GROWTH REPORT

2016

'The true power of a nation is the number of scientifically educated citizens.'

Hitel (Credit) 178.
Count István Széchenyi

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Pursuant to Act CXXXIX of 2013 on the Magyar Nemzeti Bank, the primary objective of Hungary's central bank is to achieve and maintain price stability. Low inflation ensures higher long-term economic growth and a more predictable economic environment, and moderates the cyclical fluctuations that impact both households and companies. Without prejudice to its primary objective, the MNB supports the maintenance of the stability of the financial intermediary system, the enhancement of its resilience, its sustainable contribution to economic growth; furthermore, the MNB supports the economic policy of the government using the instruments at its disposal.

The growth trends of the economy may influence, both directly and indirectly, the ability of monetary policy to reach its objectives set out in the MNB Act and consequently the conduct of monetary policy. Changes in the dynamics and structure of economic growth may determine the evolution of short-run inflation trends, while the longer-term growth potential and its factors may have a fundamental impact on the assessment of the financial stability of the economy. With that in mind, the Magyar Nemzeti Bank will provide an annual overview of the most important trends shaping economic growth over the short, medium and longer term, presenting its assessments to members of the profession at home and abroad in its Growth Report.

The analyses in this Report were prepared under the direction of Barnabás Virág, Executive Director of the Executive Directorate Monetary Policy, Financial Stability, and Lending Incentives. The Report was prepared by staff at the MNB's Directorate Economic Forecast and Analysis, Directorate Monetary Policy and Financial Market Analysis, Directorate for Fiscal and Competitiveness Analysis and Directorate Financial System Analysis and Directorate Economic Strategy and Planning. The Report was approved for publication by Dr György Matolcsy, Governor.

The Report incorporates valuable input from other areas of the MNB.

Contents

Summary of key findings

The Growth Report provides a comprehensive picture of the growth path of the Hungarian economy over the longer-time horizon and the most important factors determining this path.

The Magyar Nemzeti Bank analyses trends in economic growth in several regular publications, such as the Inflation Report, the Report on the Balance of Payments, and the Financial Stability Report. These publications typically focus on the shorter-term outlook for the economy, analysing in particular the changes in variables which determine the stance of monetary policy. The objective of the Growth Report, published every year, is to directly present the longer-term trajectory of Hungarian economic variables, sometimes over an entire business cycle, and the related critical factors, with the use of standard and alternative indicators as well. In addition to the detailed examination of the available domestic data, we deepen our analyses with international and historical comparisons as well.

The long-term growth trend of the economy is sensitive to recessions; countercyclical policies have become increasingly important in the new economics canon developing in the course of the crisis.

Before the crisis, economic scholars generally accepted the hypothesis that economic output can be divided, fairly mechanically, into a trend and a cyclical part. In this approach, the trend equals the equilibrium path determined by the supply side of the economy. Since prices and wages adjust flexibly over the longer term, the trend is governed by the expansion of available capacities and the normal level of capacity utilisation in a given economy. On the other hand, fluctuations or cycles around the trend are typically caused by the volatility of demand. Compared to this, the latest, comprehensive empirical studies have found that the level of GDP was permanently lowered by recessions in two thirds of the cases. This phenomenon is called hysteresis. Moreover, in one third of the cases, the shortfall compared to the pre-crisis trend is not steady over time, but rather increases, i.e. super-hysteresis occurs. For the time being, there is no complete agreement within economics about the explanation of this phenomenon, but it is becoming increasingly accepted empirically that the longer-term sustainable GDP trend of the economy is not independent of the cyclical path followed. The phenomenon of hysteresis raises the importance of countercyclical economic policy, since not only do fiscal and monetary policies stabilise the economy around the trend, they may also have a significant effect on the longer-term level of GDP as well.

If the recession lowers the long-term growth trend, the high-pressure economy is expected to assist in returning the economy to its pre-crisis path.

The notion of the high-pressure economy appeared in economic sciences at the beginning of the 1970s. According to this idea, if economic policy keeps the economy under greater-than-average demand pressure, a permanently higher GDP level can be achieved. In an economy steadily and predictably under demand pressure, companies, which expect their markets to steadily expand, increase their demand for factors of production, machinery and equipment and workers. Consumer demand for goods can also rise steadily, since employment and income are more predictable. In the labour market, companies train new employees themselves (learning by doing), and do not wait for the emergence of enough employees with the right skills in the labour market. A general argument against the high-pressure economy is that it is risky from the perspective of inflation. However, the dynamics of inflation have recently changed considerably with respect to two criteria, decreasing the potential cost of the high-pressure economy. On the one hand, inflation expectations are low and well anchored, and, on the other, the Phillips-curve, which connects the real economy and inflation to each other, has become flat recently. As a consequence, the widening of the output gap has an ever smaller inflationary impact, while the benefits on the real economic side can be significant and lasting.

During periods of weak economic activity, fiscal policy may play an especially important role.

The slow recovery after the crisis verified that monetary policy alone is unable to stabilise the economy in every case. The aggressive interest rate reductions did not provide sufficient stimulus for the economy, and the series

of quantitative easing steps had a smaller and smaller positive impact. The emerging new policy mix relies on fiscal policy, since – in light of the latest results – it may be an efficient tool to stimulate the economic situation. Fiscal policy becomes especially important in the case of a balance sheet recession. The fiscal authorities may be the only actors which are able to boost their expenditure, thereby further increasing their indebtedness, and thus decreasing the real economic costs of deleveraging by other sectors. In this broader context, fiscal policy can be integrated into the framework of a current account targeting regime. With respect to countercyclical fiscal policy, the issue of room for fiscal manoeuvre must be discussed. One of the ways to meet the two main expectations with regard to fiscal policy (countercyclical and sustainable) may be the optimisation of automatic stabilisers. An advantage of automatic stabilisers is that they provide an immediate, symmetric fiscal response to a change in the economic situation, whereas they do not influence fiscal sustainability over the cycle.

Investment activity in the euro area has decreased permanently since the start of the crisis, which can be traced to cyclical factors related to the crisis and structural reasons as well.

Since one of the main channels of hysteresis may be the lag or postponement of investment, in the second chapter we examined the possible reasons behind the low investment rate in Hungary's largest foreign trade partner, the euro area. Investment activity in the euro area has decreased permanently since the start of the crisis, compared to both the level before the crisis and to GDP. One set of reasons behind the moderate investment can be identified as cyclical factors. The most critical of these are persistently low demand and the lasting increase in uncertainty after the crisis. High indebtedness and tighter lending conditions, until now, are important factors in some, especially Southern European, countries. In addition to the above, the low level of investment can be explained by structural reasons as well. Over and above labour market rigidities, youth unemployment, and the phenomenon of labour market hysteresis all have unfavourable effects on the level of investment. Additional restrictive factors of a structural nature are product market rigidities, the lack of infrastructure investment and the slowdown in FDI flows as well. Moreover, permanent changes appearing in the economic structure, such as the advance of the less capital intensive service sector and the digital economy, also lead to a lower investment rate.

Domestic investment activity is extremely concentrated. After the outbreak of the crisis, the contribution of new entrants and young companies to the investment rate decreased remarkably.

The third chapter of the Growth Report examines domestic corporate investment using micro level data. This is a unique piece of research, as such a comprehensive study which captures the heterogeneity behind the aggregate investment figures had not yet been undertaken since the crisis. After the dynamic period of structural transformation in the 1990s, the investment rate decreased considerably in the 2000s. However, while the investment rate of smaller companies, producing for the domestic market, decreased continuously, that of larger or export-oriented companies increased. Investment fell in all company groups during the crisis period, with signs of recovery starting to appear from 2013. The investment performance of companies, however, still remained below the pre-crisis level. Domestic corporate investment is strongly concentrated. This is reflected by the large share of one-off, large investment projects, and the dominance of large enterprises, foreign-owned businesses and companies producing for exports. The ageing of the sector played an important role in the weak investment performance of smaller firms. Irrespective of company size, it is typical that in the first few years following entry, companies invest more and grow faster. However, while smaller firms invest less and less as they become older, ageing above a certain age results in no further deterioration in investment performance in the case of larger companies. This may be the underlying reason for the fact that, although during the period under review companies were continuously growing old in every size category, ageing had a major negative effect on investment performance only in the case of smaller companies. The structural changes, however, did not have a significant impact on investment rates in the examined period. Newly entering companies also play an important role in investment. In the pre-crisis years, entries significantly raised the investment rate. This changed, however, with the outbreak of the crisis. The contribution of new entrants and young companies to the investment rate has fallen significantly. Although several indicators of investment activity have improved since 2013, there has not been a change in the ratio of entrants even at the end of the period. This can contribute significantly to the weakness of the recovery.

The fourth industrial revolution is redrawing our current picture of the economy.

The structure of the global economy has been transformed in recent decades. Emerging countries are contributing to industrial production to an increasing extent, explained primarily by the export-oriented growth model of the Chinese economy. In parallel with China's headway, the contribution of advanced economies to global industrial production has decreased, and the sector's weight in GDP has tended to fall. In addition to the relative downgrade of industry, the move in European economies towards higher value added production may provide an answer to the challenges posed by emerging economies. Among the European countries, the real economic importance of industry is still high in Germany and in the CEE countries. The German economic strategy, formulated with a view to preserving the competitiveness of the sector, in the framework of the concept "Industry 4.0", aims at making the economy comply with the new requirements by focusing on the stimulation of technological progress and innovation. The connection of Hungary to changing production processes and value chains depends fundamentally on the preparedness of the country. Supporting the appropriate technological infrastructure and research and development activities, as well as aligning the education and training systems with the new requirements, may greatly contribute to the technological changeover of Hungarian production. The competitiveness of Hungarian industry may be strengthened by increasing the domestic value added content of manufacturing exports, raising the domestic service content of exports, alleviating corporate duality, and developing the domestic supplier chain.

Stemming from their pro-cyclical nature, domestic lending reinforced economic fluctuations in Hungary. In addition, it has resulted in a significant, asymmetric reshaping of the growth pattern during the last almost one and a half decades.

In Hungary, there was a substantial decline in the private sector's outstanding loans after the crisis. This was also significant in international comparison. The disturbances in the financial intermediary system were mostly reflected in the contraction of corporate lending. Hungary experienced an excessive, unsustainable credit outflow to the private sector before the crisis, and this indebtedness process involved major risks not only in terms of its degree, but also its structure. Lending strongly intensified business cycles, both in their rising and declining phases, and thus the GDP observed may materially differ from the economy's actual growth capacity. However, this accelerator effect is not necessarily symmetric: the economic downturn or the deleveraging phase may exceed the "growth surplus" won in the rising phase. Thus, on the whole, financial cycles may entail a significant growth sacrifice. In the special topic in this year's Growth Report, we examine how the sustainable financing path can be identified under different scenarios, and how the effect of the presumed financial cycle on economic growth may be quantified under the various methodologies. Based on the results obtained, it can be stated that excessive lending generated significant asymmetry in Hungary during the almost one and a half decades reviewed. As a result of financial imbalances, although the domestic economy expanded on average by 0.4-0.8 per cent faster between 2002 and 2008, after the crisis it lost on average a growth of 1.1-1.4 per cent annually over a similar period, due to deleveraging by economic agents.

1 New concept of macroeconomic equilibrium – the implications of hysteresis on economic policy

In view of the slow recovery after the crisis and more than 40 years of statistics, more and more studies show the lasting negative effects of recessions on GDP, i.e. hysteresis. This phenomenon calls into question the widespread practice of clearly separating the long-term trend of GDP and the cycles around the trend, and of failing to take into consideration the impact of the cycles on the long-term GDP level. Meanwhile, data show that potential output is not independent from the cyclical path taken by the economy, i.e. from developments in aggregate demand.

In light of the new mechanisms, our perception of the functioning of the economy and the optimal economic policy must be altered. Since potential output is endogenous, economic policy must take into account the potential loss incurred when economic performance falls steadily short of its potential level, due to sluggish demand. In such a scenario, countercyclical economic policy becomes more important, as it places more emphasis on preventing huge downturns, and – if a shock nevertheless happens – it makes bolder interventions to escape the recession, in order to return to potential output.

If the recession lowers the long-term growth trend, the high-pressure economy is expected to assist in returning the economy to its pre-crisis path. The notion of the high-pressure economy appeared in economic sciences at the beginning of the 1970s. According to this idea, if economic policy keeps the economy under greater-than-average demand pressure, a permanently higher GDP level can be achieved. A general argument against the high-pressure economy is that it is risky from the perspective of inflation. However, the dynamics of inflation have recently changed considerably with respect to two criteria, decreasing the potential cost of the high-pressure economy. On the one hand, inflation expectations are low and well anchored, and, on the other, the Phillips-curve, which connects the real economy and inflation to each other, has become flat recently.

