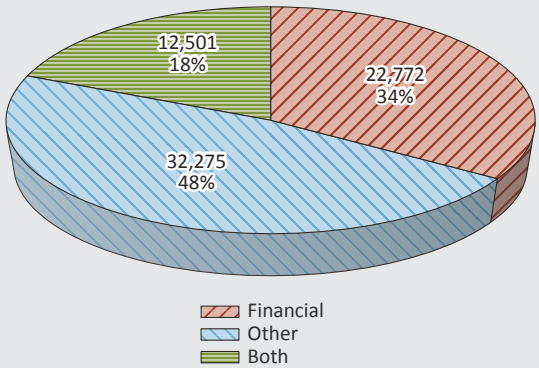
4.2. Characteristics of remittances

Remittances from abroad were separated in the questionnaire, according to the method of assistance: financial, other (non-cash) or both *(Figure 2).* Respondents were asked to indicate any low or high-value material assistance among non-cash items (e.g. electronic devices, food, automobile) or any services used in Hungary but paid by the person living abroad (e.g. travel, training). According to the method

[7] Data of total households by age group and educational attainment of reference person and by age structure of household members (2010–) HCSO Stadat 2.2.1.2, 2015. http://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_zhc015a.html. Downloaded: 1 December 2017.
[8] Data of total households by age group and educational attainment of reference person and by age structure of household members (2010–) HCSO Stadat 2.2.1.2, 2015. http://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_zhc015a.html. Downloaded: 1 December 2017.
[9] Data of total households by age group and educational attainment of reference person and by age structure of household members (2010–) HCSO Stadat 2.2.1.2, 2016. https://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_zhc015a.html. Downloaded: 1 December 2017.

of assistance, almost 48 per cent of the senders send non-cash items only, while around one-third support non-migrant family members exclusively with cash. In general, household members living abroad are somewhat more likely to support their non-migrant family members through material donations or services purchased.

Figure 2
Number of items received by receiving households according to assistance method

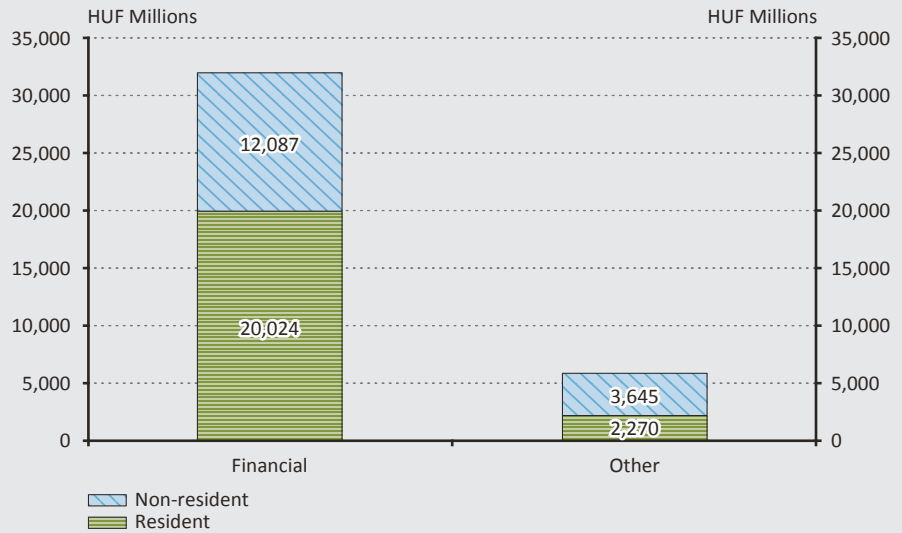


Source: Family Assistance Survey

For a variety of reasons, in the residency breakdown we considered the duration of the first sender's stay in a foreign country. Firstly, this was because the ratio of second and third senders is extremely low. Secondly, according to the instructions of the questionnaire, households were asked to identify the person sending the largest assistance as the first sender. Moreover, the amounts received by the household were not broken down by sender in the structure of the questionnaire. There are no considerable differences according to residency (i.e. number of resident or non-resident remittance senders) – the proportion of senders living temporarily or permanently abroad is roughly 50–50%.

However, once we examine the question according to the amount received, the result is considerably different: more than 84 per cent of the HUF 38 billion total assistance amount is financial-type support. In summary, as regards the method of the assistance, household members living abroad are more likely to send low-value objects (e.g. food), but when it comes to financial assistance, they allocate significantly larger amounts for this purpose. This can be explained by a variety of reasons: for example, it is more difficult and costly to send physical objects home; in addition, receiving households also favour cash, which can be used flexibly for many different purposes. This means (*Figure 3*) that, while the distribution of senders by residency was roughly half-and-half, according to the amount sent the proportion of the remittances sent by Hungarian residents (i.e. persons living abroad only temporarily) is more than 58 per cent (HUF 22 billion).

Figure 3
Amount of assistance received by receiving households by assistance method and the residency of the first sender, HUF millions



Source: Family Assistance Survey

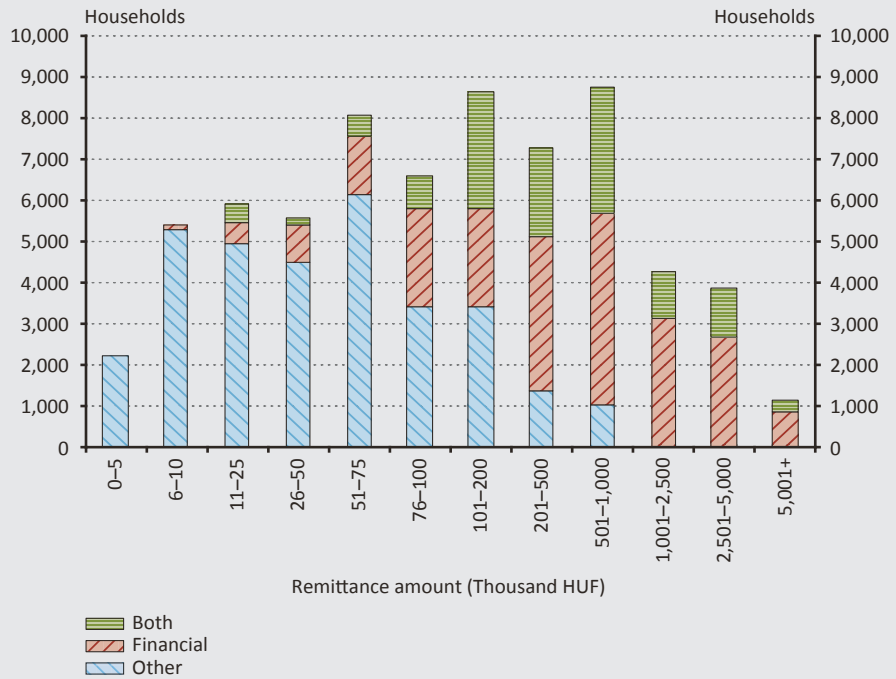
13.1 per cent of the households receiving other non-cash assistance (nearly 5,900 households) were given infocommunications devices. In the case of 7,031 households, the person(s) living abroad paid for some service, such as travel or schooling. The share of high-value material assistance – e.g. purchase of cars or real estate for non-migrant family members – was, as expected, extremely low (around 2.5 per cent). 85 per cent of the households receiving other non-cash assistance reported to receive primarily clothing or food. The structure of the questionnaire did not permit the breakdown of the material assistance categories by the amount sent as more than one answer could be selected for the type of non-cash assistance.

In summary, based on the Family Assistance Survey, the magnitude of total remittances – HUF 38 billion – significantly differs from that of the incomes available to remit – HUF 1,260 billion – as calculated from the lines of the balance of payments. It is important to see, however, that this may also be the result of definition differences, as the relevant lines of the balance of payments do not exclusively contain the actual assistance sent home. On the other hand, some respondent bias may also arise from the sensitivity of the data on personal finances and from the nature of the questionnaire-based survey. Nonetheless, examining the difference could be the subject of further analysis.

As shown by *Figure 4*, the distribution of the remittance amounts is right-skewed, close to lognormal. The average remittance amount was HUF 563,000 during a period

of 1 year; in the case of cash transfers, the amount was higher (HUF 910,000) and in the case of other non-cash transfers it was lower (HUF 132,000). Nearly three fourths of the cash remittances (73.7 per cent) were sent by persons who support the Hungarian household exclusively in this form, while in the case of one fourth of

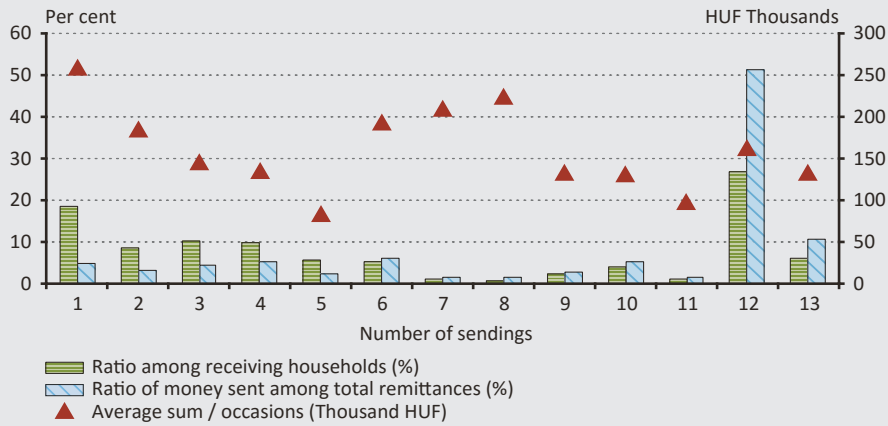
Figure 4
Distribution of remittance amounts by assistance method



Source: Family Assistance Survey

the amount the remittance was supplemented with other, non-cash assistance forms. In the case of cash transfers, the survey also included a question on the frequency of transfers *(Figure 5).* One fourth of the receiving households (about 27 per cent) received monthly transfers. In terms of the amount, these transfers accounted for more than a half of the remittances (51 per cent). This is an important piece of information, indicating that a large number of households (around 9,400) received regular transfers, i.e. they could expect a predictable source of income when preparing the family budget. Nearly one half of the households (47.4 per cent), however, received transfers four times or less – in their case, the transfers represented a one-off occasion and the households concerned received only 17 per cent of the total remittance amount sent to Hungary. The average amount sent on individual occasions typically ranged between HUF 100,000 and HUF 200,000. The highest figures were reported by Hungarian households that received only one transfer per year.

Figure 5
Distribution of the frequency and amount of cash transfers and average amounts remitted per occasion by number of transfer events



Source: Family Assistance Survey

Examining the number of transfer events, no appreciable difference can be observed between short-term and long-term workers; monthly transfers are predominant in both groups. Similarly, based on the frequency of the transfers, no significant difference can be detected between senders supporting the household only through financial or other non-cash transfers from abroad.

Comparing the remittance amounts (financial and other non-cash together) to the total income of the respective households, we found that the contribution of remittances to the income of households, as expected, is smaller among households in better income positions (i.e. higher per capita income). Remittances account for around 15–20 per cent of the household's income in the case of households with a per capita monthly income of HUF 90,000, which characterises about a half of the households. This is consistent with the results of the Macedonian survey presented by *Roberts et al.* (*2008*), which indicated that remittances accounted for maximum 30 per cent of the household's income for 43 per cent of the recipient households. It is also clear, however, that remittances are presumably important contributors in the finances of the poorest households. Indeed, according to the results of the survey, the income originating from such transfers may reach or even exceed the incomes originating from other sources (e.g. work or social assistance).