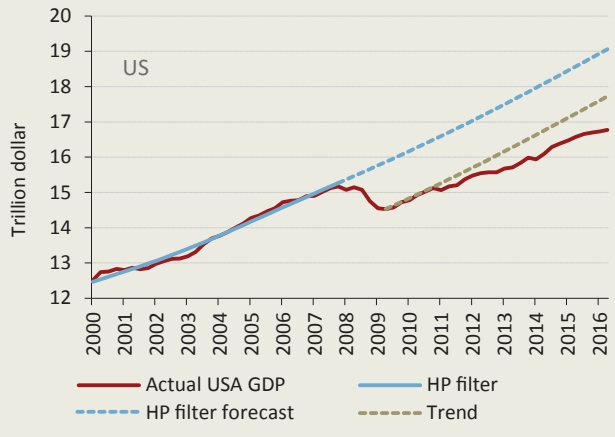
The slow recovery after the crisis verified that monetary policy alone is unable to stabilise the economy in every case. Moreover, the structure and timing of the structural reforms, which used to be regarded as general supply-side instruments, need to be chosen carefully. The emerging new policy mix relies on fiscal policy, since – in light of the latest results – it may be an efficient tool in a weak demand era to stimulate the economic growth. Fiscal policy becomes especially important in the case of a balance sheet recession. The fiscal authorities may be the only actors which are able to boost their expenditure, thereby further increasing their indebtedness, and thus decreasing the real economic costs of deleveraging by other sectors. In this broader context, fiscal policy can be integrated into the framework of a current account targeting regime. With respect to countercyclical fiscal policy, the issue of room for fiscal manoeuvre must be discussed. One of the ways to meet the two main expectations with regard to fiscal policy (countercyclical and sustainable) may be the optimisation of automatic stabilisers. An advantage of automatic stabilisers is that they provide an immediate, symmetric fiscal response to a change in the economic situation, whereas they do not influence fiscal sustainability over the cycle.

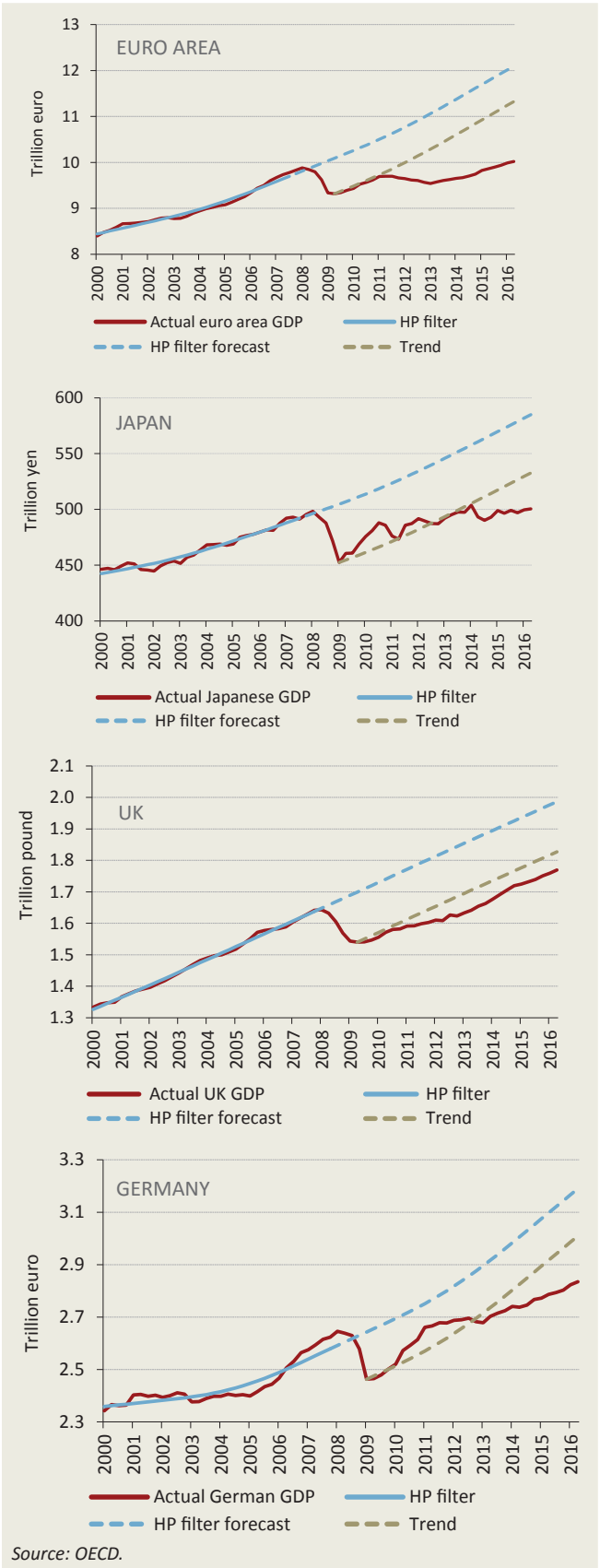
1.1 Surprisingly slow recovery

Before the crisis, economic scholars generally accepted the hypothesis that economic output can be divided, fairly mechanically, into a trend and a cyclical component. In this approach, the trend is the equilibrium path determined by the supply side of the economy. Since prices and wages adjust flexibly over the longer term, the trend is governed by the expansion of the available capacities and the normal capacity utilisation characteristic of the given economy. By contrast, fluctuations or cycles around the trend are typically caused by the volatility of aggregate demand. As an important consequence, demand shocks have no influence on the long-term growth path, and consequently, the instruments of demand management (fiscal and monetary policy) are only able to stabilise output around the trend without fundamentally influencing the long-term GDP level. In theory, growth after a recession should be more rapid than before the crisis, and therefore output should return to the path determined by the original trend in a couple of years and should continue to grow by fitting onto that path and slowing down to the long-term growth rate (potential growth rate).

Experience from the last 8–9 years since the onset of the crisis show that this expectation was too optimistic. The GDP time series lag far behind the pre-crisis trend. The recovery is slow, the return to the post-crisis GDP trend seems to be far off, and in some countries the growth rate is also lower than before the crisis.

Chart 1-1
Real GDP (seasonally adjusted, annualized quarterly data)





Source: OECD.

In an extensive empirical study, **Blanchard et al. (2015)** sought to determine whether the slow recovery following the 2009 recession was an exception in economic history. In their study, **which covered 122 recessions between 1970 and 2010, they found that GDP did not recover to its earlier trend in two-thirds of the cases.**[1] **They called this phenomenon 'hysteresis'.** Furthermore, **in about one third of the cases, the divergence from the pre-crisis trend even increased, i.e. the recession caused a sustained, negative shift not only in the level of GDP, but also in its dynamics. This phenomenon is the so-called 'super-hysteresis'.** The results were similar, irrespective of whether a four-or ten-year horizon was used for estimating the trends. Examining the 23 recessions of the 122 cases where the recession was coupled with a financial crisis, the proportion of sustained downturns was even greater (over 80 per cent), and the deviation from the earlier trend was more likely to increase than to decrease (in 35 per cent of the cases compared to 31 per cent).

The phenomena of hysteresis and super-hysteresis profoundly changes our view of the growth path of the economy and optimal economic policy. Most recently, Fatás and Summers (2016) suggested that hysteresis should receive more attention. In connection with the current slow recovery, they underline the sustained, negative effect of demand-side shocks on potential growth. This line of thought was basically echoed by Federal Reserve Chair Janet Yellen at a Fed conference in Boston (Yellen (2016)). Yet it is important to ascertain what lies behind this phenomenon, since the various diagnoses could result in different economic policies.

Table 1-1
Analysing recessions from the perspective of hysteresis

	GDP trend not lower than before the crisis	Permanent real economic loss	of which	
			Permanent loss	Increasing loss
Real GDP	32%	68%	34%	34%
Per capita real GDP	33%	67%	33%	34%

Source: Blanchard, Cerutti and Summers (2015).

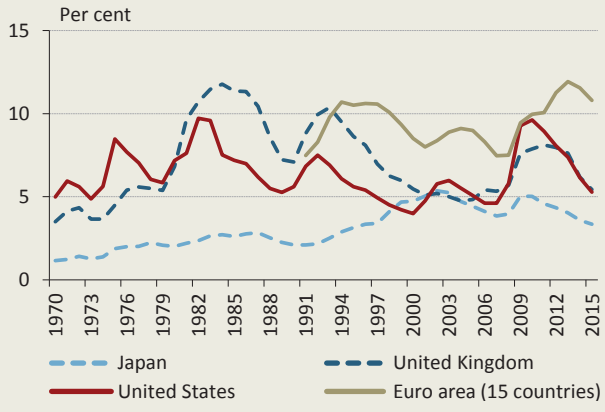
1 Blanchard et al. 2015, p. 32, Table 1.

1.2 The factors behind hysteresis

The *human capital-based explanation* of hysteresis is *still the most widespread today* (Blanchard and Summers (1986)). In their original article, the authors examined the factors behind the marked differences between the European and US labour market developments.[2] Overseas, the evolution of the unemployment rate more or less corresponded with the NAIRU approach, which was used extensively during that period. Unemployment has a long-term, natural rate (today we would rather call it an equilibrium rate), which was more or less constant over cycles. Economic cycles deflect the unemployment rate from this natural level, but they do not cause any lasting change in the long-term unemployment rate. However, European data showed that the rise in unemployment, which was regarded as cyclical, had become sustained, and unemployment stabilised at that higher level, i.e. the cyclical unemployment rate lifted the natural rate as well. Several explanations have been proposed to account for this phenomenon. Over time, the expertise of the long-term unemployed becomes obsolete, since without self-training and workplace experience they do not acquire new knowledge and are unable to practice their skills. In fact, in addition to the obsolescence of knowledge, employees' behaviour also changes. The attitude towards work deteriorates and the discipline necessary for work becomes laxer. Self-esteem is undermined, which leads to a decline in mental and physical health. Social and professional connections are eroded, and several other factors change, which reduces the employability of the employee.

The role of insiders and outsiders in wage bargaining is also considered to be an important element that sustains high unemployment. In insider–outsider models, the employed are the insiders, while the unemployed are the outsiders. In these models, wage negotiations are conducted between employers and employees.[3] The employed are mainly focused on keeping their own jobs, and do not care about the employment of the unemployed. As a result, if there is unemployment at the outset, it persists in the absence of an external shock. And in the case of a negative employment shock, the increased unemployment becomes permanent due to the bargaining strategy of the employed, whose numbers are reduced by the newly unemployed. According to Blanchard and Summers, this behaviour is consistent with the random walk observed in the case of the unemployment time series.[4]

Chart 1-2
Unemployment rate



Source: OECD.

Steadily high unemployment or economic growth which is slow or even close to stagnation may also be explained by the fact that **due to the low economic activity, capacities are not expanded, and already existing capacities are utilised often less efficiently than planned. In fact, upkeep-type maintenance may be less frequent or even neglected.** Bleak market prospects may make the return on new investments or even maintenance costs risky. However, subdued investment activity also reduces the quality of capacities, since newer, more productive and higher-quality equipment and technologies can only be put to production through new investments. **Thus, unfavourable macroeconomic performance reduces the quantity and quality of both the workforce and capacities, i.e.**

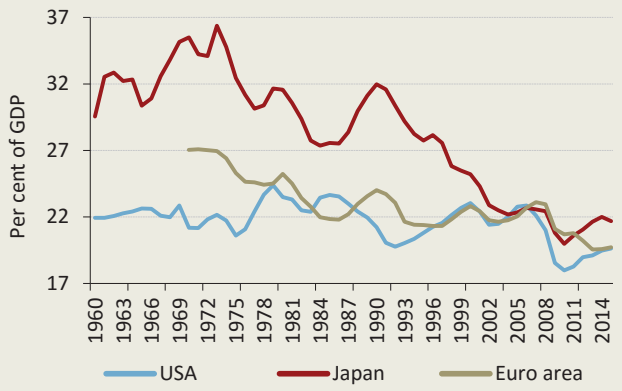
2 On the interaction of labour and goods market institutions and macroeconomic developments before the crisis, see Horvath and Szalai (2008).

3 Employee representation varies by country and over time. In most but not all countries, workers are traditionally represented by trade unions. Therefore in certain models, insiders mean the trade union members, while in other countries works councils negotiate the wages. In recent decades, trade union membership has experienced a dramatic decline, but wage bargaining continues. Those who actually influence wage negotiations should be considered insiders, irrespective of the organisational form.

4 Random walk means that in a time series there is no tendency to return to a trend after a shock to the variable, the shock persists (this is the persistence element), and it follows normal distribution.

hysteresis may be applied to physical capacities as well. This is evermore valid in times when corporate credit constraints are tight. Summers formulated several hypotheses for explaining weak investment activity, none of which are generally accepted: for example poor innovation activity, the type of innovations (materialising in consumer experience, not in GDP), and measurement error due to a drop in the relative price of capital goods.

Chart 1-3
Gross fixed capital formation



Source: World Bank.