4.3. Characteristics of remittance senders

We have constructed a separate database for characterising the range of senders, where each person represents an independent record; accordingly, instead of 1,325 cases we examined 1,427 records. After extrapolation, this implies 72,240 senders; in other words, assuming that the number of Hungarians living abroad is around 340,000, more than one out of five persons working abroad sends remittances. As

regards gender distribution, almost 62 per cent of the senders are male, although this percentage is somewhat lower (56.7 per cent) among non-resident senders. The ratio of women to the total population average is higher among second and third senders (58.7 and 48.1 per cent, respectively). In terms of age distribution, the ratio of ages 25–44 is significant; two thirds of the senders belong to this category. This confirms the hypothesis arising based on the age distribution of household heads; namely, that the typical senders are representatives of the younger generation, providing financial support to their elderly parents in the home country. This is also consistent with the sender's link to the given household: 65 per cent of the respondents chose "child" from the possible options, and only 17.6 per cent indicated "spouse" or "common-law partner". It is also important that non-relative senders represent only 1.8 per cent; that is, based on the survey, the phenomenon of remittances is linked almost exclusively to intra-household transfers.

In terms of education, the overwhelming majority of the senders have secondary education; 32.5 per cent of them are skilled workers and 27.3 per cent hold a secondary school leaving certificate. This is consistent with the results presented by *Bodnár – Szabó* (*2014*) in the case of cross-border commuters. Among non-residents (i.e. persons living abroad on a more permanent basis), the proportion of blue-collar workers is somewhat lower (27.2 per cent), and the ratio of persons with college or university degrees is higher. 28.9 per cent belong to the latter group compared to 19 per cent among the persons living abroad on a temporary basis. In line with preliminary expectations, the group of senders is fairly homogeneous in terms of economic activity: 94 per cent of them work abroad, while unemployed or retired persons, students and those classified as "other" represent less than 6 per cent. The composition of the senders according to main HSCO[10] occupational groups *(Table 1)* reveals that the group of persons working in construction and industry is predominant (21.9%), followed by the group of persons working in the trade and services sectors (18.4%) and the group comprising unskilled workers (13.7%). In more detail, the most important categories according to HSCO groups are the following:

Table 1
Distribution of senders by HSCO group

HSCO group	Frequency (person)	Share (%)
Commerce and catering	10,447	14.5
Construction	7,438	10.3
Simple service, transport	4,587	6.3
Drivers and mobile machinery operators	4,368	6.0
Metal and electrical industry	4,305	6.0
Cleaners and helpers	3,512	4.9
Food industry	3,338	4.6
Technical, IT and science-related professionals	2,982	4.1
Other commercial occupations	2,877	4.0

Source: Family Assistance Survey

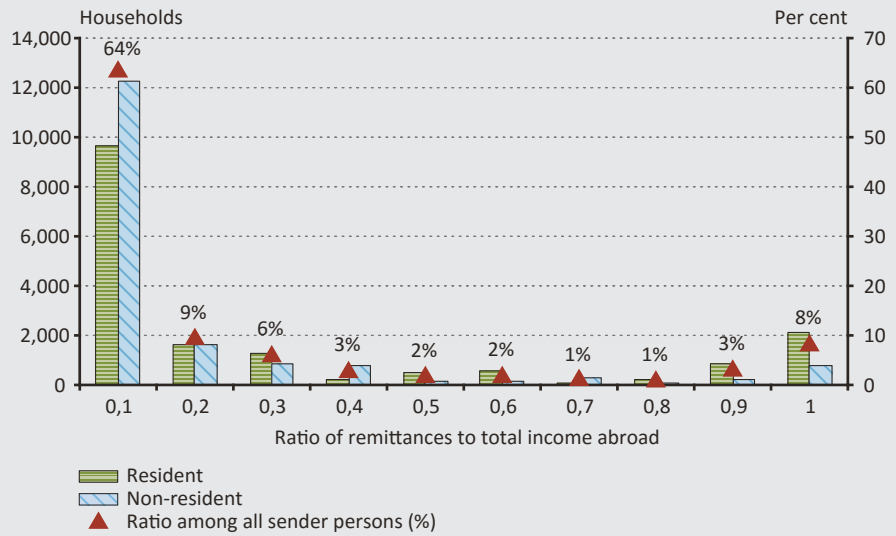
[10] The Hungarian Standard Classification of Occupation: https://www.ksh.hu/docs/szolgaltatasok/hun/feor08/feorlista.html. This is the Hungarian version of International Standard Classification of Occupations (ISCO).

Around one half of the senders replied to questions about their income. In order to achieve a higher response rate, they were allowed to choose between currency, annual or monthly frequency, and gross or net income. We converted the data into forints wherever another currency was chosen and for gross data we applied a multiplier of 0.67 to calculate net incomes. Obviously, this conceals the differences between the taxes and contributions payable in individual countries; however, in our opinion this is consistent with the HCSO methodology currently applied for calculating remittances and does not result in a material bias (*Bujnóczki 2017*). Annual and monthly salaries were recalculated for the months spent abroad in 2016 in order to receive net monthly incomes received during the period spent abroad. Examination of the income distribution thus received points to a lognormal distribution *(Annex, Figure 8).*

The ratio of the remitted amounts to the income earned by the sender during his stay abroad is also worth examining (*Figure 6*). For purpose of this exercise, the senders' respective incomes were consolidated wherever more than one sender was indicated, and the amount thus received was compared to the transfers received by the household. We found that nearly 64 per cent of the senders transfer only 10 per cent of their income at most to the Hungarian household, and around 80 per cent of the senders remit less than 30 per cent. In general, therefore, we can conclude that those working abroad remit only a small fraction of their income to their Hungarian households. According to the residency of the first person as the predominant sender, long-term (i.e. non-resident) workers are more likely to allocate only a small portion of their income to support their non-migrant family members: in this group, the proportion of persons remitting no more than 10 per cent of their income is more than 71 per cent (more than 12,000 senders), compared to 56 per cent among persons working abroad but maintaining their residency in Hungary (9,657 senders). From the other perspective, 17 per cent of the persons working temporarily abroad remit more than 80 per cent of their income, compared to 6 per cent among persons in long-term employment abroad.[11]

[11] An employee can bring home his entire income or nearly 100 per cent of it if he seeks only short-term employment abroad, and his travel and accommodation expenses, as well as meals are covered by the employer; in other words, if he does not necessarily need to spend any part of the income earned on consumption abroad.

Figure 6
Distribution of households according to ratio of remittances to net income earned abroad



Source: Family Assistance Survey

The survey also inquired about the method of the transfer, which may provide information about the percentage of remittances received informally in the form of cash. Although 37,000 senders indicated the method of the transfers, since they could select more than one answer, the remittances could not be broken down by amount. More than half of the respondents (55 per cent) reported cash remittances, while 40 per cent of the senders marked wire transfer, which is consistent with the Macedonian results (*Roberts et al. 2008*). The ratio of money transfer services was only 4 per cent.

4.4. Differences by country

It is also worth examining the differences observed with regard to remittances in terms of the sender's country and residency *(Annex, Table 2).* One third of all senders (72,240 persons in total) resided temporarily or permanently in Germany, while 21 per cent stayed in the United Kingdom and 15 per cent in Austria. The percentage of those working in other countries was below 5 per cent. The proportions of the main countries are consistent with the findings of *Blaskó – Gödri* (*2014*) on Hungarians living abroad, i.e. the ratio of senders to the number of immigrants does not show material differences in individual countries. Likewise, in terms of education, the same patterns are seen among the senders as those observed in Hungary's total immigrant population: while most senders in Austria and Germany are skilled workers (42 and 45 per cent, respectively), 32 per cent of

those remitting from the United Kingdom hold a college or university degree. At the same time, a significant portion of the persons employed in the United Kingdom found occupations below their qualifications: the most typical occupations reported in this group include waiters, kitchen helpers, storage labourers and cleaners.

In terms of the remittance amounts, the dominance of Germany, which can be considered the main source in this regard, is even stronger (45 per cent). Workers employed in Austria account for 22 per cent of the remittances; accordingly, they support households in the home country at a greater rate than warranted by their number, although this ratio falls short of the percentage indicated by macro data (38 per cent). The share of remittances received from workers employed in the United Kingdom (7 per cent) is far smaller; in other words, they are far less inclined to remit than would be suggested by their number. Only 3 per cent of the transfers arrived from countries outside of Europe, but this ratio is 7 per cent in the case of persons permanently residing abroad (non-residents).

In line with the above, an examination of the three major migration destination countries reveals that Austria and Germany essentially reflect – obviously in part due to their physical proximity – the habits of resident employees. In the case of the United Kingdom, however, the share of those remitting less than 10 per cent of their income is 81 per cent, and 92 per cent remit no more than 20 per cent of their income; in other words, senders within this group support their non-migrant households to a lesser degree than what they could afford.

5. Summary and conclusions

Our study sums up the main results of the first Hungarian representative household survey conducted on the subject of family assistance – remittances – received from abroad. However, one of the main results of the survey – the substantial difference between remittances calculated on the basis of the questionnaire-based survey and the figures estimated from macrostatistics (*Bujnóczki 2017*) – requires further analysis. On the one hand, a certain bias is inevitable due to the data collection methodology of sampling, especially in the case of a survey that involves sensitive income data such as this. Although all available tools were used in the survey – from several rounds of questionnaire testing through the training of the enumerators to the provision of various data supply channels – to gain the most precise data possible, some respondent bias cannot be ruled out. On the other hand, it would be useful to identify possible ways of finetuning the macrostatistics-based estimation procedure based on the current survey and by utilising other data sources. It is also important to note that to a significant degree discrepancies between the macro and micro data can be attributed to definition differences; for instance, while we considered net incomes in the results of the present survey in all cases, the balance of payments uses gross incomes in the case of temporary employment abroad.

At the same time, since this survey provides the first detailed data source on this subject, numerous new results can already be observed regarding the underlying socio-economic features of remittances. The data demonstrate that remittances to Hungary are primarily sent by young emigrants to their elderly parents in Hungary, which is consistent with the Polish example presented by *Krzyzowski – Mucha* (*2014*). We may conclude then that the phenomenon affects almost exclusively family members and that support for spouses and children left behind in the home country is less typical.

With respect to receiving households, it should be emphasised that remittances are such an important source of income for the poorest families that they may even exceed the incomes earned by other means. A considerable concentration can be observed among households in terms of the frequency of the remittances: a significant part of households receive relatively smaller amounts on an annual basis, whereas nearly a third of the households are the recipients of larger, regular (monthly or even more frequent) transfers, the total amount of which accounts for two thirds of all remittances.

Low-value non-financial support is more frequent; there is no difference between employees working abroad temporarily or permanently in this regard, whereas in terms of value, financial support is the predominant form of assistance, and more than 60 per cent of such transfers originate from short-term workers. While this percentage falls short of the 80 per cent ratio indicated by macro data, the difference could also be attributed to the fact that the balance of payments define compensations of employees instead of the remittances sent from these compensations. At the same time, it is consistent with the result of the Moldovan household survey presented by *Pinger* (*2009*).

The survey also yields information on numerous features of the senders. We found that in general, senders have secondary education and work in the industry and services sectors, but the percentage of senders with higher education qualifications is somewhat higher among those employed abroad on a permanent basis. Two thirds of the senders remit no more than 10 per cent of their income, and this ratio is somewhat lower among those residing abroad over the long term. In addition, differences can be observed also in terms of destination countries: while the number of senders reflects migration data and does not demonstrate appreciable differences, in terms of the amount remitted Austria is over-represented and the United Kingdom is under-represented.

A possible direction of research could be the formulation of a more accurate estimation procedure; moreover, a more detailed examination of the determinants of remittances may also be the subject of future research. This study was intended to serve as a basis for such subsequent analyses.