Another explanation for the phenomenon is that **R&D spending declined during the crisis, the adaptation of new technologies lost momentum, which may decrease even potential economic growth** (see Fatás (2000), Dosi et al. (2008), Anzoategui et al. (2016)). **Basically, the phenomenon of super-hysteresis can also be attributed to these factors.**

In addition to explanations based on real economy developments, there are notable approaches that emphasise the concept's financial side. **The current crisis is a banking crisis and a credit crunch, which can be explained by the financial instability and drastic deleveraging necessarily following excessive lending.** This is highlighted by **Richard Koo[5] in the balance sheet recession concept.** In this explanation, the crisis is protracted because the unavoidable deleveraging affects many players at the national, regional and global level, which weakens aggregate demand.

The slow recovery, however, is not explained solely by the weak lending activity, which is caused by the subdued credit demand as well as the moderate credit supply on account of the high proportion of bad bank loans. One of the important explanatory factors is that **before the crisis, when abundant credit was available, the allocation of resources among the individual economic sectors and utilisations differed of the optimal distribution.** Excessive real estate investment, the financing of which did not prove to be sustainable, cannot be easily converted back into other assets and productive capital elements. On macroeconomic level, physical investments can only be reversed gradually, in a financial form, in proportion to the receipt of sales revenues, but not in a physical form. **This real adjustment is time-consuming and costly, and increases the adjustment costs incurred due to the balance sheet adjustment.[6]**

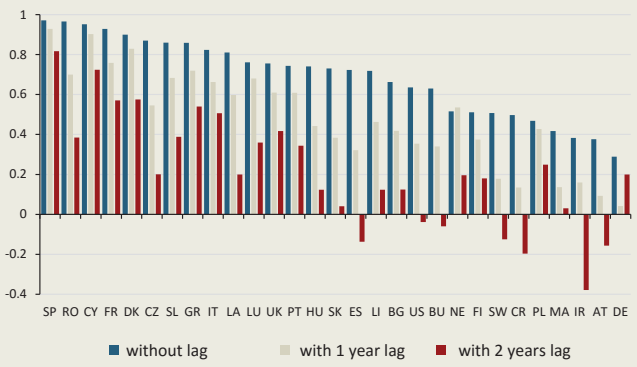
5 Koo (2011), Rogoff (2015).

6 For more potential causes of the current slow recovery, see Csortos and Szalai (2015a and 2015b) and MNB (2015) Chapter 1.

1.3 Consequences of the new approach to the cycle and the trend

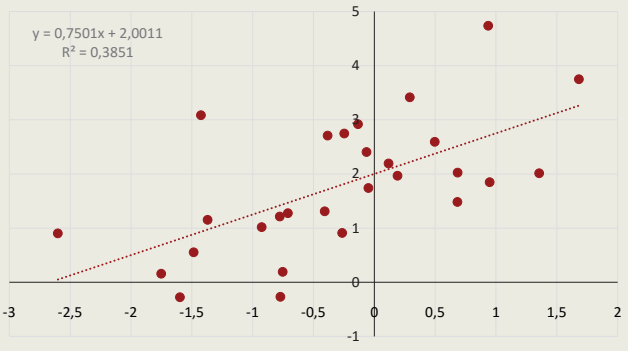
As seen, there is no consensus as to the exact mechanism yet, but the fact that the income path sustainable over the longer term is not independent from the cyclical path taken by the economy is increasingly accepted empirically.[7] Since this means a radical change in macroeconomics, the new approach may fundamentally alter our picture of optimal economic policy.

Chart 1-4
Correlation between output gap and potential GDP (2002-2016)



Source: AMECO.

Chart 1-5
Cross sectional correlation between output gap and potential GDP (2016)



Source: AMECO.

1.3.1 COUNTERCYCLICAL POLICY BECOMES MORE IMPORTANT AND AUGMENTED WITH THE FINANCIAL CYCLES

If recessions entail considerable long-term effects, countercyclical policy becomes particularly significant. Among academics, 1995 Nobel laureate **Robert Lucas (2003) believed that countercyclical policy exerted no significant impact on welfare, and therefore we should not be concerned with smoothing out economic cycles.** On the other hand, **cyclical troughs affect the growth trend in most cases, and therefore the role of fiscal and monetary demand management is much more pronounced than was believed in the economic canon before the crisis.**

One of the mistakes before the crisis was that the prevention of the crisis did not receive enough weight.[8] Although a crisis was not considered completely impossible, it was assumed that it would not be extensive and persistent, and that economic policy, and the central bank in itself, would be able to minimise the fallout and usher the economy back to the pre-crisis path without any major long-term losses. In retrospect, it can be seen that this was an over optimistic assumption, and today it is increasingly recognised that we have to focus more on prevention of the economic turmoil. This approach has been underpinned by changes in institutional setup, i.e. the increased demand for macroprudential policy to be implemented amongst other economic policies. Due to the euro area's unique structure, new institutions were created (the banking union in order to bolster financial stability and fiscal capacity). Since the crisis, the number of publications presenting the role of financial cycles in shaping economic cycles has increased.[9] One of the conclusion of the models presenting financial cycles not as external shocks but as endogenous processes is that these endogenous financial processes have a lasting impact on the economy's growth path, in times of both the recovery and the potential costly adjustment or financial crisis.

7 It should be noted that the concept of potential growth emerged in Wicksell's works. Interestingly, Wicksell also considered potential growth endogenous, in contrast to the modern neo-Wicksellian approach that characterises the neo-Keynesian models. See Hauptmeier et al. (2009).

8 Golub et al (2009).

9 See, for example, Borio et al. (2014).

1.3.2 THE LONG-TERM EFFECT OF DEMAND PRESSURE – "HIGH-PRESSURE ECONOMY"

To stimulate the economy in the era of slow recovery Ball suggests the implementation of Okun's concept of the **"high-pressure economy".** Okun argues that **if economic policy exerts above-average demand pressure on the economy, a consistently higher GDP level can be achieved. In other words, potential output can be persistently increased through a suitable economic policy.** This approach hence not only contends that potential output is not independent from aggregate demand, i.e. that it is endogenous, but also that it reacts to economic policy. This is evidenced by a study of Fatás and Summers (2016), in which the authors show that in developed economies, each percentage drop in GDP caused by fiscal austerity in 2010–11 entailed a 1-per cent fall in potential output. In an economy that can be characterised by steady, predictable demand pressure, companies, which expect their markets to expand persistently, increase their demand for factors of production, machinery and equipment, and workers. Consumer demand for goods can also rise steadily, since employment and income are more stable and predictable. On the labour market, companies train new employees themselves (learning by doing) and do not wait for the emergence of enough employees with the right skills on the labour market.[10] Firms also hire workers who in a normal recovery would not be considered employable by employers. Companies employ an ever growing share of employees as part of the "core" workforce, with open-ended labour contracts, as full-time employees, and the proportion of employees with looser ties to the labour market and companies, often employed as part-time workers or non-employee independent contractors, diminishes.

Even in Okun's time, many have argued that implementing his concept entails considerable risks.[11] Mainly among European decision-makers, there was a widespread belief that the potential output of the economy suffered enduring damage in the crisis. They saw the crisis as evidence that the economy had been overheated before the recession. As the recovery has dragged on, international institutions have been continuously reducing their potential output estimates since the crisis.[12] This, however, points to serious problems. Potential output is indeed not independent from actual output, i.e. it is endogenous, and the institutions send the wrong message to economic policy by constantly revising it downwards, and thus closing the negative output gap. If economic policy reacts in line with the closing output gap, it slows down the growth rate of potential output endogenously as well. This is the danger of attributing high unemployment and sluggish growth to structural factors, when in fact they are partly or entirely cyclical.[13]

The other common argument against the high pressure" economy is inflation risk. Yet it is important to point out the considerable changes in inflation dynamics in recent years. In contrast to the projections by the theoretical models, the weak demand environment did not entail deflation during the crisis (for more detail on the missing disinflation, see Coibion and Gorodnichenko 2015). The process can be basically attributed to two factors: the anchoring of expectations and the flattening of the Phillips curve. Chart 1-6 clearly shows that the relationship between the output gap and inflation cannot be considered stable, since the slope of the regression line is not constant. Due to the flattening of the curve, the high pressure economy (positive output gap) has an ever smaller inflationary impact. In addition, if inflation expectations are anchored, the inflationary impact is only temporary, and economic policy does not have to worry about future costly disinflation.

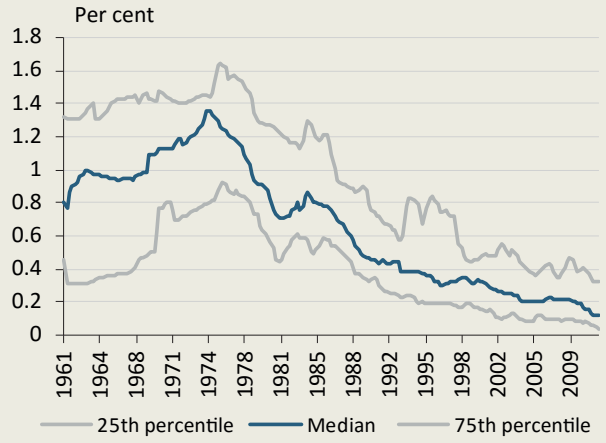
10 In business surveys, we can often see that managers believe that despite high unemployment, companies do not find employable workers (skill mismatch). They expect the education system to produce employees with the right skills for the companies. According to experts, when company leaders talk about skills shortages, they often do not think about formal qualifications, but how the candidate will adopt the company's unique habits ("cultural fit"). Okun observed that in a "high-pressure" economy, these kinds of concerns are voiced less by managers, as firms have the necessary incentive to train their own . workers. See also the study by Holzer et al. cited in Ball (2015). Holzer et al. (2006).

11 See, for example, the opinion of the reviewers of Okun' study: Fellner (1973) and Greenspan (1973).

12 Martin et al. (2015).

13 Fitoussi explained the high unemployment in Europe in the 1980s with such a mechanism, and created the concept of "soft growth". He used this term to describe the subdued growth coupled with high unemployment, when European decision-makers wrongly kept real interest rates high because they considered unemployment to be structural when in fact it was cyclical (Fitoussi 2001).

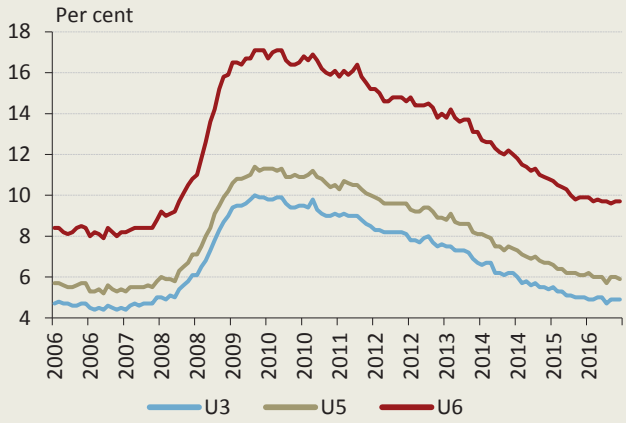
Chart 1-6
Changes in the slope of the Phillips curve



Source: Blanchard et al. (2015).

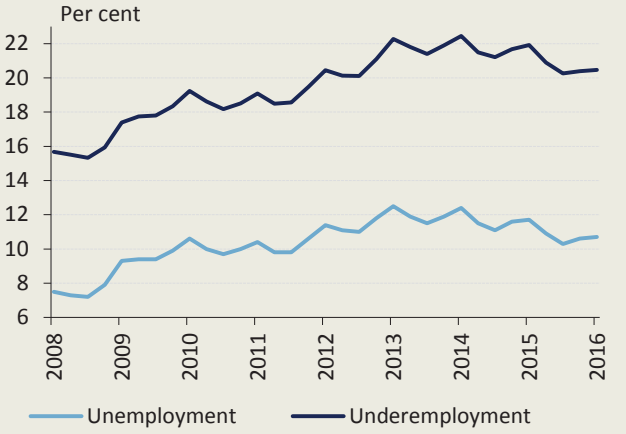
Ball and others point out **that there is still untapped potential in boosting employment.** Although in the US unemployment has practically fallen to pre-crisis levels, this is only true of the indicator in line with the official definition: underemployment[14] is still substantial. For the time being, unemployment in the euro area, which increased during the crisis, is far from the pre-crisis level, when it was already high (Chart 1-8). In addition, the share of part-time and self-employment has risen in the euro area as well, which can only be partly deemed as an alternative chosen by the employee: for the most part, this can be considered underemployment accepted out of necessity.[15]

Chart 1-7
Unemployment and underemployment, US



Note:
U3: normal (ILO) unemployment;
U5: U3 plus potential workforce not active on the labour market;
U6: U5 plus part-timers due to economic reasons.
Source: Bureau of Labour Statistics.

Chart 1-8
Unemployment and underemployment, euro area



Note: Underemployment: the unemployed plus the alternative indicators in line with Eurostat (2015).
Source: Eurostat.

1.3.3 THE TIMING OF SUPPLY-SIDE MEASURES IS KEY

According to the generally accepted belief before the crisis, structural policies directly influence the economy's long-term growth potential, and therefore their use is independent from economic activity. Experiences in recent years, however, have shown that the demand effects of supply-side measures need to be taken into account as well. The problem is especialy-ly acute in connection with the Greek crisis management (Papaioannou et al. (2015), Haliassos (2015),

14 The official unemployment figures are compatible with the ILO's definition. This does not include those, for example, who gave up looking for a job after losing hope, who work part time for want of something better, and the involuntary entrepreneurs. Statisticians in both the US and Europe have devised alternative underemployment indicators that are able to capture this workforce potential. See Charts 1-9 and 1-10 in the main body of the text.

15 Eurostat also started publishing employment indicators that are better able to capture these new and unconventional forms of employment. See Eurostat (2015).

Table 1-2
Macroeconomic impact of reforms on the product and labour markets

Reform area	Normal economic conditions		Weak economic conditions		Strong economic conditions	
	Short term	Medium term	Short term	Medium term	Short term	Medium term
Product market	+	++		+	+	++
Employee protection			-	- -	+	++
Unemployment benefits	+	++	-		+	++
Taxes on labour	++	++	++	++		
Active labour market policies	++	++	++	++		

Note: Impact on output and employment; + and (-) denote a positive (negative) impact, the number of signs shows the strength of the impact. Taxes on labour and the budget expenditure on active labour market policies are lower if they are introduced in a budget neutral manner (i.e. if the budget balance remains the same).
Source: IMF (2016a).

Manasse (2015)). Although according to textbooks increased labour market flexibility and weaker trade unions improve the economy's supply side, they reduced demand further. In a deep balance sheet crisis, implementing otherwise useful structural political measures may cause severe damage, even according to theoretical models (Eggertson and Krugman (2012), Eggertson and Mehrotra (2012)).

In the light of the lessons learned, the IMF recommends a more differentiated approach than before with respect to structural reforms as well. The various structural reforms exert their impact over different horizons and may have some detrimental effects that hamper growth and undermine confidence. **In the weak and fragile growth environment, product market reforms, a reduction of taxes on labour and active labour market programmes are recommended.** The IMF suggests that the reforms that impair employment security should be postponed to times of not even normal, but substantial upswings.

Certain reforms may have a lasting adverse effect on particular social and business groups, which can be offset by economic policy.[16] Income distribution effects also must be taken into account, as they have gained prominence in macroeconomic policies in recent years.

16 The compensatory economic policy can expect less resistance from those negatively affected. Compensation may also be a social policy objective, when society does not consider the affected responsible for the situation and wishes to express its solidarity. One such example is the compensation of the former employees in the disappearing mining sector in Hungary ("coal penny"), or, at the European level, the compensation provided to those affected by the crisis in the textile and the heavy industry.

1.4 Towards a new economic policy consensus

In autumn 2016, the IMF revised its growth forecasts downwards again.[17] Due to the unsuccessful economic stimulus measures, we can also see shifts in economic policy recommendations as compared to the ones in the earlier stage of the crisis. Against this background, the calls for greater alignment of economic policies are becoming louder. In the acute phase of the crisis, both monetary and fiscal policy was accommodative, and this accommodation was globally coordinated by the economic policymakers of the large regions in the G-20.[18] Later, fiscal policies were gradually scaled down – earlier and more rapidly in Europe than in the US – in line with the pre-crisis approach. However, this proved to be too early in view of the recent experiences and risk outlook. The supportive measures of fiscal policy are proposed to complement economic policy that has previously relied solely on central banks, especially in the countries where the necessary room for fiscal manoeuvre is available and there is no pressure from the financial markets for rapid fiscal consolidation. This holds true for both the US and the core countries of the euro area.

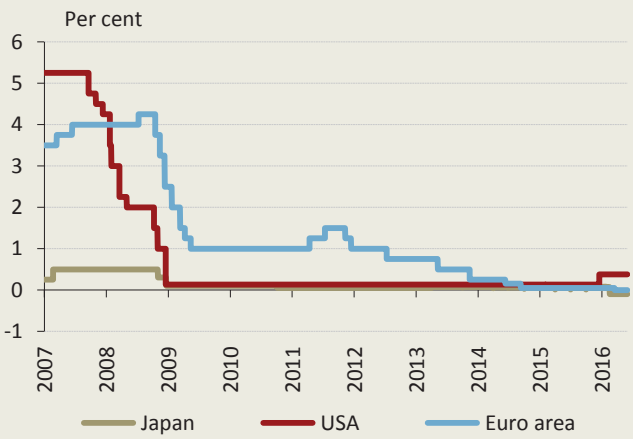
The push for a globally more balanced stimulus with more coordination among the economic policy spheres[19] suggests that more and more people recognise the long-term negative effects of weak growth or stagnation, which was termed hysteresis above. The danger from an economic policy perspective is that if the lasting negative effects are not taken into consideration, we may arrive at flawed economic policy conclusions.

1.4.1 MONETARY POLICY IS NOT OMNIPOTENT

After the acute phase of the crisis had passed, absolute confidence in monetary policy's strength dominated economic policy decisions. Initially, decision-makers sought to stimulate the economy with classic instruments (by drastically cutting the interest rate), but the stimulus did not prove sufficient to bring GDP back to its earlier trend. As early as the 1930s, Keynes argued that in the context of extremely low interest rates monetary policy becomes ineffective. Since in a weak demand environment inflation is also typically low, **the central bank cannot provide adequate stimulus to the real economy by changing the nominal interest rate** (Constâncio (2016)). In this case, interest rate policy basically becomes ineffective (Eggertson and Krugman (2012)).

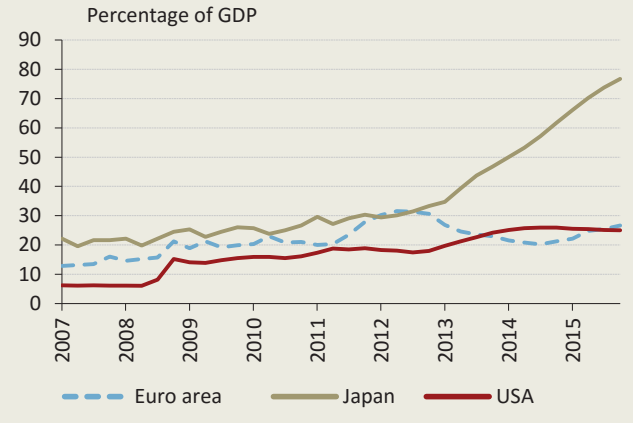
Having recognised the problem, developed central banks attempted to loosen monetary conditions with unconventional central bank balance sheet instruments. Consecutive quantity measures were decreasingly able to deliver positive effects throgh diminishing yields. Over time, the BIS's opinion that the effectiveness of monetary policy's quantitative easing decreases seems to be confirmed.

Chart 1-9
Developments in nominal interest rates



Note: Central bank interest rates.

Chart 1-10
All central bank assets



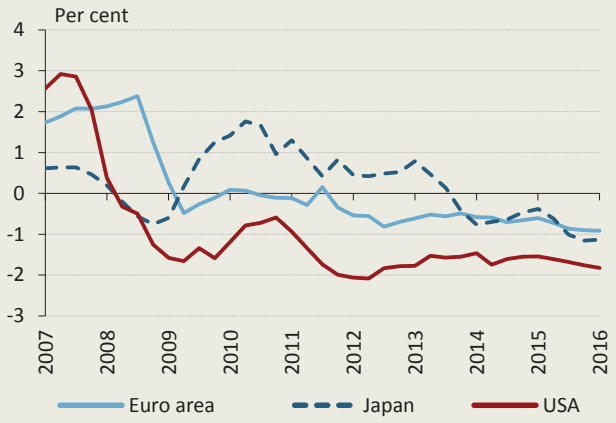
Source: OECD, BIS calculations.

17 IMF (2016).

18 MNB (2014), Chapter 1.

19 Gaspar et al. (2016).

Chart 1-11
Developments in real interest rates



Note: Central banks' nominal interest minus inflation excluding food and energy prices; in the case of Japan figures adjusted corrected with VAT.

Source: BIS (2016).

Chart 1-12
The effectiveness of unconventional monetary policy on yields and interest rates, FED

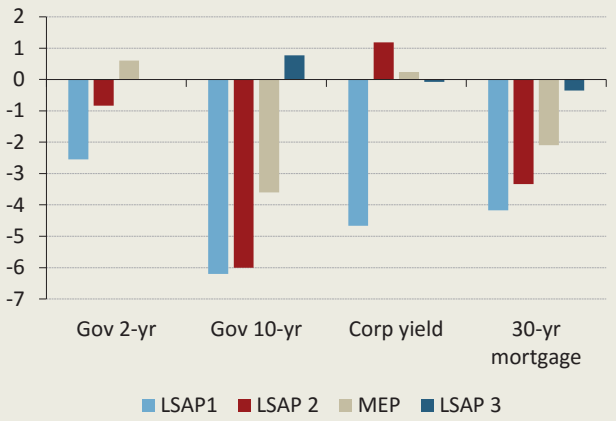


Chart 1-13
The effectiveness of unconventional monetary policy on yields and interest rates, Bank of Japan

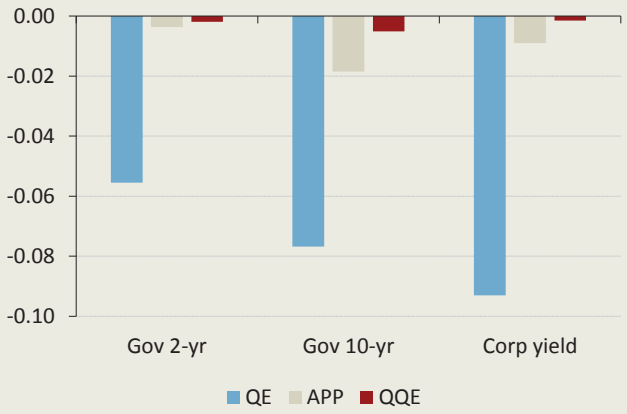
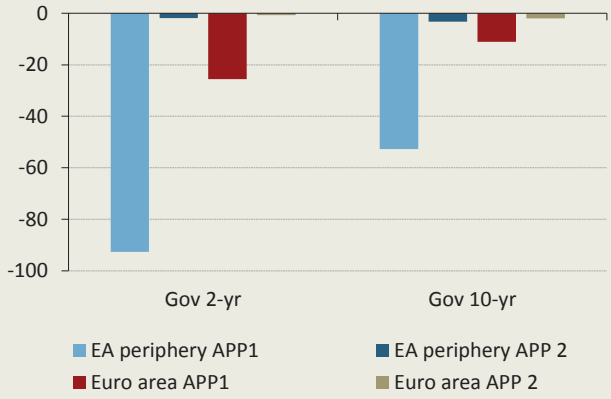


Chart 1-14
The decreasing effectiveness of unconventional monetary policy on yields and interest rates, ECB



Note: The effect of buying 100 billion in the domestic currency; APP: asset-purchase programme; LSAP: large-scale asset purchase; MEP: maturity-extension programme; QE: quantitative easing; QQE: quantitative and qualitative easing.

Source: BIS (2016).

1.4.2 FISCAL POLICY CAN HELP IN TIMES OF TROUBLE, BUT NEEDS ADEQUATE ROOM FOR MANOEUVRE

Before the crisis, economics was typically characterised by great **scepticism regarding fiscal policy.**[20] This negative attitude was based on three main arguments. First, it was believed that fiscal policy exerted its impact with a **significant lag**, while at times of the Great Moderation, the duration of recessions shortened. Accordingly, it was a widely held notion that fiscal expansions had an effect when the recession was over, i.e. **when they were not needed anymore. In the previous chapters we demonstrated that recessions can be deep and the recovery is usually prolonged,** therefore the argument that fiscal policy exerts its impact too late, after the unfavourable cyclical conditions, is simply not valid. **Monetary policy may reach the limit of its stimulus capacities** after large recessions, as discussed in the section on monetary policy. In such a scenario, neither the interest rate instrument, or the balance sheet instruments can provide adequate support to the economy, meaning the **conventional instruments of monetary policy become ineffective.**

Second, it was believed that fiscal policy's **effect on macroeconomics (i.e. the fiscal multiplier) was weak**, and that government spending **crowded out private investments.** Third, it was assumed that beyond a

20 The aversion concerned the way how fiscal policy managed economic activity. It was not questioned that the government played a special role in providing public goods.

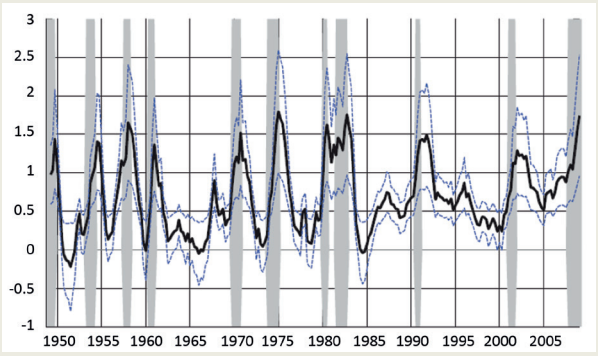
point, a rise in the debt ratio on account of the measures caused so much uncertainty among market participants that it hampered economic growth.