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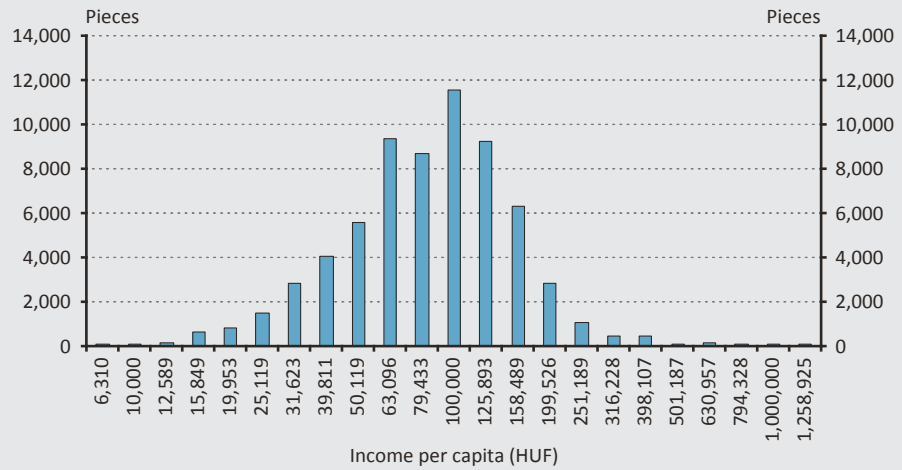
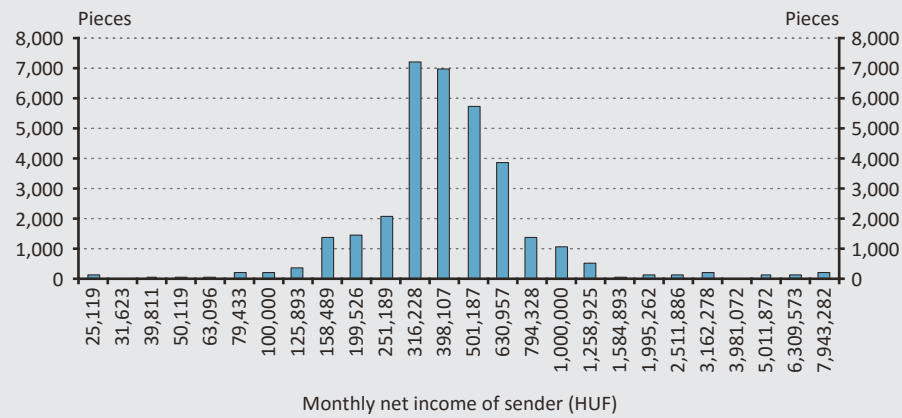
Annexes

Figure 7
Distribution of the per capita income of receiving households



Source: Family Assistance Survey

Figure 8
Distribution of senders' net monthly HUF-denominated income for the period spent abroad in 2016



Source: Family Assistance Survey

Table 2
Remittances by the country and residency of the sender, 2016

	HUF millions			%		
	resident	non-resident	total	resident	non-resident	total
DE	10,886	6,343	17,229	48.8	40.3	45.3
AT	5,737	2,741	8,479	25.7	17.4	22.3
UK	1,548	1,253	2,801	6.9	8.0	7.4
NL	1,600	141	1,741	7.2	0.9	4.6
IT	296	958	1,254	1.3	6.1	3.3
FR	286	603	889	1.3	3.8	2.3
CH	246	445	691	1.1	2.8	1.8
SE	94	401	495	0.4	2.5	1.3
NO	66	352	419	0.3	2.2	1.1
IE	64	270	334	0.3	1.7	0.9
BE	34	19	53	0.2	0.1	0.1
DK	20	20	40	0.1	0.1	0.1
ES	18	209	227	0.1	1.3	0.6
Europe	**20,897**	**13,756**	**34,653**	**93.7**	**87.4**	**91.1**
CA	72	13	85	0.3	0.1	0.2
US	54	1,033	1,087	0.2	6.6	2.9
AU	7	47	54	0.0	0.3	0.1
Countries outside of Europe	**133**	**1,093**	**1,226**	**0.6**	**6.9**	**3.2**
Other countries	1,152	877	2,029	5.2	5.6	5.3
No response	112	6	118	0.5	0.0	0.3
Total	**22,294**	**15,732**	**38,026**	**100.0**	**100.0**	**100.0**

Source: Family Assistance Survey

Ethical Aspects of Intertemporal Discounting and the Social Discount Rate*

Márta Somogyvári

The paper examines the ethical aspects of discounting during the preparation of intertemporal decisions, and the influence of this on the cost-benefit analysis of community investments. It focuses on the economic philosophy and ethical considerations that underlie discounting as a daily financial activity. The author attempts to resolve the apparent logical contradiction between the cardinal and discounted utilitarian ethical approaches. By analysing the preconditions related to the definition of the values of the parameters included in the Ramsey formula, it is presented that neither the social discount rate applied in the case of intertemporal investments nor the current practice of establishing the market discount rate used for investments representing a potential burden on the environment is suitable for the assessment of the long-term community investments and private investments burdening the environment.

Journal of Economic Literature (JEL) codes: A13, D63, H43, Q58

Keywords: discounting, social discount rate, Ramsey formula, utilitarianism, economic ethics

1. Introduction

Although economic and business decisions are seemingly about the future, in fact policy-makers are guided by a relatively static vision corresponding to or easily deducible from the present. This is the foreseeable and predictable future, where the cycles are repeated, trends continue, trend changes can be easily predicted, and disasters are moderate and negligible over the long run. By contrast, there are the situations which involve large, unpredictable changes even over the short run, and we do not know whether the scenario in store will be the one we imagined or something completely different. This second group also includes cases which involve such long-term periods of time the general conditions of which we are unable – or do not dare – to estimate. We tend to ignore the fact that the unforeseeable and

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

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unpredictable future – which we instinctively identify with the very long term – may appear on our time horizon even within a few years.

Why is it important to differentiate between the two types of future? Because, when economists talk about decisions impacting the future – whether foreseeable or unforeseeable – almost instinctively rely on the same tool, i.e. on discounting. According to the classic economic approach we can talk about risk when we are able to quantify the respective factor, while in the case of uncertainty we are unable to measure the probability and/or the outcome is fully uncertain (*Knight 1921*). The daily practice of investment valuation conflicts with these two, theoretically easily differentiable, notions. Discounting involves cash flows, which means that somebody somehow – either on an "objective" or "subjective" basis (*Bélyácz 2010*) – has already estimated the respective factor, be it the income earned in the 20th year as a result of the investment, or the rate of the inflation influencing the cost over the entire investment horizon. Neither of these are foreseeable, but nevertheless we estimate both of them to declare whether or not the investment will generate a return. And we try to clear up the uncertainties by discounting. Thus, discounting is an answer to the question "how to manage the future", and at the same time it is an easily usable, practical guideline for the preparation of financial calculations. The general response provided by discounting sounds like this: let us try to treat it as the present, just reduce its value a little bit. What may be surprising for an outsider is that in the case of both the foreseeable and the seemingly foreseeable future, which may become unforeseeable at any moment, most of the theoretical and practical trains of ideas rely on the same solution.

The standard discounting methods are used routinely in the elaboration of policies and measures applicable to the foreseeable future. The mechanism of discounting is the same as that of compound interest. However, while compound interest may be reasonably conceivable for the experts over the short run, over the long run it can generate results which appear unrealistic even for such experts. Consider, for example, the fact that a sum of USD 1,000 invested 100 years ago at a compound interest rate of 5 per cent would be worth USD 131,501 today. The same example would not work with the Hungarian forint, since the bank of 100 years ago would no longer exist (which in the case of the USA would be realistic), and 100 years ago the currency was also different, since meanwhile currency replacements, hyperinflation, economic crises, political transformations and various other disasters added colour to the economic conditions of Hungary.

In the case of the unforeseeable future, discounting raises questions even for those who use it as daily practice, since such mechanical devaluation of the future raises the issue of conflicts between the present and future generations. Seeing that over the long run a change even in a relatively small discount rate can cause major differences in the valuation of future cash flows, we have a good reason to assume

that this calculation method is biased and it conflicts with our instincts, and perhaps also with common sense.

Discounting appears to be only as a secondary financial technical decision and its use is routine. It is exactly this lack of sophistication that conceals the fact that discounting and the discount rate fundamentally influence our decisions on the planning of investments necessary for the production public and private goods, and decide which investments should be implemented and which ones should be declared unprofitable.

The impact of discounting on the unforeseeable future can be best demonstrated by the cost-benefit analysis of measures related to climate change. Although we do not know the exact scenario in which climate change will materialise, we assume that it will generate losses both at the level of the individual national economies and globally. When *Stern* (*2007*), and a little bit later *Nordhaus* (*2008*), tried to take stock of these potential economic impacts, they used the same benchmark assumptions with regard to the impacts of the climate change, the determinant factors and key parameters of the economic system (*Weisbach – Sunstein 2009*). The largest difference between them is a seemingly minor technical issue, namely, the way they define the discount rate. Stern proposed a low, 1.4 per cent discount rate (later on he raised it to 2 per cent), while Nordhaus argued for a high, 5.5 per cent discount rate. The two values represent two different assessment of the future. When using a discount rate of 1.4 per cent, the costs of climate change 100 years later are 53-times higher than when using 5.5 per cent. 200 years later there is already a 2,800-fold difference (*Weisbach – Sunstein 2009*). The two authors propose different measures for preventing the impacts of climate change. Stern believes that immediate, expensive measures should be taken to reduce emissions of greenhouse gases and prevent losses. By contrast, Nordhaus takes the position that no quick measures are needed since the very low discount rate underlying those is not compatible with today's market conditions (*Nordhaus 2006*). In his opinion, a slow, gradual transformation of the energy framework is sufficient. Fast and instant measures are extremely expensive, offering relatively low profit.

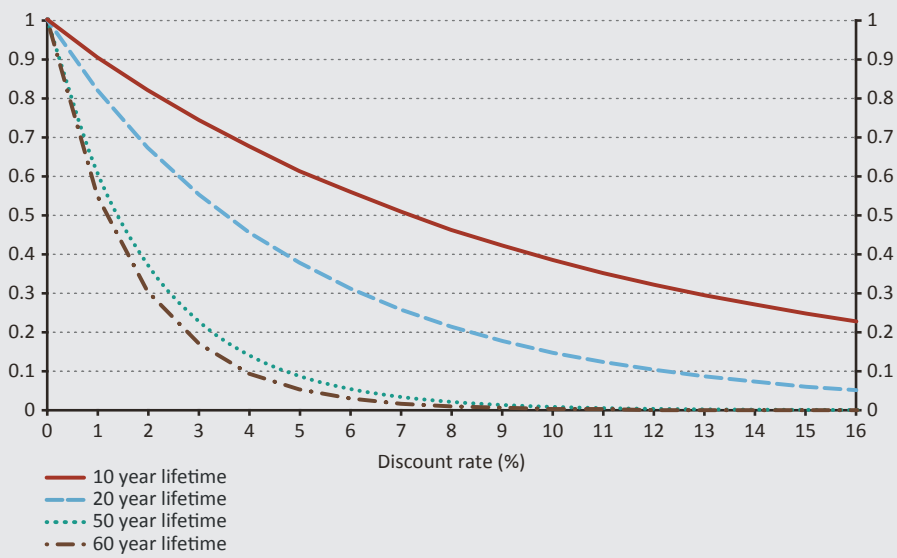
2. Impact of discounting on projects with asymmetric cost structure

The discounting of the unforeseeable future is particularly interesting in the case of investments with a long life cycle, where the distribution of the costs and revenues during the service life is asymmetric. For example, when we evaluate certain energy production technologies, in calculating the net present value projects with high initial investment costs followed by low operation, maintenance and dismantling costs are disadvantaged compared to projects where the distribution of costs is more even. This difference systematically appears between investments based on renewable sources (wind, water, solar, geothermal) and fossil fuels (coal, gas, oil).

When this financial valuation is accompanied by a moral judgement, according to which fossil fuels are "bad" and renewables are "good", everyone calls for aid to counterbalance the barriers to the renewable energies' market entry. High subsidies are justified in the case of immature technologies in the phase of innovation, if society believes that it wants to change over to another energy paradigm. When these technologies become mature, i.e. they are able to generate electricity at the same or even lower price as the network price, or the investment in the respective project has already returned, and the subsidy can be already interpreted as a rent. This rent is unearned compensation, which prevents society from using its resources for the implementation of other innovations or other social goals.

When assessing the burdens on future generations, investments burdening the environment in the future, where the costs of dismantling are extremely high, represent a special case. *Figure 1* shows that in the case of projects of different lifetimes what proportion of the dismantling costs should be taken into consideration for the purpose of calculating the net present value of the project when applying different discount rates.