Before the crisis, there was a consensus among economists that **the multiplier effect of the various measures varies** (Baksa et al. (2014)). It was also commonly accepted that **the features of a given economy also have a marked influence on the effectiveness of fiscal policy measures.** Ilzetzky et al. (2011) examined the question on a panel of several countries, but the sample **ended in 2007**, and so the conclusions of the study are only **relevant for the pre-crisis period.** Based on their results, one can see that the value of the multiplier is much higher in the case of developed economies, and that the effectiveness of fiscal policy is supported by both the fixed exchange rate regime and the closeness of the economy. However, the scepticism was justified by the fact that the multipliers calculated for the various types of countries and exchange rate regimes are typically lower than 1. In the model framework, the parameters determining the multiplier (openness, exchange rate regime) are typically stable or change only slowly, therefore it was assumed that the estimated multipliers are also constant over the cycle.

Yet empirical analyses after the crisis showed that the **estimations on the pre-recession samples substantially underestimated multipliers. In a study that garnered considerable attention, Blanchard and Leigh (2013) showed that the IMF had underestimated the fiscal multiplier in its forecast models.** According to their observations, the multiplier has risen to the 0.9–1.7 range since 2007–2008. However, they also pointed out that the **value of the multiplier decreased as the crisis got further and further away.[21] The effect of fiscal measures is also influenced by how monetary policy reacts to the changes in aggregate demand.** If monetary policy is unable to react because nominal interest rates have hit the zero lower bound (ZLB), the fiscal multiplier may also change. There have been few such episodes, and therefore it is difficult to find empirical evidence to that effect. Based on high-frequency interest rate, inflation and exchange rate data, Wieland (2011) found that in such a case, the fiscal multiplier may be higher than 1.

Accordingly, the multipliers are state-dependent, and their values are significantly influenced by the cyclical position of the economy. This is supported by the study of Auerbach and Gorodnichenko (2012). The authors use econometric methods with which the parameters that change over time can be estimated. Their results are summarised in Chart 1-15. The grey bars on the chart represent the recessions in the US economy that were identified by the National Bureau of Economic Research. The black continuous line shows the value of the fiscal multiplier in time. **The chart makes it clear that the fiscal multiplier in the US is considerably higher than 1 in and around recessions, while in times of upswings, it drops below 1.** This state-dependency stems from factors such as the proportion of households with liquidity constraint, capacity utilisation, and it is affected by non-linearities such as the already mentioned zero lower bound (ZLB) as well. All in all, it can be said that **in a recession, especially a deep and long downturn, fiscal policy may be an effective tool from the perspective of stimulating the economy. Moreover, monetary policy may reach its limits in precisely these situations.**

Chart 1-15
Historical development of the expenditure multiplier in the US



Source: BIS (2016), Auerbach and Gorodnichenko (2012).

Fiscal policy becomes especially important during balance sheet recessions. **For example, Koo (2011) showed that governments could be the only players not pursuing private interests which can boost their expenditure, thereby further increasing their indebtedness, and thus diminishing the real economy costs of deleveraging by other players.** Putting Koo's analysis in a broader context, **fiscal policy can be integrated into the framework of a current account targeting fiscal regime.** If private sectors (households and corporations) increase their leverage, the government should pursue a disciplined fiscal policy. Then the current account balance does not deteriorate markedly, since the fiscal policy offsets the rise in excessive external debt. By contrast, if the private sector starts deleveraging (which increases the current account surplus or decreases its deficit from the financing side), the government pursues an expansionary fiscal policy.

21 The results of Blanchard and Leigh (2013) are called into question by several people, including Mohlmann and Suyker (2015).

Therefore, the opposite happens with respect to leverage in the private and the government sector, which smooths the time series of the current account from the financing side and prevents the sectors' deleveraging or an increase in their leverage from happening at the same time.[22]

With respect to countercyclical fiscal policy, the issue of room for fiscal manoeuvre must be discussed. Events in recent years showed that with the exception of a few large and developed economies, **there are limits to indebtedness, even in the case of governments.** If an economy slides into recession when its government debt is already high, this may constrain its deficit financing options, since the government may approach its debt limits. However, if government debt is low at the onset of the recession, it considerably **increases fiscal policy's room for manoeuvre,** as **much more expenditure can be financed from the deficit. The initial fiscal position measured with the debt ratio also affects the multiplier: the latter is high if the fiscal position is strong, and low when the fiscal position is weak** (Huidrom et al. 2016). In the latter case, the rise in yields on account of the deficit-increasing measures affects the whole economy, and thus private investments and consumption are crowded out (Bi et al. (2014)).

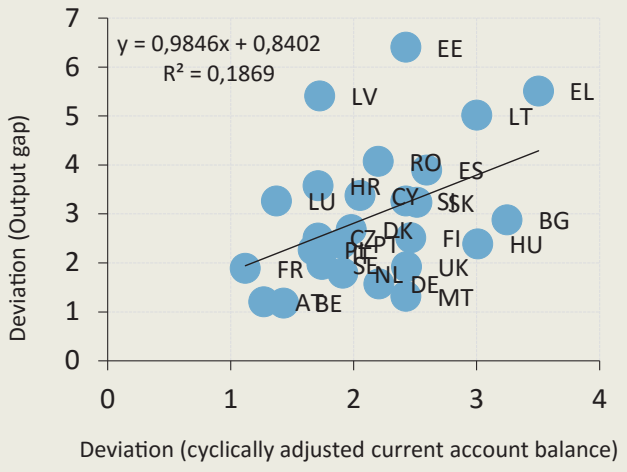
There have been many attempts in the literature at **defining the room for fiscal manoeuvre,[23] but no consensus has been reached with respect to the numerical value of the sustainable deficit or debt ratio.** Fiscal sustainability is very different in the case of developed and less developed countries, both in terms of space and time. Another major difference is whether the government is indebted in the domestic currency or in a foreign currency (original sin), against residents or non-residents. Less developed countries have typically less opportunity to accumulate debt in their own currency, and their domestic investor base is also smaller, whereas certain developed countries can accumulate almost unlimited debt in their own currency against domestic residents (Japan).

Overall, it can be said that the fiscal leeway in a recession can be expanded if the government creates room for manoeuvre in a boom. At such times, fiscal multipliers are typically lower, and the growth sacrifice of achieving a low deficit may be moderate. Of course, in actual economic policy practice this is much harder than it sounds. Whether economic growth is permanent or merely temporary is difficult to identify **in real time**, since **the separation of the trend and the cycle is based on uncertain methods, and, as shown in the previous chapters, they are not independent from each other. Between 1994 and 2006, the fiscal policy measures intended to be countercyclical proved to be procyclical in several countries after the subsequent revisions to trend growth** (Forni and Momigliano 2004, Cimadomo (2008)). As a result, no reserves were accumulated for the rapidly diminishing revenues during the crisis. However, the reverse may also be true. **If economic policymakers underestimated the sustainable trend output after a large downturn,** as, according to certain opinions, it happened after the latest global financial crisis, **they may also estimate the absolute value of the negative output gap to be lower or even consider it zero. In such cases, fiscal policy is more stringent, since the deficit is regarded as structural and not cyclical.** In this scenario, striving to reduce the deficit and increase the surplus, and engaging in fiscal retrenchment may be considered optimal. However, due to the drop in aggregate demand, this has a negative impact on potential output, especially if hysteresis is present. **Then retrenchment justifies itself, and later potential output will indeed be lower, but only as a result of an economic policy measure based on a pessimistic assessment of the situation.**

22 It has to be noted that the regime can be seen as a sort of reverse Ricardian equivalence. In this case, households do not react to the government's indebtedness by surplus savings (as it would follow from Barro's [1974] theoretical framework), but the government offsets the change in the private sectors' gearing.

23 Nevertheless, in line with the most general definition of the room for manoeuvre (Heller 2005), the desired expenditure-increasing or tax-reducing measures can not only be implemented by increasing debt or the deficit. Their source can be a tax increase (or tax shift), an increase in the efficiency of tax collection, cuts to low-priority expenditure, higher seigniorage revenue or growing foreign (e.g. EU) transfers. This means that even with the same budget balance, the structure of expenditure and revenues may shift in a favourable direction.

Chart 1-16
Discretionary fiscal policy and the volatility of the output gap (1995–2015)



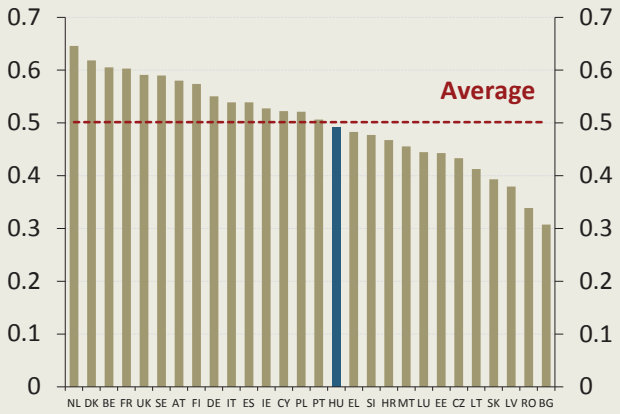
Source: AMECO.

One of the ways to meet the two main expectations with regard to fiscal policy (countercyclical and sustainable) may be the **optimisation of automatic stabilisers.** The negative experiences in connection with discretionary measures are among the main arguments for automatic stabilisers. Despite economists' concerns, **discretionary measures have been used relatively often (Wyplosz 2005). Yet these measures increased the volatility of output, rather than decreased it** (Fatás and Mihov (2003), and Chart 1-16). The advantage of automatic stabilisers is that they provide a symmetrical fiscal response to the change in economic activity without delay (Taylor (2000)).

The **fiscal stabilisation coefficient (FSC) captures the elasticity between the budget balance and the output gap**, i.e. the strength of automatic stabilisers in an economy. The greater its value, the larger the automatic countercyclical reaction in the budget balance. The FSC depends on the economy's structure (how much the unemployment rate reacts to the output gap, i.e. value of the so-called Okun parameter), and on certain economic policy parameters (e.g. unemployment replacement ratio, tax system).

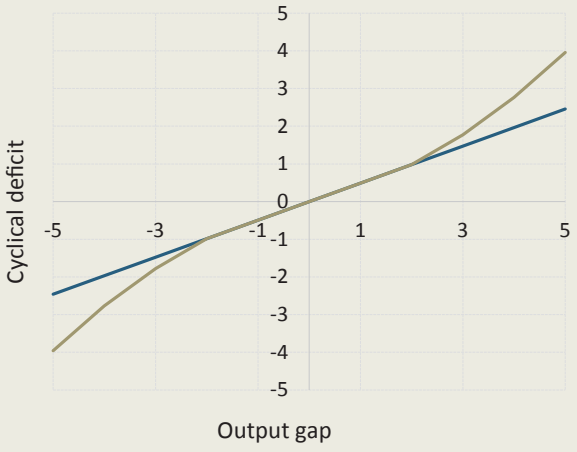
Buti and Gaspar (2016), and McCay and Reis (2016) emphasise that automatic stabilisers were originally created for redistribution purposes, and the fact that they smooth out economic activity is merely a positive by-product. **The capacity of automatic stabilisers to smooth out economic activity can still be improved significantly,** which would make countercyclical fiscal policy more effective. The FSC is a linear coefficient, i.e. it is irrelevant whether the output gap rises from 0 to 1 or from 5 to 6 per cent, the fiscal response only depends on the magnitude of change. **The countercyclical role of automatic stabilisers could be supported substantially if the fiscal response could be made non-linear.** This would be possible by **linking certain economic policy parameters** (budgetary investment, the volume of the public work programme, replacement ratio) **to the economic cycle or to variables that give a good approximation of it** (e.g. unemployment rate). **In this manner, the fiscal reaction would be influenced by not only the change in the output gap but also its level.**

Chart 1-17
Fiscal stabilisation coefficient (FSC)



Note: The fiscal stabilisation coefficient (FSC) captures the elasticity between the budget balance and the output gap.
Source: AMECO.

Chart 1-18
Automatic stabilisers in the case of linear and non-linear responses (FSC)



Source: MNB.

LITERATURE

Anzoategui, D. – Comin D – Gertler M – Martinez J (2016): Endogenous Technology Adoption and R&D as Sources of Business Cycle Persistence, NBER Working Paper, 22005.

Baksa, D., Benk Sz. and Jakab M. Z. (2014): „Létezik „a" költségvetési multiplikátor? Fiskális és monetáris reakciók, hitelesség és költségvetési multiplikátorok Magyarországon" (Is there such a thing as "the" fiscal multiplier? Fiscal and monetary reactions, credibility and fiscal multipliers in Hungary), Szigma, Vol. XLV, 1–2.

Ball, L. (2009): Hysteresis Old and New Evidence, NBER working papers No. 14818, *http://www.nber.org/papers/w14818*

Ball, L. (2015a): Monetary Policy for a High Pressure Economy, Center on Budget and Policy Priorities, Full Employment Project, *http://www.econ2.jhu.edu/People/Ball/HighPressure.pdf*

Ball, L. (2015b): Comment on Inflation and activity by Oliver Blanchard, Eugenio Cerutti and Lawrence Summers.