Figure 1
Proportion of dismantling costs taken into consideration for the purpose of the financial valuation of the project



If the valuation of the project is for a lifetime of ten years, we see on the top curve that upon using a 2 per cent discount rate, 82 per cent of the dismantling costs are taken into consideration for the purpose of financial valuation. (If this amount is HUF 1 billion, the net present value of this is HUF 800 million.) With an increase in the lifetime and/or the discount rate, the dismantling cost taken into consideration for the investment decision becomes increasingly negligible. There are a number of industries where dismantling costs are high, because the machinery, areas or buildings used for the investment cannot be utilised for other purpose and/or are harmful for the environment (e.g. shutdown of mines, power stations or chemical plants). In this case, when the lifetime planned for the long run, i.e. 50–60 years, is accompanied by a discount rate of 4–5 per cent, it means that the burden of dismantling is hardly or not at all taken into consideration for the purpose of the investment decisions and we charge it to the future generation in full. In this case, uncertainty and ignorance of the future generations' plans are combined. We are uncertain in respect of the future costs, but instead of admitting this, we opt for a seemingly "technical" method that makes the future events financially unimportant. The policy-makers making the final decision, including economic experts or politicians financing the investments, are usually not aware of the fact that the verdict declaring an investment profitable is substantially influenced by the choice of the discount rate.

In discounting the cash flows of the distant future, the correlation illustrated in the figure above always exists, irrespective of whether it is a private or public investment. The German nuclear power plants were private investments, while the investment in the Hungarian nuclear power plant was financed by the Hungarian state. Dismantling costs exist in both cases, and it is almost impossible to assess the magnitude of those, since the highly radioactive waste must be stored at safe locations for periods of several hundred thousand years. But even if we ignore the storage costs, the direct costs of dismantling, neutralisation and disposal alone involve such high amounts that will be paid not by the individual (private or public) companies, but by the society in both cases. According to the Expert Committee of Sciences operating under the Parliament of the Federal Republic of Germany, the preliminarily estimated costs of dismantling will not be covered by the reserves appropriated in the balance sheets of the German energy companies, which, by the way, for the time being represent only a commitment rather than realistically appropriated funds (*BWE 2015*). This example also shows that in the case of the intertemporal decisions – for 40–50 years or for an even longer time horizon – the discount rate has the same effect irrespective of whether it involves a public or private investment. In both cases, with a sufficiently high discount rate, the burden of dismantling is shifted to future generations, while projects are also implemented which with a very low or even zero discount rate would be regarded as financially unviable.

3. Descriptive and prescriptive procedures for establishing the discount rate

The procedures applied for determining the optimal discount rate differ based on the type of project. There are various methods for identifying the discount rate both in the case of private investments and public investments which are deemed important by society but fail the test of general market conditions and payback criteria. Essentially, two methods can be differentiated. The first group includes the methods that calculate the discount rate based on the observation of certain economic processes (descriptive, positive methods), while in the second group the definition of the discount rate is governed by express moral principles (normative, prescriptive methods).

3.1. Observing the discounting habits of people

Through a number of experiments behavioural economics has established that people primarily prefer the present and very strongly discount anticipated future rewards. This behaviour characterises almost all living organisms and is not only a determinant of human behaviour. This high degree of individual impatience may also be attributable to the fact that we cannot be sure that we still will be alive when we are able to reap the future profit or bear the future costs (*Lewandowsky et al. 2017*). This is also supported by the analysis of *Trostel and Taylor* (*2001*), which is based on panel data of household consumption habits in the USA (Panel Study of Income Dynamics – PSID). The authors concluded that the willingness to discount is not constant in the various phases of human life, and the older people are (the closer they believe to be to death), the more inclined they are to discount the future more strongly.

The discounting willingness of people is not necessarily linear, as it does not assess all future events and consumption opportunities in the same way. The concept of hyperbolic discounting describes the phenomenon – observed in the case of savings, borrowing, or even with sports or drug addiction – that people use a future valuation pattern – which can be best depicted by a hyperbolic curve – according to which they are impatient when it comes down to the present (i.e. short term) and patient about the future (cf. *Rambaud – Torrecillas 2006*).

3.2. Discount rate determined based on the observation of capital markets and competitive market processes

For the purpose of determining the discount rate used for private investments, a large number of factors are taken into consideration, such as the corporate cost of capital in respect of both own and debt capital (Weighted Average Cost of Capital, WACC), the risks of the given project, the inflation impacts and other, industry-specific systemic risks. Accordingly, in the practice of enterprises the determination

(in fact, the estimation) of the discount rate moves within relatively broad limits, depending on the size and capital structure of the company, the return on equity expected by the investors, the disposable liquid assets, as well as on the aptitude or strategic short-sightedness of the management (*Jagannathan et al. 2016*), and also on the common procedures in the respective country or what the respective decision-maker deems appropriate (cf. *Szűcs 2014*).

3.3. Social discount rate

It is necessary to determine the social discount rate, because there are long-term investments that are important for society's long-term welfare or during the production of various public goods. The financial valuation of these with the usual discount rate established for private investments returns negative net present value, although their social net present value is positive (*Tabi 2012*).

Usually, four methods are applied for the definition of the discount rate used in the cost-benefit analysis performed for social investments.

- The *social time preference rate* (STPR) shows the size of the future yield for which the society is willing to postpone its present consumption.
- The calculation of the *social opportunity cost* (SOC), which reflects the costs of money markets (*Tabi 2012*; *Tabi – Csutora 2011*), comparing the two situations when the capital destined for the investment is used in the private or public sector.
- The discount rate of those projects can be calculated with the use of the *weighted average (WAM)* where both the private and the public sectors are involved. This is the weighted average of the social time preference rate and the social opportunity cost.
- The *shadow price of capital (SPC)* is the full price of the resource, also containing the external impacts. This tries to price the profit generated by the respective investment for the entire society, e.g. by preventing a kind of pollution, flood, etc. (*Liu 2011*).

Of these methods, the shadow price of capital and the social opportunity cost are clearly descriptive methods. Normative attempts can be observed for the definition of the social time preference rate, as it will be presented when we discuss the Ramsey formula.

3.4. Expert enquiries

Weitzman (*1998, 2001*) elaborated a method – later referred to as gamma discounting – to resolve the contradictions related to the discounting of projects useful for society, which has gained ground in the social project valuation of several countries. In the distant future, the degree of all factors influencing the

discount rate, and thus the degree of the growth rate as well, is uncertain. The further away the future is, the smaller discount rate is proposed by Weitzman, i.e. the discount rate is not constant, but rather changes by periods. In fact, by using a declining discount rate (DDR) this approach tries to adjust the mathematics of discounting. By using lower or even close to zero discount rate for longer periods, it can be avoided that the future values become very small and thereby negligible. Weitzman substantiated the definition of the discount rate by expert enquiry (*Freeman – Groom 2015*).

3.5. Evaluation of the procedures used for the definition of the descriptive discount rate from an ethical point of view

Clearly, establishing the weight used for considering the effect of our actions on future generations is essentially a question of ethics. Those using descriptive methods seemingly circumvent this problem, but even with this they proclaim that their preference is the status quo, i.e. the situation is good when it somehow corresponds to the present and future deducible from the historic trends. According to this approach, the discount rate must be somehow aligned with the interest rate level currently observed in the capital markets or with future, expected interest rate level connected to historic trends, with return expectations, values calculated based on some sort of market prices, or perhaps with the discounting patterns of human agents.

Several arguments can be brought forward against the descriptive position. The first counter-argument highlights the epistemological constraints of the descriptive method – how to define the method of determining the descriptive discount rate in a "normative way", if even the participants of the economy do not know what would be "optimal", since in fact it changes from company to company or from project to project even in the same market environment *(Szűcs 2014*; *Jagannathan et al. 2016*).

If the social discount rate is determined on the basis of the discounting practice used in the competitive market for projects with short-term horizons, it raises additional methodological questions. The models based on which the descriptive discount rate is established overly simplify the real business and social processes. These results are used e.g. in Great Britain or in France in a normative way for real investment calculations (*HM Treasury 2003*). The most disputable part of the simplification is that they often make no distinction between investments in private goods and public goods. Thus, the models implicitly assume that the allocated resources are mutually replaceable with each other (pl. *Weitzman 2012*, *Groom et al. 2007*). However, investments in public goods and private goods cannot be analysed based on the same profitability criteria, since a large part of the "utility" generated through investments in public good cannot be measured and is connected to the risk averse attitude, the absence of which may lead to the decay of the entire

society. Although we can try to measure the utility of the efforts to reduce air pollution by tabulating the costs of the treatment of illnesses thus avoided, in this case we do not consider the better general conditions and "quality of life" of those not falling ill directly, or the habitats that are not devastated, for example by acid rain. Dams must be adjusted to the highest water-level of the last one-hundred years even if precipitation decreases in the future and the likelihood of a very large flood is small. The future "utility" generated through the cash flows invested in the production of private goods, which can be measured by monetary incomes, cannot be compared with the "utility" generated by investments for the production of public goods, which often span over generations. Despite the above seemingly reasonable arguments, the separation of public goods and private goods becomes increasingly difficult in practice. Education, healthcare and defence – usually listed as the classic public goods – today increasingly tend to be classified as private goods. Whether a particular goods, e.g. clean air, is regarded as public or private goods, today is mostly based on social consensus (*Malkin – Vildavsky 1991*). While in China it is only the middle class that can afford clean air in Beijing by operating air purifier equipment installed in private homes, in the European Union – today still – it is a basic human right, the breach of which is sanctioned.

If we wish to set out from the discounting habits of human agents, the question is not only whose discounting habits we take into consideration and how we obtain the data and based on which principles we make conclusions with regard to a discount rate. We also need to address the problem of rationality. Hyperbolic discounting habits, when people make decisions in respect of their own life, were analysed by a large number of tests. However, these decisions differ from each other not only at the level of the individuals: they are also not consistent over time, as the reference point for discounting may change in each new moment. Hence, the conclusion that the results thus obtained cannot serve as methodological basis for rational decisions appears to be acceptable (cf. *Rambaud – Torrecillas 2006*). On the other hand, it is also not acceptable in ethical terms, if in the course of influencing the present and future society we use a method that focuses on individual selfishness instead of the interests of society. This latter statement is based on the ethical maxim, according to which the economy must serve society (*Odum 1983*; *Tainter 1988*), and when making technological investment decisions, the most important factor to be considered is the long-term survival of mankind (*Jonas 1984*).

The "normative application" of the descriptive rate alone raises a severe philosophical problem, which is dealt with by Hume's law. *Hume (1739)* notes that deducting "what ought to be" from "what is" in fact is a methodological error, since the moral commands thus obtained lack a suitable logical basis. Hume's law also serves as methodological basis for ethical analyses. Accordingly, the application of descriptive discounting not only has epistemological constraints, as there are also

ethical reasons against making the application of a currently postulated discount rate based on any particular observation mandatory in long-term projects with an effect on the unforeseeable future.

3.6. Discount rate determined on the basis of ethical considerations

The ethical frameworks are differentiated on the basis of the decision rules used for deciding what is good and what is bad. The two most important classic ethical schools are deontology and consequentialism. Both of these ethics focus on human acts and the evaluation thereof. In the case of deontology, the emphasis is on the intention of the acting agent, since at the moment of the decision we do not know what the consequence of the act will be. In the case of intertemporal decisions, deontology does not offer a proper practical basis for valuation. The decision rule of the deontology is generalisation. The perception of good and bad is based on whether there is a general moral maxim, applicable to all, which can be used in the given situation (*Kant 1995).* In the case of discounting, it is difficult to imagine such a norm, to be observed under any circumstances (categorical imperative). Although the philosophers researching the principles of deontology do deal with our responsibilities towards other living creatures or people living in the future, this is primarily a static philosophy that is unable to manage events of a long time horizon, which may also impact several generations, as it focuses on the moment of decision (*Hampicke 2011*).

On the other hand, according to the consequentialism, it is the consequence of the action rather than the intention, of which we may make an ethical judgement, i.e. declare it good or bad. In consequentialism, we can specify a variety of benchmarks and measure the consequence depending on whether the freedom of the society or the stakeholders increases or decreases (*Gaus 2012*). We can examine how the respective action affects the happiness of the individual, the stakeholders, the entire society or all people living and to be born (*Sinnot-Armstrong 2015*). It is no accident that, in terms of ethical frameworks, it is the concepts of consequentialism that we can rely on when examining how today's decisions impact future generations. The ethical judgement as to whether discounting and the selection of the discount rate is good or bad can be pronounced based on the future consequences of the investments deemed viable by today's discounting methods, i.e. how today's generations and future generations share the burdens and the benefits (*Broome 1994*; *Sen 1973*).

Of the schools of utilitarianism, which belongs to consequence-based ethics, classic cardinal utilitarianism and discounted utilitarianism deal with discounting (*Gollier 2011*; *Greaves 2017*). Cardinal utilitarianism assumes that joy and utility, the economic equivalent of joy, are measurable and can be expressed as individual preferences (e.g. *Jevons 1911*). *Harsányi* (*1955*) explains that individuals are able to compare the utility realisable through certain choices also between each other,

and the basis of such comparison is the inductive arguing based on facts, rather than a subjective feeling based on some kind of psychological basis. Discounted utilitarianism and the various schools thereof already more or less make allowances for conflicts of interest between different generations (*Greaves 2017*), with Ramsey being one of the very first advocate of this.

Setting out from the utilitarian positions dealing with discounting, we can arrive at two completely contradicting results: according to classic cardinal utilitarianism discounting must be avoided, thus for example in the context of climate change we should renounce our present consumption to ease the burden of future generations. According to discounted utilitarianism, discounting is our moral obligation and we should hardly deal with the future and particularly with our descendants in the distant future *(Greaves 2017).* In the following, we present through the analysis of the Ramsey formula the considerations that may lead to these two opposite ethical positions.

4. The Ramsey formula

The baseline of the discussion related to long-term discounting, applicable to the unforeseeable future – which caused increasing excitement from the end of the 1960s – is *Ramsey's 1928 paper* on the mathematical theory of savings (for a summary of the dispute, see e.g. *Arrow et al. 2012*; *Gollier 2011*). This paper focuses on the question how much a society needs to save to maximise its welfare for a very long time, i.e. "forever". Ramsey's model sets out from a closed society, first created by a single immortal consumer, who controls the factors of production and consumes the produced goods on his own, and would like to save as much that ensures maximum utility both in the present and in the future. To achieve this, he must keep marginal utility at a constant level, i.e. in the case of consuming each new unit of product the same utility must be attributed to consumption. For this very reason, one of Ramsey's benchmark assumptions is that during consumption marginal utility does not grow to infinity, but rather converges to a certain limit (the greatest happiness achievable). Later on, Ramsey resolves the concept of single consumer, and impersonates this in successive generations, when the single individuals are concerned with their own and their heirs' profit.

In the model, Ramsey differentiates the discounting of utility and the discounting of cash flows. While in the latter case the discount rate corresponds to the interest rate, in the case of utility various people may have different utility concepts, and this heterogeneity is reflected by the size of the discount rate applied to the utility. Ramsey talks about a society, essentially divided into two groups, where people – or rather the immortal families – will become rich or poor depending on their patience or their capability of renouncing current consumption to invest the savings so accumulated.

From Ramsey's model the rate applied to the discounting of cash flows (rather than the individual utilities), i.e. the desirable interest rate level, can be deduced from the following equation, referred to as the Ramsey formula:

$$r = \delta + \eta g$$

Where the rate in the given moment of time is determined by three factors:

- δ = pure social time preference rate
- η = elasticity of marginal utility with respect to consumption
- g = growth rate of consumption per capita.

The size of r so determined returns the interest rate level expected from the investment financed from savings, and which ensures the maintenance of social welfare in the case of the intertemporal decisions. Accordingly, in order to maximise utility in the present and future society, we need to use the same value also as the discount rate (*Greaves 2017*).

The Ramsey formula is often used for the valuation of investments that the society is compelled to make in order to preserve its welfare in the future as well, but do not offer a return under market circumstances. Thus the Ramsey formula substantiates the already mentioned, widely used method of determining the social discount rate. The r – renamed as social time preference rate (STPR) – shows the amount which the present society is willing to renounce in order to ensure the consumption of future generations (*Tabi – Csutora 2011*).

The definition of the individual parameters of the Ramsey formula reveals the individuals' ideas of the future and whose interests they consider in making intertemporal decisions.

4.1. Pure social time preference

Pure social time preference is the parameter in respect of which there are a variety of opinions. Today this parameter is interpreted as the "measure of the impatience" of successive generations (*Tabi – Csutora 2000*), indicating to what degree we are willing to renounce current consumption to the benefit of the future generation. By contrast, *Fisher (1930)* believes that the impatience of the society and/or of the individual is expressed by the complete Ramsey formula. The pure social time preference is to be combined with the expected growth per capita, which – according to the classic theory – leads to a decrease in the marginal utility of consumption.

The above interpretation of the pure social time preference detracts from Ramsey's original definition. Ramsey interprets pure social time preference as the function

of utility rather than of the cash flow (*Ramsey 1928:288*). This parameter is zero for Ramsey, because it is not possible to compare the utility of people living in different periods or, in the context of single individuals, the utility perceived today with the utility perceived later. For this reason, it is not acceptable in ethical terms if preference is given to the utility of any generation over the other.

While Ramsey's view that the value of the pure social time preference is zero is based on epistemological presumption, later authors (e.g. *Cline 1992*; *Dasgupta 2008*; *Gollier 2011*) explain this by impartiality and the equality of generations, as utility should not be differentiated depending on when and which generation enjoys it. Let us think of the utility provided by public goods, such as clean air, forests or unpolluted rivers. It should be mentioned that *Stern (2006)* also believes that we must not put our welfare before that of future generations. Thus, the result of the zero social time preference is that only growth and the marginal utility of consumption influence the discount rate.

What could be the arguments for a positive pure social time preference rate, i.e. for putting today's utility before that of the future? That is, what could justify the lack of impartiality in the case of intertemporal decisions? The most obvious argument is that we are going to die, and since this increases the possibility of not benefiting from the future utility created through our savings, we should ultimately give our own generation preference. This argument can be substantiated based on the principle of maximising the utility between the single individuals. The pure time preference rate adjusted for life expectancy increases the parameter's value by the mortality ratio. If life expectancy deteriorates, it increases the value of the time preference, while if it improves, it reduces it (*Pearce – Ulph 1995*).

According to the second argument, ensuring the welfare of the successive generations requires us to make huge sacrifices. According to *Arrow (1999)*, all generations are selfish, and for this reason we cannot expect them to renounce their present consumption for the benefit of the next (also selfish) generation, to maximise the utility of all generations succeeding them. Although this does not preclude the consideration of the next generations' interests, it results in a pure time preference rate higher than zero. If we think about an investment that produces profit in the long run, spanning over generations, such as e.g. – according to *Arrow (1999)* – the Hoover dam, the generations that enjoy the benefits of this investment are put at an advantage over the members of the generation from the savings of which the investment was financed. Those who enjoy the benefits provided by the dam later may even decrease the degree of their own savings, and thus they are put at an advantage over the previous and the next generations. This train of thoughts is in line with the utilitarian approach, as the retaliation applied upon the individual generations (in the form of discounting) within the given framework, makes an

attempt to reduce their benefit deriving from selfishness and thus it spreads the utility among more people, making the distribution thereof more even.

4.2. Elasticity of marginal utility with respect to consumption

The elasticity of marginal utility with respect to consumption reflects that we assess the utility of each future additional unit of consumption depending on our own welfare. Expressed in cash flows: receiving 100 forints means much less for a rich man than for a poor one. Since this is a ratio, if the elasticity of the marginal utility is 1, one per cent additional consumption will generate the same utility both for the poor and the rich man. (Of course, when expressed in absolute value, the values differ; each additional consumption of 1 forint represents the same utility for a poor man with 100 forints, as the additional consumption of 10 forint for a rich man with 1,000 forints.) If this ratio exceeds 1, it means that it brings less profit for the rich man if his consumption grows by as many percents as that of the poor man. This correlation is Gossen's law on the decreasing marginal utility, and in fact is an axiomatic general condition, which is usually illustrated by analogies such as: if I already have a house/apple, car etc. in the future I will have much less benefit if I get one more of that than if I did not have it, and thus it is unlikely that it makes sense to save today to enjoy the benefit thereof in the future. This axiom appears to be plausible in the case of consumer goods within a single generation, i.e. in respect of the decisions of an individual determining his own future.

If the value of the consumption marginal utility exceeds one, it means that – if the other factors are constant and growth is positive – the discount rate will be higher. Thus, this parameter can be also interpreted as a guarantee for the equal distribution between present and future consumption, which shows the degree of intertemporal inequality aversion (*Gollier – Hammit 2014*). According to *Arrow et al. (2004)*, this parameter ensures equitableness between generations.

There are intertemporal decisions that determine the future state of nature for example and reduce the effect of climate change. Why would it represent a smaller benefit for a rich man than for a poor one if the extinction of certain species of animals or plants, e.g. polar bears, can be prevented (*Frederick 2006*)? The rich are usually much more willing to support such projects than the poor. Based on the analogy of the above train of thought, it would also follow from this that for them it represents higher utility if they can benefit from the natural resources in the future as well, than for the poor (*Revesz – Shahabian 2011*). Thus, if we prefer present consumption instead of investing in projects that preserve the services provided by nature, it is possible that the future generation will appreciate scarce and disappearing natural resources much more than we do at present, and thus in the case of such projects the parameter must be less than on in the case of positive growth per capita in order to reduce the value of the discount rate.

4.3. Growth rate of consumption per capita

The seemingly most exact parameter of the Ramsey formula is the growth rate of consumption per capita. If we ignore the other parameters, i.e. the value of the pure time preference rate is zero and the elasticity of marginal utility of consumption is one, the discount rate is determined solely by the growth rate.

Economists usually assume a positive growth rate in the long run. The source of growth is capital accumulation and technological change (*Pearce – Ulph 1995*). Based on retrospective data, going back 100–180 years, this value is estimated for Great Britain to be 1.3–1.6 (*OXERA 2002*). If we accept this value also in relation to the future long-term growth rate, it is easy to justify the discounted utilitarianism. Since our objective is to ensure the optimal – i.e. most even – distribution of the benefit of the investment between the generations, discounting is unavoidable. Without discounting, the present generations renounce their consumption to ensure that the future generations which become rich through the growth of the economy become even richer. As it is noted by *Baumol (1968)*, this is a "reverse Robin Hood" measure, as in 100 years the average income per capita may be several times higher (in real terms) than today, so why should we renounce part of our income to give it to those more affluent than us.

On the other hand, if the growth rate is zero, we have no right to discount, since with discounting we make the future generations poorer. According to *Broomer (1994),* a believer in cardinal utilitarianism*,* particularly in the context of climate change discounting cannot be justified, as the impacts thereof will be mostly felt by the poor countries. Those who are more willing to invest today in the reduction of the emission of greenhouse gases, are the rich countries with developed industry, while the poor, underdeveloped countries that will feel the impact of climate change the most, will be poorer even in the future than today's developed countries.

The dispute between the two opinions (cf. e.g. *Sen 1973* and *Pearce – Ulph 1995*) is not the result of the questioning of the utilitarian principles based on equality and impartiality, but rather of the different construction of the authors' world model. While *Sen (1973)* deems the individual generations to be homogenous, *Broome (1994)* expands the issue of discounting over generations with the inequalities within the generations. If both the present and future generations comprise of the poor and the rich, it is indeed questionable how today's rich relate to the future's poor. This problem appears even if economic growth is positive. If we make major investments that relieve the future generation of the impacts of climate change, we have two options: withdraw the necessary funds from the poor or from the rich. If from the rich, the argumentation of *Broome (1994)* may be valid. But if the price of these investments is that we spend less for the elimination of the inequalities within the generations due to reducing the investments and aids in the individual countries and those directed to the developed countries, the reference to reverse

Robin Hood becomes valid. Namely, in the future generations the poor will become less poor by exploiting the less affluent members of the present generations.