Barro, R. (1974): "Are Government Bonds Net Wealth?" Journal of Political Economy, 1974, vol. 82, issue 6, pages 1095-1117

Bi, H, W Shen, and S C S Yang (2014): Fiscal limits, external debt, and fiscal policy in developing countries. IMF Working Paper 14/49.

BIS (2016): 86th Annual Report 2015/16, *http://www.bis.org/publ/arpdf/ar2016e.htm*

Borio, C. (2012): The financial cycle and macroeconomics: What have we learnt?, BIS Working Papers, No 395., *www.bis.org/publ/work395.htm*

Borio, C., P. Disyatat and J. Juselius (2014): A parsimonious approach to incorporating economic information in measures of potential output, BIS Working Papers, No. 442, *http://econpapers.repec.org/paper/bisbiswps/442.htm*

Breughel (2016): The US infrastructure investment debate, September 19, *http://bruegel.org/2016/09/the-us-infrastructure-investment-debate/*

Blanchard, O. – J. Wolfers (2000): The Role of Shocks and Institutions in the Rise of European Union: The Aggregate Evidence. MIT working papers *http://econ-www.mit.edu/faculty/download_pdf.php?id=803.*

Blanchard, O. - F. Giavazzi, F. (2000): "Macroeconomic Effects of Regulation and Deregulation in Goods and Labor Markets (January)", MIT Dept. of Economics Working Paper No. 01-02 *http://ssrn.com/abstract=257542.*

Blanchard, O. (2004): Designing Labour Market Institutions *http://econ-www.mit.edu/faculty/download_pdf.php?id=927.*

Blanchard, O. (2005): European Unemployment: "The Evolution of Facts and Ideas", (October 10, 2005). MIT

Department of Economics Working Paper No. 05-24, *http://papers.ssrn.com/sol3/papers.cfm?abstract_id=825885.*

Blanchard, O. (2006): A review of "Unemployment. Macroeconomic Performance and the Labour Market", by Richard Layard, Stephen Nickell, and Richard Jackman, *http://econ-www.mit.edu/faculty/index.htm?prof_id=blanchar&type=paper.*

Blanchard, O. – Leigh D. (2013): Are We Underestimating Short-term Fiscal Multipliers? IMF Working Paper 13/1.

Blanchard, O. and L. Summers (2015): "Hysteresis and European Unemployment Problem", in: Fischer, S. (ed.), NBER Macroeconomics Annual, MIT Press, September, pp. 15–77., *http://www.nber.org/chapters/c4245.pdf*

Blanchard, O., E. Cerutti, L. Summers (2015): Inflation and activity – two explorations and their monetary policy implications, ECB Forum on Central Banking, May, pp. 25–46, *http://www.ecb.europa.eu/pub/pdf/other/ecbforumoncentralbanking2015en.pdf*

Blanchard, O. (2016): Three Remarks on the US Treasury Yield Curve, Peterson Institute of International Economics, *https://piie.com/blogs/realtime-economic-issues-watch/three-remarks-us-treasury-yield-curve*

Buti, M. and V. Gaspar, 2016. Designing Fiscal Policy for Steady Enduring Growth, Voxeu.org *http://voxeu.org/article/fiscal-policy-enduring-growth*

Byrne, D., J. Fernal, M. B. Reinsdorf (2016): Does the United States Have a Productivity Slowdown or a Measurement Problem?, Brookings Papers on Economic Activity, Spring 2016, *https://www.brookings.edu/wp-content/uploads/2016/03/byrnetextspring16bpea.pdf*

Cimadomo, J. (2008) "Fiscal Policy in Real Time" European Central Bank, Working Paper No 919, July 2008.

Forni, L. and S. Momigliano (2005) "Cyclical Sensitivity Of Fiscal Policies Based On Real-Time Data", Applied Economics Quarterly 50(3), 299–326.

Coibion, O. Gorodnichenko Y. (2015): Is the Phillips Curve Alive and Well after All? Inflation Expectations and the Missing Disinflation. American Economic Journal: Macroeconomics 2015, 7(1): pp. 197-232.

Constâncio, V. (2016): The challenge of low real interest rates for monetary policy. Macroeconomics Symposium at Utrecht School of Economics, 15 June 2016 *https://www.ecb.europa.eu/press/key/date/2016/html/sp160615.en.html*

Csortos, O. and Szalai Zoltán (2015a): A pénzügyi válság kezelésének nehézségei: elméleti és gazdaságpolitikai tanulságok (Difficulties in the management of the global financial crisis: academic and economic policy lessons), *Financial and Economic Review*, September, pp. 5–38, *http://english.hitelintezetiszemle.hu/letoltes/1-csortos-szalai-en.pdf*

(2015b): Az alacsony inflációs környezet és a visszafogott beruházási aktivitás lehetséges magyarázatai (Possible explanations of the low inflation environment and restrained investment activity), *Financial and Economic Review*, December, pp. 29–56, *http://english.hitelintezetiszemle.hu/letoltes/2-csortos-szalai-en.pdf*

ECB Forum on Central Banking, pp. 47–52, *http://www.ecb.europa.eu/pub/pdf/other/ecbforumoncentralbanking2015en.pdf*

ECB (2016a): The employment-GDP relationship since the crisis, Economic Bulletin, Issue 6, 2016, pp. 53–71, *http://www.ecb.europa.eu/pub/pdf/other/eb201606_article01.en.pdf*

(2016b): Factors behind developments in average hours worked per person employed since 2008, Economic Bulletin, Issue 6, 2016, pp. 49–52.

Dosi, G., G. Fagiolo and A. Roventini 2008. Schumpeter Meeting Keynes: A Policy-Friendly Model of Endogenous Growth and Business Cycles, LEM Working Paper, 2008/21.

Eurostat (2011): New measures of labour market attachment, Statistics in Focus, 57/2011, *http://ec.europa.eu/eurostat/documents/3433488/5579744/KS-SF-11-057-EN.PDF*

Fatás, A., 2000. Do business cycles cast long shadows? Short-run persistence and economic growth, *Journal of Economic Growth*, 5(2), pp. 147–162. 2000.

Fatás, A. and L. Summers (2016): The Permanent Effects of Fiscal Consolidations, NBER Working Paper 22734. October, *http://www.nber.org/papers/w22374*, short summary: Hysteresis and Fiscal Policy during the Great Recession, VOX. EU, 12 October, *http://voxeu.org/article/hysteresis-and-fiscal-policy-during-global-crisis*

Fatás, A and I. Mihov, 2003. "The Case for Restricting Fiscal Policy Discretion," The Quarterly Journal of Economics, Oxford University Press, vol. 118(4), pages 1419-1447

Fellner, W. (1973): Comments and Discussion of Okun (1973), in: Brookings Papers on Economic Activity, Spring, pp. 253–256.

Fitoussi, J. P. (2001): Monetary Policy and the Macroeconomics of soft growth, in: Leijonhufvud, (ed.) (2001): Monetary Theory as a basis for monetary policy, Palgrave MacMillan

Gali, J. (2015): Hysteresis and the European unemployment problem revisited, ECB Forum on Central Banking, May, pp. 53–79., *http://www.ecb.europa.eu/pub/pdf/other/ecbforumoncentralbanking2015en.pdf*

Golub, S., A. Kaya and M. Reay (2014): What were they thinking? The Federal Reserve in the run-up to the 2008 financial crisis, Review of International Political Economy, DOI: *10.1080/09692290.2014.932829*

Gordon, R. J. (2015): Comment on Hysteresis and the European unemployment problem revisited by Jordi Gali, pp. 80–86. *http://www.ecb.europa.eu/pub/pdf/other/ecbforumoncentralbanking2015en.pdf*

Greenspan, A. (1973): Comments and Discussion, Okun (1973), in: Brookings Papers on Economic Activity, Spring, pp. 256–257.

Haliassos, M. (2015): Greece: Are we missing the reform opportunity? Voxeu.org *http://voxeu.org/article/greece-seizing-crisis-s-reform-opportunities*

Hauptmayer, S., Heinemann, F., Kappler, M., Kraus, M., Schrimpf, A., Trautwein, H-M. and Wang, Q. (2009): *Projecting Potential Output. Methods and Problems*, ZEW Economic Studies Vol. 42, Physica Verlag Heidelberg, *http://www.zew.de/en/publikationen/projecting-potential-output/?cHash=be6959b8366f60858af4cb60c90106e5*

Heller, P. (2005), "Back to basics", Finance and Development, Vol. 42, No. 2, IMF, *www.imf.org/external/pubs/ft/fandd/2005/06/basics.htm*

Holzer, H., S. Raphael and M. Stoll. (2006): Employers in the Boom: How Did the Hiring of Less-Skilled Workers Change During the 1990s?., Review of Economics and Statistics 88.2 (2006): pp. 283–99.

Horváth, H. and Z. Szalai (2008): Labour Market Institutions in Hungary with a focus on wage and employment flexibility, (ECB WDN Institutional Project,) Occasional Papers No. 77, November (only in English), https://www.mnb.hu/kiadvanyok/elemzesek-tanulmanyok-statisztikak/mnb-tanulmanyok/mnb-tanulmanyok/op-77-horvath-hedvig-szalai-zoltan-munkapiaci-intezmenyek-magyarorszagon-a-ber-es-foglalkoztatas-rugalmassaga-szempontjabol

Huidrom, R, M A Kose, J J Lim, and F L Ohnsorge (2016), "Do fiscal multipliers depend on fiscal positions?", Policy Research Working Paper Series 7734, The World Bank.

Ilzetzki, E., Mendoza, E. G. & Vegh, C. A. (2010). How Big (Small?) are Fiscal Multipliers? NBER Working Paper Series, Number 16479.

IMF (2016a): World Economic Outlook, April, http://www.imf.org/external/pubs/ft/weo/2016/01/pdf/text.pdf

IMF (2016b): World Economic Outlook, October, http://www.imf.org/external/pubs/ft/weo/2016/02/

Koo, R. (2011): The World in Balance Sheet Recession, Real World Economics Review, cases, cure and politics, No. 58., http://www.paecon.net/PAEReview/issue58/Koo58.pdf

Kozlowski, L. Veldkamp, V. Venkateswaran (2016): The tail that wags the economy: The origin of secular stagnation, VoxEU.org, http://voxeu.org/article/origin-secular-stagnation

Lucas, R. E. [2003]: Macroeconomic priorities. American Economic Review, Vol. 93, No. 1, pp. 1–14.

Manasse, P. (2015): *What went wrong in Greece and how to fix it: Lessons for Europe from the Greek crisis. Vo*xeu.org http://voxeu.org/article/what-went-wrong-greece-and-how-fix-it

Magyar Nemzeti Bank (2014): *Növekedési Jelentés (Growth Report),* https://www.mnb.hu/letoltes/novekedesi-jelentes-en.pdf

Magyar Nemzeti Bank (2015): *Növekedési Jelentés* (Growth Report), https://www.mnb.hu/letoltes/eng-novekedesijel-boritoval.pdf

Martin, Robert, Teyanna Munyan, and Beth Anne Wilson (2015): *Potential Output and Recessions: Are We Fooling Ourselves?,* International Finance Discussion Papers, Board of Governors of the Federal Reserve System, No. 1145, https://www.federalreserve.gov/econresdata/ifdp/2015/files/ifdp1145.pdf

Mathieu and Sterdyniak (2015): *Should we still use the concept of potential growth?, edited version of* paper given at the 12th EUROFRAME Conference: 'Challenges for Europe 2050', Vienna, 12 June 2015., http://www.boeckler.de/pdf/v_2015_10_24_mathieu.pdf

Mathy, G. P. (2015): Hysteresis and Persistent Long-term Unemployment: Lessons from the Great Depression and World War 2, https://www.american.edu/cas/economics/research/upload/2015-02.pdf

Manyika, J., S. Lund, J. Bughin, K. Robinson, J. Mischke, and D. Mahajan (2016): Independent work: Choice, necessity, and the gig economy, McKinsey Global Institute, http://www.mckinsey.com/global-themes/employment-and-growth/independent-work-choice-necessity-and-the-gig-economy

McKay, A. and R. Reis, 2016. Optimal Automatic Stabilisers, CEPR Discussion Paper 11337.

McCombie, J., M. Pugno and B. Soro (eds.) (2002): Productivity Growth and Economic Performance. Essays in Verdoorn's Law, McMillan

Mitchell, W. and J. Muysken (2008): *Full Employment Abandoned. Shifting Sands and Policy Failures*, Edward Elgar

Mohlmann, J. – Suyker W. (2015): An update of Blanchard's and Leigh's estimates in 'Growth Forecast Errors and Fiscal Multipliers. voxeu.org http://voxeu.org/article/blanchard-and-leigh-s-fiscal-multipliers-revisited

Okun, A. (1973): Upward Mobility in a High Pressure Economy, in: Brookings Papers on Economic Activity, Spring 1973, pp. 207–253.

Auerbach, A J, and Y Gorodnichenko (2012), "Fiscal multipliers in recession and expansion," in: Alesina, A. and F. Giavazzi (eds.), *Fiscal Policy after the Financial Crisis*, Chicago, University of Chicago Press, pp. 63–98.