However, if the growth rate of the consumption per capita is negative, there will be an interesting situation where the discount rate becomes negative. However, the literature deals with this possibility only marginally. According to *Weitzman* (*2009*), in those cases when there is a very high risk of an imminent disaster, it is justified to use all resources of the present for the prevention thereof. In the model where he proves this thesis, he examines consumption as a function of the rising temperature of the Earth. If we examine the hypothetical situation when due to the extremely high temperature consumption falls to the minimal, the negative discount rate should also converge to the infinite.

Whether GDP is an appropriate measure of the long-term growth or "social utility" – not to mention happiness – generates rather strong disputes. Extreme weather conditions, disasters, floods and forest fires, which are becoming increasingly frequent in the course of climate change, and the dramatic fall in the growth rate of the agricultural average yields observed in the long run, accompanying the rise in temperature (*Ray et al. 2013*; *Hatfield 2016*) suggest that the economists' belief in continuous and technological growth will sooner or later will come up against natural barriers. While in the past period monocultures, the use of chemicals, genetically modified organisms and agricultural technologies forcing back nature to smaller and smaller fragmented territories contributed to the growth in GDP, between 1998 and 2013 the production potential of these areas decreased substantially, by roughly 20 per cent (*GLO 2017*). As a result of urbanisation, the changed use of land, and at the same time making a fetish of GDP growth, there may be nothing left for the future generation to measure.

5. Evaluation of utilitarian discounting

Although cardinal and discounted utilitarianism are seemingly antagonistic to each other, in fact this antagonism is connected to the different expectations with regard to the future and the often opposite assumption related to economic agents. The benchmark assumptions of the models include the rational, profit maximising agent, which is immortal or mortal. When it comes down to mortal agents, they are clustered in successive or overlapping generations, which are either homogenous in terms of capital distribution and consumption, or can be divided into the rich and the poor.

The normative position precludes the differentiation of generations: that is, we prefer the present to the future (cardinal utilitarianism) or the future to the present (discounted utilitarianism). Setting out from this position, the decline in the marginal utility of consumption can be questioned in the same way when it

comes to the valuation of public goods, the nature or the environment, rather than to the consumption of private goods. The concept of "greatest happiness" is usually identified with "utility" in the utilitarian literature on discounting. This substitution represents a major leap between the absolute, numerically not measurable, concept of happiness and the utility notion, which can be quantified, at least in theory by various methods. The identification of happiness (described by Ramsey as the perfect but unattainable "bliss") with the utility achievable during consumption is a fundamental logical error. Muddling the "utility" of the services provided by nature with the utility of consumption is the same sort of error.

In summary, we can state that the seemingly controversial results of utilitarian ethical analysis are attributable to the different interpretations of utility and/or the different estimation of the various parameters, primarily the future growth rate, impacting the discount factor.

5.1. How to discount?

For the discount rate applied in the case of investments important for society, a wide range of values are determined in the world. At present, in the USA discount rates of 3 and 7 per cent both apply to public projects (*CEAI 2017*), in Norway it is 2.5 per cent for risk-free projects, declining to 1 per cent after 41 years, while in the Netherlands the discount rate is 0 per cent for the risk-free projects, and these rates are adjusted by the risk premium as necessary (*Groom 2017*). The discount rate applied in developing countries may be as high as 10–12 per cent, e.g. in Serbia it is 10 per cent (*Djukic et al 2016*). The different values are determined on a descriptive or prescriptive basis, or sometimes the discount rate that facilitates the implementation of the respective project is simply adjusted to political decisions (*Groom 2017*).

Having reviewed the procedures and philosophies determining the discounting methods, we found that neither utilitarian normative discounting nor observation-based descriptive discounting (or some sort of combination of the two) resolves the ethical problems related to the discount rate to be applied in the case of intertemporal projects and they give no guidance to be followed with regard to the ultimate discount rate. However, the failure of utilitarian discounting does not mean that we need to give up the ethical dimension. If we choose human societies or even the entire mankind rather than the individual or generations interpreted as the aggregation of individual interest as the ethical benchmark shaping the general conditions of the model to be used for the definition of discounting, we may arrive at an approach that helps avoid the contradictions of the models presented in the study. The cases when we need to make a decision on the application of the social discount rate are usually long-term projects important for the entire society or even for mankind as a whole. These projects also include investments

the implementation of which is financed by the private sector, but in the future will substantially burden the environment.

In practice, this involves how to treat a development related to a risky technology or projects aimed at protecting the environment. One of the obvious possibilities to address these cases is the application of two types of discount rates: when it comes to investments where damages caused to the future generation should be prevented, no discounting should be applied, while in all other cases the determination of the discount rate should be left to the market (*Davidson 2014*). (Of course, we do discount even when no discounting is applied, but in this case the discount rate is zero.) Another possibility, in addition to discounting, is to take measures that help reduce the burdens of future generations. These measures should be taken by society or it should force private investors to take them. These may be requirements, already introduced in certain areas, which e.g. increase the costs of a mine opening due to the requirement to deposit collateral for the costs of recultivation, or measures when the respective society invests in research to reduce the environmental effects of a harmful technology, as well as the research and constructions related to the high-level radioactive waste disposal of a nuclear plant. No matter which of the above possibilities is implemented, we never know in advance whether we comply with the principle of utilitarianism, i.e. have we not favoured the present or future generations. This assessment, if it is possible at all to measure the utility generated by a public investment, always takes place ex post, while upon planning the investments we need to focus on the future ex ante, without knowing what will follow.

If we do not want to become resigned to our ethical impotence, it is worth looking for ethical arguments which focus on the future of human society rather than trying to reconcile the economic theory and the ethical opinion (*Davidson 2014*). The ethics of responsibility, as defined by *Jonas* (*1984*), states that the most important ethical command for all generations is to ensure the survival of mankind in such a way that future generations can also live a worthy life on Earth. When it comes to potentially hazardous technologies, we must not ignore the risks they represent in such a way that we increase the amount of the damage caused by a disaster, catastrophe or extraordinary event by the risk of the occurrence. It follows from this that we should forego the technologies the impact of which jeopardises the vital conditions of future generations. What is the consequence of this in terms of discounting? If we insist on the cost-benefit analysis, *Weitzman's* (*2009*) negative discount rate must be used for these technologies, which also assumes that we do not believe that the future society will be able to eliminate the environmental damages that we leave to them. Eastern Europe or Hungary are good examples of this, where the rehabilitation of the environment damaged by the socialist industry has not taken place to date; just think about the hazardous waste in Garé or that

the recultivation of the refuse dump left over by the uranium mines was financed – in the absence of suitable domestic resources – by the European Union's pre-accession fund, the PHARE programme. These examples also show that we must not assume that future generations will be richer than us, as we exhaust and degrade the natural resources and environment through human activity in such a way that provides much worse general conditions for the future generation than those we live in today.

The presently used discounting methods and discount rates cannot be applied for deciding on the type of investments that can ensure the right of future generations to a clean environment and nature, and thereby to human dignity. Both the theoretical and practical problems indicate that in the future some kind of different discounting philosophy or different type of cost-benefit analysis method should be elaborated for the valuation of public investments. For this purpose, we may rely on – in addition to the responsibility of ethics of Jones, mentioned above – the philosophy of *Rawls* (*1985*), which focuses on fairness. If we fairly distribute the benefits and burdens between the individual generations rather than focusing on the utilitarian approach of utility, where we chase the "greatest happiness" (*Bentham 1907*), we change over to a different paradigm of thinking. In this paradigm the minimisation of damages may be more important (*Popper 1952:304*) than the maximisation of welfare. The role of discounting in such a cost-benefit analysis, introducing fairness as an axiom, is not yet clear. The elaboration of this in the form of policies also implementable in practice may be a research area for the future.

6. Summary

Discounting is apparently a financial technical operation, but in fact determining the discount rate is based on serious ethical and economic philosophic considerations. This is particularly true when it comes to discounting the cash flows of cost-benefit analyses used for investments important for the society. In this paper, we summarised the most important trends in the literature on ethics related to discounting. We found that the descriptive discount rate, observing the individuals' discounting habits or the behaviour of the agents of the private economy, is questionable both in terms of epistemology and ethics. The reason for this is that the determination of the rate is rather subjective even in the private economy. On the other hand, with the ethical assessment we run into Hume's guillotine, which states that what we have now is not necessarily good as well. In the case of the prescriptive approach, the most common utilitarian approach sets out from the need to ensure fair distribution between the present and future generations by discounting. We examined certain aspects of the utilitarian approach relying on the Ramsey formula. We found that of the parameters specified by Ramsay, the

contradictions characterising the cardinal and discounted utilitarianism arise from the different interpretation of utility and the different estimation of the future growth rate. Namely, according to the cardinal utilitarianism we must not discount, while according to the discounted utilitarianism we must discount, if we want to ensure the welfare of both present and future generations. Finally, the paper deals with the discount rates applied in practice in the case of social investments, upon the substantiation of which both the descriptive and the prescriptive principles are relied on in the individual countries. This diversity, together with the most important – often contradicting – recommendations of the reviewed literature, show that the present discounting methods distort the cost-benefit analysis of the investments important for society.

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Loans and Credits – Delving Deeply into History*

Gábor Tamás

György Kövér – Ágnes Pogány – Boglárka Weisz (*eds*)*:*
Magyar Gazdaságtörténeti Évkönyv 2017–2018. Hitel – Bank – Piac (*The Yearbook of the Hungarian Economic History 2017–2018. Credit – Bank – Market*)
Research Centre for the Humanities of the Hungarian Academy of Sciences – The István Hajnal Foundation, Budapest, 2018, p. 333.
ISSN: 2498–8634

"Every beginning is difficult. And it gets even more difficult from there on..." so goes the saying attributed to FIFA President Sir Stanley Rous, among others. This is also why it is a great achievement that the second issue of the Yearbook of the Hungarian Economic History launched in 2016 has at last reached the stores this year, thereby definitively responding to the most important requirement of a periodical publication, i.e. the requirement of regular publishing. The Yearbook is not the first attempt in Hungary to establish a journal of economic history: at the turn of the 19th and 20th centuries, the Hungarian Economic History Review, which was among the first of its kind in Europe, appeared for more than a decade. The Review tended to mean agriculture by economy, and focused on the agricultural sector. At the time of its suppression in 1906, nobody would have thought that 110 years would go by before the success of a similar endeavour.

The first issue of the Yearbook provided insight into the less researched history of crises and trade, starting from the great famine of the 14th century to the financial crises of the 20th century, and from trade in the Arpadian age to private trade in the socialist era.[1] This year's issue undertook a similarly challenging task: to examine lending practices before and after, but in parallel with the evolution of the modern financial institution system, bringing together researchers dedicated to the history of the Middle Ages, the early modern period and the 19th and 20th centuries. The objective of the editors is to give a better insight into the relation between traditional and modern financial systems, and into the network of credit systems behind the institutions by including research papers that examine different eras.

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

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[1] György Kövér – Ágnes Pogány – Boglárka Weisz (eds): *The Yearbook of the Hungarian Economic History 2016. Crisis – Trade*. Budapest, 2016.

The volume includes 14 papers from 15 authors in strict chronological order from the 14th century lending practices of the Teutonic Order up to the management of the financial crisis in Hungary in the 1930s. The papers may be grouped around four major topics: lending practices before the evolution of credit institutions; alternative lending arrangements used besides credit institutions; the various levels of the financial institution system and their operation; and papers that are not directly linked to lending, but examine the history of markets.

Lending before institutionalisation

Four papers fall into this category. Some examine state financial affairs, while others look at private financial issues, covering a period from the 14th century to the turn of the 18th and 19th centuries. From a chronological point of view, the first place needs to be given to the paper by *László Pósán* with the title: *Loan transactions and lending practices in the State of the Teutonic Order of Prussia.* After outlining the Christian position with its principal prohibition of charging interest on a loan and presenting the less restrictive German legal practices determined by the growing needs for cash, the paper demonstrates the highly diverse lending practice of the Order. Both the range of borrowers and the purposes of lending are highly varied, extending from small loans granted to private individuals for social or political purposes to loans granted to Prussian towns and foreign merchants for business purposes and to loans offered to foreign princes in the pursuit of diplomatic interests. Loan arrangements circumventing the prohibition of charging interest on a loan are a particularly valuable part of the paper, as well as the presentation of annuity purchasing, arrangements disguised as money exchanges or mortgage lending. Two other papers examine mortgage lending.

János Incze (*The pledging practice of Sigismund of Luxembourg in Hungary*) provides a detailed presentation of the contractual arrangements applied at the beginning of the 15th century, the reasons and procedure of a pledge, and the methods by which pledged estates can be transferred by means of inheritance or redeemed. His key conclusion is that there existed no common practice followed by Sigismund, and contracts contained a number of individual clauses. The fate of pledged estates also varied: Sigismund himself rarely redeemed them through loan repayment, it was much more common for him to give this opportunity to others, or he donated the pledged estates, but it also occurred that the estate remained in the use of the lender – or their successors – for a very long period, such as the Zips Region that was in pledge by the Polish king even after 360 years from the time it was pledged in 1412. The contractual terms of the pledge did not change fundamentally over this period of almost four centuries.

We can see this from another paper by *Krisztián Kovács* examining Nógrád County pledge and leasing contracts from the 17th–19th centuries. *"Forced by our*

imperative distress…" as the title reads, making reference to the fact that justifying the pledge was an essential element of a pledge agreement. The author establishes that the landed nobility did not use pledging and leasing solely or even principally to finance their consumption. These instruments ultimately served the purpose of an active estate policy through transferring holdings in the periphery and acquiring holdings closer to the estate centre.

The paper by *Attila Tózsa-Rigó* (*The big survivors. The lending activity of the Paller-Weis company* (*1569–1582*) *and the copper business in Besztercebánya*) provides insight into the lending practice of the 16th-century Southern German merchants. The author analyses the profitability of the copper business in Hungary as a guarantee of the survival of the trading company. At the same time, he also points out the constraints that merchants financing the Habsburg Empire faced in the interdependence of unequal partners. We can learn about alternative techniques of loan repayment, arrangements which are not at all risk-free for the lender, such as individual trade conditions and duty rates, which, in this case, had a significant impact on the world market for a product, i.e. copper.

Alternative lending arrangements in parallel with financial institutions

The emergence of financial and credit institutions by no means implied the immediate marginalisation of traditional arrangements. The presence of merchant-bankers was significant even at the beginning of the 20th century, both in Hungary and on the international financial markets. Lenders, such as towns, foundations and families were also essential parts of the credit systems in the 19th century. An example of the latter is provided in the paper by *Szabolcs Somorjai* and *Adrienn Szilágyi* (*The financial opportunities of the Harruckern heirs. Kinship loans in the first half of the 19th century*). Through the duality of the operation of the presented family credit fund – the application of market rates, but lending exclusively to family members – the pair of authors points out that it is all about correcting the ineffectiveness of the credit market whilst interest is not the sole or even the most important factor. Accessibility and minimisation of the transaction costs arising from the lack of trust were the most important factors in the maintenance of the family fund over half a century. We can see similar motifs behind the loans provided in the town of Szombathely by town and by its local funds analysed by *Imre Halász* (*"At six per cent interest". Data on the lending activity of the Episcopal market town of Szombathely in the years of Neo-absolutism*). Similarly to the budget of the Harruckern heirs, these funds provided credits with a view to investing the residual income from their core activity, while they did not collect any funds. These funds operated with separate accounting but under the supervision of the town. Their clientele comprised local individuals and the town itself.

Károly Halmos endeavours to give a picture of commercial credit relationships when they break down, i.e. at the moment of bankruptcy. His paper titled *The paths of*

bills of exchange based on the 1869 bankruptcy cases shows in detail, with the aid of examples, the functioning of the bill of exchange, the operation of the bankruptcy procedure, the economic background of the credit crunch, and some typical business management-related causes of failures. The intervention of the state via the bankruptcy court creates documents on the functioning of those economic micro processes that we have too little sources about. Therefore, the author draws the attention to the value of a bankruptcy file as a historical data source.

Operation of the financial institutional system

Banks as creditors already appeared in the bankruptcy files of Károly Halmos. In the next three papers, however, they play the key role. *Róbert Bagdi* (*The annual closing accounts of banks and savings banks of Kecskemét in the era of Dualism*) draws attention to a less often analysed segment of the banking sector, the rural savings cooperatives, and in addition, in a specific situation since they are based in a town belonging to the catchment area of the financial institutions of the capital. Based on balance sheet data, he compares the financial institutions of Kecskemét to national and county averages and to other big towns in the Great Plain region.

We can see banks expressly as creditors and railway financers in the paper by *Csaba Gidó* (*The Dreamer of the Sekler Railway. Gábor Ugron and the local railway line between Héjjasfalva* and *Székelyudvarhely*). The author wrote an important case study on the leading industrial sector at the end of the 19th century. His analysis reveals that even in this profitable enterprise, not all participants are winners. The main beneficiaries of success take out their profit through the entwined relationship between their roles (assignee, member of the board of directors, creditor, subcontractor and supplier), while the main contractor carrying out the effective work fail. Banks within the sphere of interest of some managers of the railway company are important channel for profit-taking, through lending at a higher rate than the rate on the market.

The paper by *György Kövér* titled *The Rothschild consortium and the debt of the Austro-Hungarian Monarchy* also looks at banks, but guides us into the world of public finances. Public finances are usually examined from the side of states, however, the author points out that in the case of financing the debt of the Monarchy, both the domestic and the international markets were significantly impacted by a non-state actor, the intermediary Rothschild banking group with its international embeddedness, prestige and credibility. The schedule of the degree of indebtedness of the two states of the empire show a high consistency. This is much more attributable to the coordination activity of the Rothschilds than to consultations between the financial governments. According to the author, the significance of the Rothschilds in the consolidation of the debts of Austria and Hungary is undisputable.

Public finances and consolidation are also the subject of the paper of *Ágnes Pogány* (*Szentháromság Square versions of fiscal crisis. The management of the budget crisis in the first half of the 1930s*). The assessment as to what constitutes a critical level of the debt ratio and budgetary deficit differed in every era. From this aspect, the period between the two world wars was very strict: it was considered that a budget deficit had to be eliminated at all cost, irrespective of its size. Through the main revenues and expenditures of the budget, the paper shows what factors led to the fiscal crisis and how subsequent governments tried to manage it. An important lesson is that it was a careful balancing of the recommendations of the League of Nations mainly reflecting the interests of the creditor, the fiscal restriction and the state economic stimulus – which was also largely implemented through lending activity – that finally brought a result.

Market history studies

The volume also includes three papers that are not closely related to lending. These are mainly linked by the demonstration of the functioning of the commodity market. In his work titled *Administration and management of the Dominium of Huszt under the jurisdiction of the Szepes Chamber* (*1600–1604, 1614–1615*), *László Glück* points out how a castle estate operated in Hungary at the beginning of the 17th century, in a time of monetary tightness. The participation of the manor in trading remained negligible despite the fact that it operated a complex agricultural holding.

Tamás Csíki (*Market and black market in the rural society during the First World War*) shows the opposite extreme, the mechanisms in the period of commodity shortage, examining a period two hundred years later. State regulations on prices and forced sales hampered market relations, however, the market created its way, resulting not only in the emergence of black market trading and bartering, but also changes the structure of production.

The role that prices play in regulating the market also appears in the paper of *Antal Szántay* (*Prices in 18th century Hungary*). After a short review of the professional literature on price history, he provides insight into the typical sources of the era, and calls for a comprehensive, systematic research on prices in the early modern period.

On the whole, the volume responds to the objective of the editors: it includes interesting and valuable “deep delvings” into all of the various participants involved in the world of credit, from the Middle Ages to the early modern period and to the middle of the 20th century; and it may thus mark an important stage in fundamental research aimed at creating the missing synthesis of the history of credit. Readers, whether they are economists, historians or they just show interest in economic history will definitely obtain a deeper understanding of the centuries-old development of lending, while they will also find many things of historical interest they maybe did not look for, but will certainly enjoy reading.

How Will Technology Transform the Work of Human Experts?*

Gyöngyvér Szakál

Richard Susskind – Daniel Susskind:
The Future of the Professions: How Technology Will Transform the Work of Human Experts
Oxford University Press, 2015, p. 346.
ISBN-13: 978-0198713395

The authors, Richard Susskind, a professor dealing with the field of the technological development of the legal profession and his son, Daniel Susskind, an economist, analyse on the basis of their professional experience how technological development is changing occupations/trades belonging to the scope of intellectual occupations requiring a degree, and called "profession" (such as legal occupations, physician, teacher, tax consultant, priest, architect, etc.), and the work of their practitioners.

One important starting point of the book is the definition, in order to distinguish those occupations/professions that belong to the category of "profession", a concept not identified by a specific term in Hungarian language, to which I will refer in the subsequent part as occupations that require a degree, or professions in English. By profession they mean such occupations, usually offering a high degree of social appreciation and a safe financial background, that comply with the following four conditions: (i) the practitioners of these occupations have specialist knowledge in which theoretical qualification is only one element, they must be able to apply it in practice (as opposed, for example, to university researchers), and this knowledge should be constantly developed so that it can be applied in practice, (ii) admission tends to depend on several credentials (education, practice, demonstration of theoretical and practical knowledge, competence for the performance of the task, ethical requirements/expectations), (iii) the activity is regulated (in a self-regulating manner or by an external institution, interest-representing organisation), only authorised persons are allowed to perform the activity, (iv) the practitioners of the profession have or are expected to have a common set of values, such as honesty, commitment and reliability.

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

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The system that makes the skills of these specialists available to society is about to undergo fundamental and irreversible changes. In the long term they will not be needed, or we will not want them to work the way they did in or before the 20th century.

The book consists of three main parts. In the first part, the authors describe those changes affecting professions that can be observed already. The second part maps out the anticipated developments and directions. Finally, the book focuses on assessing what consequences we should anticipate and whether we can counter the undesirable effects.

Past and present

People do not possess all the skills necessary for managing every area of their lives. However, the special knowledge, practice, expertise, skills and know-how provided by professions (how theoretical knowledge can be applied to the needs of the given people, entities, to convert, apply them in a way that addresses the existing problems in an adequate manner) is capable of bridging this problem. Therefore the "grand bargain" was made between members of society and members of professions, which basically meant that the professions are allowed to operate as self-regulatory bodies, and people trust in their practitioners that they are capable of giving them advice and assistance, for example, that in possession of the appropriate qualification and practice physicians can diagnose and treat diseases.

In their current form, professions reflect the needs for the fulfilment of which they were traditionally established. Most of today's professions developed in the 19th century, in response to the needs of the time, adapted to the requirements current at that time. Practitioners of the professions are not interested in terminating the existing status quo, and from the other side no realistic alternative has been raised so far on how the above needs could be met. Therefore, so far no one has questioned the social contract between professions and the people.

However, during the recent period the world has undergone significant technological development, which has fundamentally changed the way of the generation, search and sharing of information, and this process is still very far from being over. The four main aspects of development are: exponential growth in information technology, increasingly capable machines, increasingly pervasive devices and increasingly connected humans.

Technological development offers new alternatives regarding services provided by practitioners of professions as well. *The "grand bargain" has been questioned.* While in paper-based industrial societies professions played a central role in the spread

of expertise within the society, today professions are not the only way to ensure the spread of expertise to members of the society.

The future

The four common features of the practical knowledge provided by practitioners of professions are the following: i) they are non-rival services (when they are consumed, others will not receive less of them), ii) many of them are available for everyone (those who do not pay for them cannot be excluded from their consumption), iii) they are cumulative (their use and recycling creates new knowledge), iv) they are digitisable (they can be converted into bits suitable for processing by machines). It is the new processes affecting the above features that enable changes to the way expertise is created and spread within society.