Papaioannou, E., Portes R. Reichlin L. (2015): Greece: Seeking a way forward. Voxeu.org http://voxeu.org/article/greece-seeking-way-forward

Roger, F. and K. Platonov (2016): Reinventing IS-LM: The IS-LM-NAC model and how to use it, http://voxeu.org/article/reinventing-lm-explain-secular-stagnation

Rogoff, K. (2015): Debt supercycle, not secular stagnation, Vox.EU blog, April, *http://voxeu.org/article/debt-supercycle-not-secular-stagnation*

Stirati, A. (2016): Blanchard, the NAIRU, and Economic Policy in the Eurozone, ineteconomics, March 31, *https://www.ineteconomics.org/ideas-papers/blog/blanchard-the-nairu-and-economic-policy-in-the-eurozone?p=ideas-papers/blog/blanchard-the-nairu-and-economic-policy-in-the-eurozone*

Szentmihályi, Sz. and Világi B. (2015): A Phillips-görbe – elmélettörténet és empirikus összefüggések (The Phillips curve – history of thought and empirical evidence), *Financial and Economic Review*, December, pp. 5–28. *http://english.hitelintezetiszemle.hu/letoltes/1-szentmihalyi-vilagi-en.pdf*

Taylor, J. B. „Reassessing Discretionary Fiscal Policy" Journal of Economic Perspectives – Volume 14, Number 3 – Summer 2000 – Pages 21-36

The Conference Board (2016): *Total Economy Database*, May, *https://www.conference-board.org/data/economydatabase/*

Wieland, Johannes, 2011. "Fiscal Multipliers in the Liquidity Trap: International Theory and Evidence," manuscript

Woetzel, J., N. Garemo, J. Mischke, M. Hjerpe, and R. Palter (2016): Bridging Global Infrastructure Gap, McKinsey Global Institute, *http://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/bridging-global-infrastructure-gaps*

Wyplosz. C. „Fiscal Policy: Institutions versus Rules" National Institute Economic Review January 2005 vol. 191 no. 1 64-78

Yellen, J. (2016): Speech at "The Elusive 'Great' Recovery: Causes and Implications for Future Business Cycle Dynamics" 60th annual economic conference sponsored by the Federal Reserve Bank of Boston, Boston, Massachusetts, 14 October, *https://www.federalreserve.gov/newsevents/speech/yellen20161014a.htm*

2 Why is investment low in Europe?

Investment plays a special role in the functioning of an economy, as it influences economic growth not only in the short but in the long run as well (OECD 2015). As an element of expenditures, in the short run it adds to demand, whereas later the capital created as a result of the investment leads to an increase in potential output. Therefore, a lower investment level due to a possible crisis may hinder economic growth permanently as well. This impact may be amplified by the two-way causal relationship which can be discovered between investment and economic growth. This stems from the fact that enterprises make their investment decisions mainly on the basis of their profit expectations for the future, thus a lower long-term growth potential results in lower propensity to invest (ECB 2014a). As a result, the fall in investment may be coupled with persistently low economic growth, and may necessitate economic policy intervention.

Investment activity in the euro area has steadily declined since the outset of the crisis, compared to both the pre-crisis level and GDP. Examining the underlying reasons is important not only because the lower investment level affects our region (the V4 countries) as well, but also because euro-area growth also significantly affects the growth of Hungary through the tight commercial relations. Even though this chapter focuses on the euro area, the reasons presented are valid – to a certain extent – for Hungary as well, which is not analysed in detail.

The reasons for the moderate investment level can be divided into two groups. One of these is constituted by the cyclical reasons related directly to the crisis. Of these reasons, the literature emphasises low demand, the real estate bubble that evolved before the crisis, high indebtedness, increasingly tight lending conditions since the crisis and the persistently elevated uncertainty. Although basically these are of a temporary nature and are easing as the crisis is coming to an end, as a result of the slow recovery, they continue to affect the developments in the investment level.

The permanently low level of the EU investment rate is a result of long-term structural factors as well, in addition to reasons that prevail in the short run. In addition to cyclical factors, the problem of unemployment of the young generation, the phenomenon of labour market hysteresis, product market rigidities, lack of investment in infrastructure, the deceleration in FDI and the short-term approach of the financial market also have an adverse effect on the investment rate.

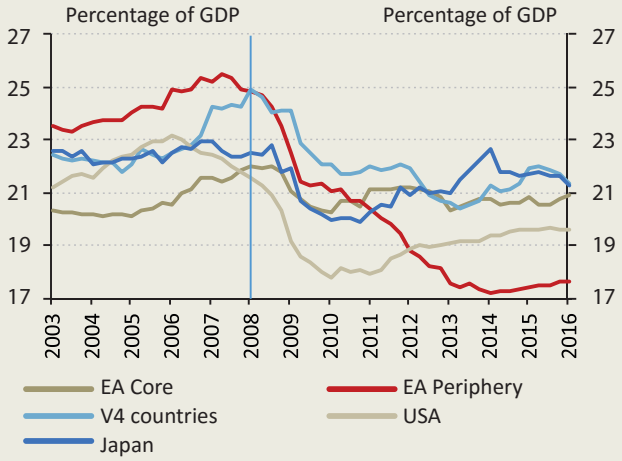
Permanent changes appearing in the economic structure also result in a lower level of the investment rate. Firstly, this follows from the increasing weight of the tertiary (services) sector and thus from its lower investment and capital intensity compared to that of the industrial sector. Secondly, it is also attributable to the limits of statistical measurement possibilities. Namely, only a part of the knowledge-based investment appears in intangible investment, and real verification of the depreciation of investment is also difficult. In parallel, the spread of digital technology is increasingly intensive in production processes. The intention with the concept of Industry 4.0 is to facilitate this. Based on an expert forecast, the successful introduction of the Industry 4.0 in Europe requires a 35 per cent increase in investment activity in the next 10–20 years. In connection with the implementation of the concept, special attention must be paid to prevent the further increase of the productivity differences between large enterprises and the SME sector.

Increasing the investment rate may primarily be achieved through efficient structural and regulatory solutions. One solution can be to increase product market competition as well as to reduce entry and functioning constraints. In addition, a tax system focusing on investment-related tax allowances as well as the increasing of the expenditures on public investment and a policy that facilitates direct investment inflows would also contribute to a rise in the investment rate. Finally, the reduction of financial fragmentation, a further reduction of non-performing loans as well as the strengthening and diversification of the corporate sector's raising of financial funds may also be parts of the solutions.

2.1 Low investment? Compared to what?

In parallel with the outbreak of the crisis, euro-area investment activity fell considerably after 2008. At the same time, in view of the heterogeneity of the region, the various parts of the euro area were affected in different ways by the crisis (Deutsche Bundesbank (2016)). The data reveal a **core–periphery or North-South antagonism**: while in the case of core countries the fall in investment as a proportion of GDP did not reach 2 percentage points, in the southern countries of the periphery it exceeded 8 percentage points (Chart 2-1). There are significant differences in the developments in dynamics as well. In the countries of the periphery the decline took place in two steps, in line with the financial crisis in 2008 and the debt crisis that began in 2011. By contrast, the investment rate in the core countries remained already practically unchanged at the time of the debt crisis. At the same time, it is true for both country groups and even for the European Union as a whole, including Hungary and the V4 countries, that investment as a proportion of GDP has not yet returned to the pre-crisis level. Nevertheless, according to the calculations by Lewis et al. (2014) and Barkbu et al. (2015), the investment rate falls significantly short of not only the pre-crisis level but also of the long-term equilibrium level estimated on the basis of earlier data.[24] This indicates that **low investment is explained not only by short-term, cyclical factors, but there are also other, structural reasons for the moderate investment activity**.

Chart 2-1
Investment rate



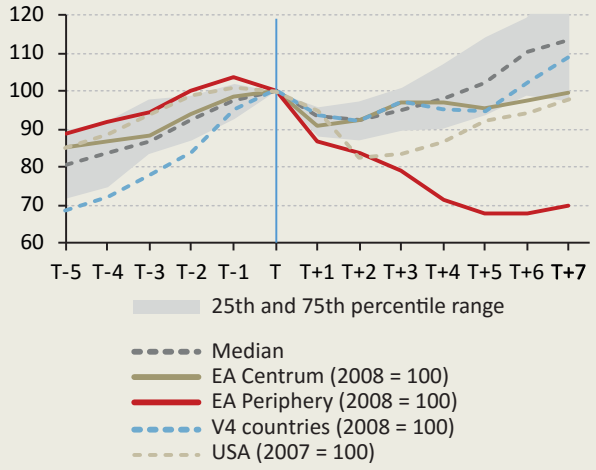
Note: Euro-area core countries: Belgium, France, the Netherlands, Luxembourg, Germany. Euro-area periphery countries: Greece, Italy, Portugal and Spain.

Sources: Eurostat, OECD.

Nevertheless, the fall in investment rate during the crisis and its stagnation at a lower level is typical not only of Europe, but the same is observed in other developed countries, such as the USA and Japan. However, similarly to the core countries of the euro area, in the case of the aforementioned economies, a downswing was observed only until 2010. Accordingly, the investment dynamics of the European Union, and of the southern periphery within that, was different from that of other developed regions as of 2011, which resulted in a lag in returning to the pre-crisis level (ECB (2014a)). Although during the crisis the fall in investment was mainly typical of developed economies, the increase in the investment level decelerated significantly and permanently in developing countries as well. All this indicates that **since the crisis the investment trend has changed not only in the developed countries, but these developments are also typical of the global economy as a whole** (IMF (2015)).

24 According to Lewis et al. (2014), the shortfall exceeds 2 per cent of GDP.

Chart 2-2
Changes in investment following the crisis compared to earlier recessions (volume index, last year before the crisis = 100)

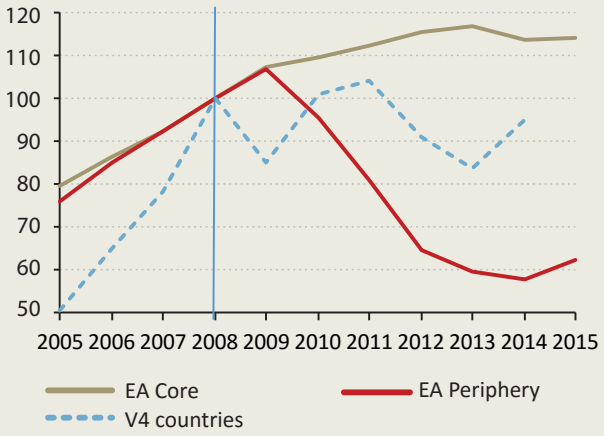


Note: The basis for comparison is constituted by the recessions observed in OECD member countries between 1970 and 2007. Euro-area core countries: Belgium, France, the Netherlands, Luxembourg, Germany. Euro-area periphery countries: Greece, Italy, Portugal and Spain.

Sources: Eurostat, World Bank.

Comparing the developments observed during the 2008 crisis **to earlier recessions experienced in OECD countries since the 1970s** it can be seen that **the fall in investment exceeded the decline experienced in the case of average recessions** (Chart 2-2). However, if the current crisis is compared to the financial and systemic crises defined by Reinhart and Rogoff (2008), which are more severe than the average, the fall in investment after 2008 seems similar to the systemic ones, so it is more severe than the downswing experienced in the case of a typical financial crisis (ECB (2014c)). Nevertheless, the current developments in euro-area investment are still **different from previous systemic crises in a sense that even compared to them, the double decline taking place because of the debt crisis as well as the subsequent slower growth and stagnation are special**. It is to be noted that the developments in investment similar to those during systemic crises are **mainly typical of the southern periphery countries**, while in the case of the core and V4 countries the dynamics is more similar to that observed in average recessions.

Chart 2-3
Government investment (volume index, 2008 = 100)



Note: Euro-area core countries: Belgium, France, the Netherlands, Germany. Euro-area periphery countries: Greece, Italy, Portugal and Spain.

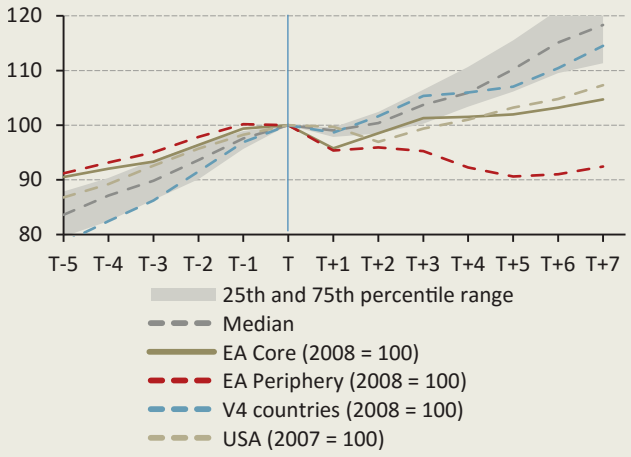
Source: Eurostat.