In the technology-based Internet society (which is gradually replacing oral, written and ultimately, printed communication, and currently offers the highest level of the conveyance of expertise), expertise is becoming more and more accessible and affordable for those who use and benefit from services provided by professions. On the other side, the work of those who create expertise and provide it to the society is also changing. The state-of-the-art technologies enable the standardisation, automation and simplification of several routine tasks. Going beyond that, machines that are capable of more and more functions, operating in an automated manner or by persons who cannot be considered specialists of a profession, will largely take over those tasks that had previously been the exclusive domain of practitioners of professions. These processes are occurring simultaneously in the short and the medium term.

Professions are about to undergo a transformation, the impact of which will be similar to that of the Industrial Revolution on traditional trades (such as smiths). Certain tasks of professions (physicians, lawyers, journalists, architects, etc.) will be terminated or transformed. If all or most of the tasks of a traditional profession are replaced, then the given profession will disappear. However, if the changes only affect certain partial elements, then we should rather talk about transformation. We can observe several aspects of transformation, such as the reorganisation of the activity or the spread of new employment trends (such as flexible self-employment, involvement of the users).

For example, the work of travel agents or tax consultants will become obsolete in many cases, which gives rise to disintermediation. The online booking websites and tax preparation software force the providers of the services into new roles. That way, the reconsideration of their intermediary activities (for example, concerning tax advisors, a shift from the reporting side in the direction of tax planning) new intermediary models emerge (reintermediation). Typical processes include

decomposition of certain professions and their provision by multiple players (in the form of out-sourcing, multi-sourcing, offshoring, near-shoring, co-sourcing, etc.). As for the design and engineering activities, it is an already existing practice that the activity is divided up into tasks and the individual tasks are allocated to expert groups.

It is the opinion of the authors that professions will not disappear completely. The new machines/systems will not be capable of copying or substituting humans entirely. At the same time, professions that serve machines/systems, such as an assistant, specialised assistant, process analyst, engineer, software architect, will be more appreciated, and entirely new professions may come into existence based on the traditional ones (e.g.: data scientists, professional emphatizer who helps in emotional treatment of information produced by machines).

Furthermore, we should anticipate that in the labour market different skills and talents will be needed and become essential. These include, for example, multi-disciplinary thinking, the skills to quickly learn how to apply novel channels of communication (such as social media), or the operation of the new systems that emerge or undergo changes almost on a daily basis.

Consequences

The book also looks into important moral issues. *We have reached a point where society is not only able but also obliged to shape the future.* We must certainly reach social consensus on what are those areas where exclusive reliance on the use of technology is not morally permissible. In the opinion of the authors, decision on human life should be one of these in any case.

Furthermore, humankind cannot avoid thinking about who should possess and control expertise in the future. In the position of the authors, the only obvious aim that we can set is that human beings around the world should have equal direct access to living, help, guidance, learning, and insight that will empower them to live healthier and happier lives.

Report on the East-West Cohesion II International Scientific Conference*

Annamária Csiszér

Since 2007, the University of Dunaújváros organises annual international scientific conferences with the title "Danube-area cohesion". These events now considered as traditional have contributed to the establishment and operation of the European Danube Regional Strategy (EDRS).

Building on the results of the Danube area, the Eastern Opening Strategy unfolded at the University of Dunaújváros in 2014 has significantly contributed to the development of international cooperation, the strengthening of East-West relations and to socio-economic cohesion. With these thoughts in mind, the East-West Cohesion International Scientific Conference was organised for the second time on 16–17 November 2017. The aim of the event was to strengthen international cooperation between higher educational institutions, to promote modern forms of training, to establish scientific cooperation and to help the work of doctoral students and young researchers.

Participants of the conference came from 7 different countries and 20 different higher education institutions. The two-day event opened with a plenary session with comprehensive lectures linked to the main topics and continued with four parallel sections in the afternoon. On the second day, panel discussions were held providing an opportunity to hold multilateral consultations and exchanges of views, thereby facilitating the development of international partnership and the foundation of joint research projects.

The conference was opened by *István András*, Rector of the University of Dunaújváros, who gave a brief overview of the university and its operation. He then discussed the strategic possibilities expected from the Eastern Opening in the areas of research and development. Following the opening words of the Rector, *Antal Papp,* President of the Scientific Council of the National Directorate General for Disaster Management of the Ministry of Interior and patron of the conference greeted the participants.

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

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At the plenary session, renowned local and foreign speakers reported on their latest scientific research findings which contributed to the issue of East-West cohesion. The plenary lectures started off with a comprehensive academic lecture by *Lajos Veres,* College Professor at the University of Dunaújváros, Director of Danube Strategy, entitled "New challenges in the East-West cohesion in the global economic space". The speaker pointed out the changes observed in interpreting the concept of cohesion, which led to increased attention to economic, social and territorial disparities. The second part of the lecture focused on the transformation of European values and on new crisis phenomena. Last but not least, the third point dealt with the concept of security changing as a result of the growing financial and economic crisis experienced over the last decade and the need for creating economic security in the period ahead, as well as the wider interpretation of the security of supply.

In his lecture entitled "International economic challenges in the transnational sphere", *Csaba Lentner,* Professor at the National University of Public Service, outlined that the new economic policy responses to the 2008 financial and economic crisis were no longer formulated in the spirit of neoliberalism, but according to the new requirements of the post-globalisation era. The crisis of the European Union has shifted the focus not only to cooperation between macro-regions and country groups, but also to national economic policy responses that are stronger than seen up to now. In the developing geopolitical environment, economic policy ambitions that reinforce national popular opinion, monetary policy and public finance have gained importance. Finally, Lentner outlined the importance of the increasing role of the state in the economy.

In his lecture, *Ferenc Szávai,* Rector of the University of Kaposvár, focused on current and potential capital investments in the border area of Hungary. He talked about capital as an essential and intentional tool for economic modernisation and a factor needed for development. In many cases, the appearance and a larger inflow of foreign capital is vital to the development of the economy and the region. However, just as important is the reverse movement of capital. Hungarian firms have invested about one third of the foreign capital flows coming to Hungary into regional states, primarily in Slovakia, Poland and Romania. Besides their strategic significance and the fact that in certain cases they are proof of national policy impacts and advantages, these capital investments are an important item in the capital account of the country. The speaker emphasised that the breakdown of capital imports in Hungary by sectors and countries as well as the results of venture capital activities in Hungary provide important information to new investors.

Attila Korompai, Associate Professor at Corvinus University of Budapest, analysed the linkages between the export/import dependency of the Visegrád countries (V4) and the headline target of the EU cohesion policy for the reduction of territorial

disparities. By presenting the changes in GDP per capita between 1996 and 2015, he demonstrated that the V4 countries make for a dynamically growing region within the EU, although the speed of convergence differs by country and time period. A key factor in achieving growth is the strong dependency of the individual countries (except Poland) on foreign trade with the EU-15 countries, meaning an increasing dependency but on a declining path, including Poland after EU accession. Germany is the dominant foreign trading partner of each V4 country. However, in the period following the crisis of 2008, the dependency of these countries on the EU-15 was reduced partly by an increase in trade among themselves, and partly by an opening up to the world market, i.e. a shift in orientation towards the dynamic regions. Thus, the dynamism of GDP per capita growth continued to ensure that the cohesion objective of catching up is achieved.

Andrea Keszi-Szeremlei and *Katalin Kukorelli,* college professors at the University of Dunaújváros, delivered interesting lectures on economic security, the migration problem in Hungary and its impact on the state budget. Of the types of migration recently in the centre of interest of researchers and politicians, the issue of refugees fleeing from east to west, especially from war zones, was highlighted. Hungary as a country bordering the Schengen Area is among the target destination countries for refugees, however the country is mostly seen as a transit country. Migration of the population to Western Europe presents greater challenges both to Hungary and the other Eastern European countries. The increase in the number of citizens living abroad, the composition of migrants (most of them are young, i.e. belong to an age group ranging from 20 to 40, highly-qualified and single) may cause problems in the region. The lecturers analysed the positive and negative effects of migration, especially on the labour market and the state budget.

On the afternoon of the first day, the conference continued with panel discussions. The first point of this programme addressed the issue of the Chinese Silk Road in Europe. In the discussion moderated by *György Nanovfszky,* former Ambassador to Moscow, the focus was on the traffic corridors of the European Union. The second discussion round addressing new university cooperation projects and partnerships was led by *Szilárd Simon,* Innovation Director at the University of Dunaújváros. With a panel moderated by *Attila Szabó,* Associate Professor at the University of Dunaújváros, new innovation opportunities and special capacities were presented.

During the panel forums, attention was centred on the Silk Road traffic corridor as a future key factor. *György Misur*, Director of the Korridor V Foundation, outlined the important role of the debate on the Silk Road in economic cooperation. *Federico Botto,* Vice President of the Foundation, stressed the importance of logistics relations between Central Europe and Italy as well as the entrepreneurial interest in it. The speakers agreed that it is necessary to exploit the potential of economic

relations, and higher educational institutions play an increasingly important role in this respect.

On the second day, the conference continued with 3 section meetings. The first section "Education and innovation" was led by *Csilla Szabó,* Associate Professor at University of Dunaújváros, Director of Institute of Teacher Training. *Antal Papp,* Fire Brigade Colonel and President of the Scientific Council of the National Directorate General for Disaster Management of the Ministry of Interior, led the "Safety" section, while *Géza Szabó,* Associate Professor at the University of Pécs chaired the "Cultural heritage" section. In the three sections, the attendants could listen to a total of 29 lectures in Hungarian and English.

The significance of the conference was confirmed through a number of new cooperation agreements. Of these, it is worth highlighting the agreement made between the Jan Amos Komienski State School of Higher Vocational Education (Leszno, Poland) and the University of Dunaújváros on a mechanical engineering student exchange, the degree programmes of the University of Dunaújváros as well as traineeship and internship opportunities for Hungarian students in Poland. A further agreement was concluded between the University of Dunaújváros and the Ural State University of Economics (USUE), Yekaterinburg, Russia.

Based on agreements already concluded and the positive feedback from participants, the leadership of the University of Dunaújváros decided to organise the East-West Cohesion III International Scientific Conference on 12–13 November 2018.

INSTRUCTION FOR AUTHORS

Manuscripts should be submitted in accordance with the following rules.

- The length of the manuscripts should be limited to 40,000 characters (including spaces) but a ± 50 per cent deviation is accepted. Manuscripts should be written in Hungarian and/or English.
- Papers always begin with an abstract which should not exceed 800–1,000 characters. In the abstract a brief summary is to be given in which the main hypotheses and points are highlighted.
- 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).
- Manuscripts should be written in clear, concise and grammatically correct Hungarian and/or English. Chapters and subchapters should be bold.
- Manuscripts should contain the list of references with the first and surname of the authors (in case of non-Hungarians the initials of the first name are required), the year of publication, the exact title of the book, the publisher, the place of publication. In case of papers, the exact title of the journal, the year, the volume, and the pages should be indicated. References in the text should contain the surname and the year separated by comma. When citing, the exact page be indicated.
- Tables and figures are to be numbered continuously (chapters and subchapters should not contain restarted numbering). Every table and figure should have a title and the units of quantitative values are to be indicated. Tables and figures are to be made by MS Word and Excel in Hungarian and English. Notes and sources are to be put directly at the bottom of the tables, figures.
- Equations should be aligned to the right and should be numbered continuously in parenthesis. (Chapters and subchapters should not contain restarted numbering.)
- Manuscripts are to be sent to the Editorial Office of the FER only. Papers are peer-reviewed by two independent and anonymous reviewers.
- Manuscripts should be sent as attachment by e-mail in MS Word file. Figures and tables should be sent in MS Excel file both in Hungarian and English.
- In case of further questions related to the manuscript visit the following website: *http://english.hitelintezetiszemle.hu/letoltes/authors-guide-en-1.pdf*

Thank you!

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