According to classification by sectors, the fall in investment is mostly related to the private sector, and within that primarily to enterprises, while the contribution of public investment did not reach 20 per cent (IMF (2015)). At the same time, the dynamics of government sector investment varies across country groups (Chart 2-3). Although business sector investment already fell in all three areas right after the outbreak of the crisis – with the exception of East European countries – in 2008 this was still partly offset everywhere by an increase in public investment. However, starting from 2009, the high level of government debt in the periphery countries required to apply tightening measures. As a result, government sector investment fell to 60 per cent of the pre-crisis level. By contrast, public investment activity did not decline in the core countries, although the growth rate decelerated to some extent. The result of the contrasting trends observed in the two country groups was that the 2.3–2.4 per cent public investment as a proportion of GDP evolving in the periphery countries fell persistently below the 2.8 per cent level observed in the core countries.

2.2 Cyclical reasons for low investment

Some of the cyclical factors behind the moderate investment activity include low demand, the real estate bubble which evolved prior to the crisis, high indebtedness, increasingly tight lending conditions since the crisis and the persistently elevated uncertainty. Although the importance of individual factors vary from country to country, some common features are seen. The most important factor in every country is low demand, but uncertainty also plays a role everywhere, affecting the more indebted countries to a greater extent. By contrast, high corporate leverage and financial constraints are more country-specific factors, which affect the periphery countries, particularly Italy, Portugal and Greece (Barkbu et al. (2015)).

Chart 2-4
Changes in GDP following the crisis compared to earlier recessions (volume index, last year before the recession = 100)

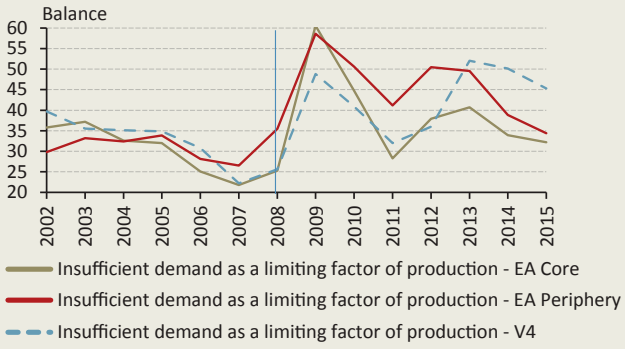


Note: The basis for comparison is constituted by the recessions observed in OECD member countries between 1970 and 2007. Euro-area core countries: Belgium, France, the Netherlands, Luxembourg, Germany. Euro-area periphery countries: Greece, Italy, Portugal and Spain.

Sources: Eurostat, World Bank.

According to calculations based on accelerator models, **low demand is responsible for four fifths of the fall in investment observed since the crisis in developed countries** (IMF (2015)) **and for a significant part in the core countries of the European Union** (OECD (2015)), while in Spain it can be considered as almost the only factor (Barkbu et al. (2015)). This means that current investment dynamics are mostly attributable to the changes in GDP following the crisis. In the euro-area core countries, the dynamics only recovered three years after the outbreak of the crisis, and even in 2015, the output of periphery countries was still 7.5 per cent below the pre-crisis level (Chart 2-4). The slower recovery compared to previous crises reduced growth expectations in a more permanent manner, in parallel with which maintaining the existing capital level will be too expensive, while expectations concerning the future hamper the accumulation of new capital. Taking into account the low growth prospects and the current capacity utilisation, according to the German central bank, no upswing in investment is likely in the near future, and cyclical factors and the loose monetary policy are not necessarily sufficient for improving the investment environment (Deutsche Bundesbank (2016)).

Chart 2-5
Demand perceived by enterprises



Note: Euro-area core countries: Belgium, France, the Netherlands, Luxembourg, Germany. Euro-area periphery countries: Greece, Italy, Portugal and Spain.

Sources: European Commission company survey.

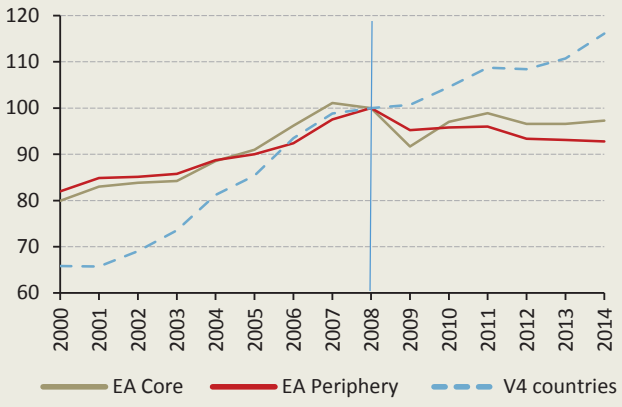
Closely related to low demand as a factor explaining investment is the **global nature of the crisis**, which also results in a **temporary decline in export possibilities**. This was not typical at the time of previous systemic crises, as in these cases the impact of the crisis was geographically more concentrated, affecting foreign trade to a lesser extent. However, according to the ECB (2014b), this factor cannot explain the prolonged downturn in GDP and investment, as exports returned to the pre-crisis level relatively quickly, in hardly more than two years.

Low demand is confirmed by corporate questionnaire surveys as well as changes in profits (Charts 2-5 and 2-6). According to companies, insufficient demand continues to be a greater obstacle to production than in the pre-cri-

sis period, although the ratio of enterprises with this opinion has been declining dynamically since 2013. By contrast, gross operating surplus in real terms has been practically unchanged in the case of core countries since the downswing in 2012, while it continues to show a downward trend in the periphery countries. Accordingly, corporate profits still do not reach the pre-crisis level either in the core or in the periphery countries, thus restraining investment (Lewis et al. (2014)).

Not only can current profits influence investment decisions through profit expectations, due to the weaker cash flow it makes companies resort to more external funds, which reduces investment activity (Bond et al. (2003)). In parallel with the low profitability prospects, the value of companies' invested assets also declined, and thus the ratio between their market and replacement values (Tobin's q) also decreased. Until 2013, the value of the indicator fell to 1.5 from the pre-crisis level of 2.5, thus reducing the motivation to invest (ECB (2014a)).

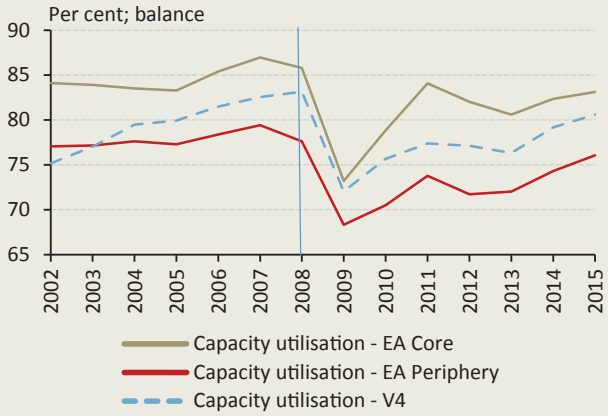
Chart 2-6
Gross operating surplus of enterprises (volume index, 2008 = 100)



Note: Euro-area core countries: Belgium, France, the Netherlands, Germany. Euro-area periphery countries: Greece, Italy, Portugal and Spain.
Sources: Eurostat.

The investment restraining effect of the low profit rate is amplified by low capacity utilisation, which is 1.5 percentage points below the average pre-crisis level all over the EU, except in the East European countries (Chart (2-7)). However, there are major differences between the various areas of the economy; excessive capacities are mainly typical in construction and the services sector (ECB (2014a)).

Chart 2-7
Capacity utilisation in manufacturing



Note: Euro-area core countries: Belgium, France, the Netherlands, Luxembourg, Germany. Euro-area periphery countries: Greece, Italy, Portugal and Spain.
Sources: European Commission company survey.

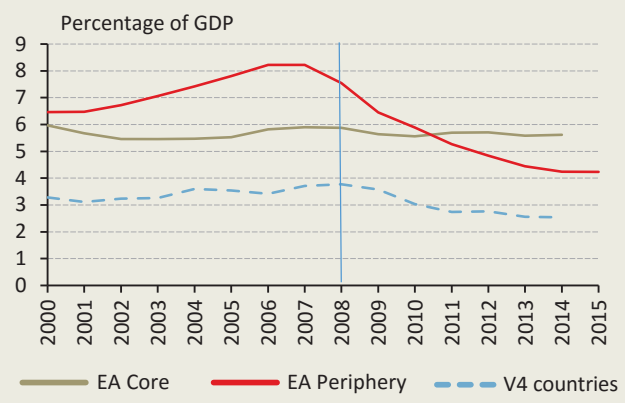
Table 2-1
Demand perceived by enterprises

	Interest rates	Capacity utilisation	Profit
Direction of the effect	↑	↓	↓

Source: Based on Palenzuela and Dees (2016).

The quantitative role of the factors presented above in the fall in investment observed in the EU was examined empirically by Palenzuela and Dees (2016). According to their findings, after the crisis, a structural break was observed in the correlation between investment and capacity utilisation, real interest rate, and profitability. **The investment level became less sensitive to the interest rate and more sensitive to capacity utilisation and to the profit rate.** Accordingly, the decline in the interest rate contributed less to investment growth, while capacity utilisation and the profit rate hindered investment growth to a greater extent. In addition, a significant fall in investment related directly to the crisis was detected, which cannot be explained with the independent variables used by the authors. All of this means that – although the low demand explains a major portion of the decline – other factors may also have played an important role. The same conclusion was drawn by Lewis et al. (2014), who – on the basis of the experiences of previous crises – established that, compared to the pace of the recovery of the economy, investment is returning to the pre-crisis state more slowly, and **the correlation between GDP and investment has changed since the crisis.**

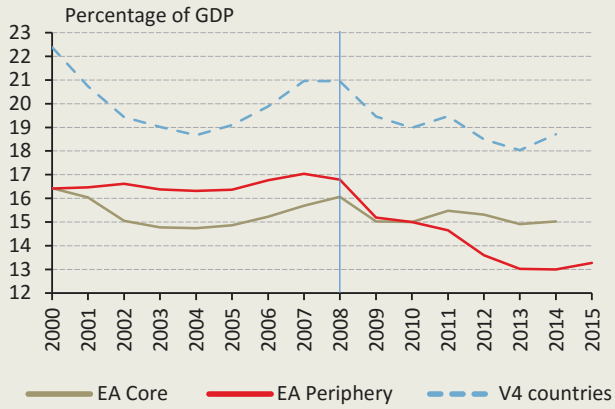
Chart 2-8
Real estate investment



Note: Euro-area core countries: Belgium, France, the Netherlands, Luxembourg, Germany. Euro-area periphery countries: Greece, Italy, Portugal and Spain.

Source: Eurostat.

Chart 2-9
Investment excluding real estate



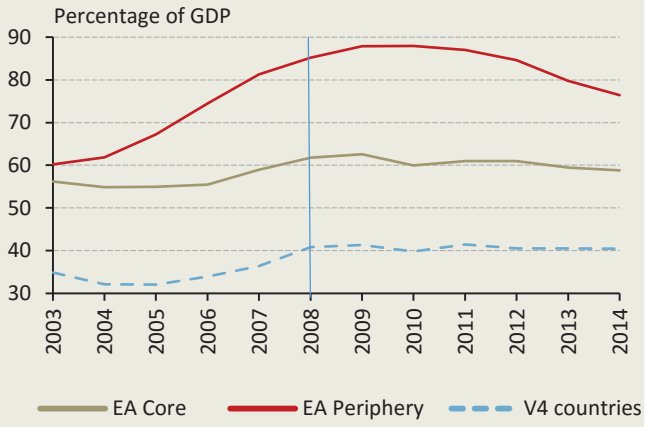
Note: Euro-area core countries: Belgium, France, the Netherlands, Luxembourg, Germany. Euro-area periphery countries: Greece, Italy, Portugal and Spain.

Sources: Eurostat.

Real estate investment played an important role in the upswing in investment prior to the crisis, which was largely attributable to the real estate market bubble. At the same time, **real estate investment did not account for most of the downturn in investment following the crisis**. Significant falls in real estate investment were mainly **typical only in the periphery countries**. At the same time, in the case of this country group as well, more than half of the downturn is attributable to non-real estate investment (Charts 2-8 and 2-9). This indicates that the excessive real estate investment related to the pre-crisis real estate bubble was primarily typical only in the periphery countries, and this factor cannot be considered as the only reason for the persistently low investment all over Europe (Lewis et al. (2014)). This is also supported by the calculations of the IMF (2015), suggesting that at the total investment level the developed countries were generally not characterised by excessively high, unsustainable investment levels.

Nevertheless, **the bursting of the real estate bubble** also had an indirect impact on developments in investment. With the fall in real estate prices, **the value of the collateral backing** both household and **corporate loans declined**, which reduced the level of investment through the financial accelerator channel described by Bernanke et al. (1999) (Palenzuela and Dees (2016)). The higher loan-to-value and payment-to-income ratios as well as enterprises' automatically increasing leverage represented elevated risks both from the borrowers' and lenders' sides, and the balance between the leverage preferred by companies and the actual leverage was upset. Both companies and banks attempted to restore it, which **led to lower investment demand and tighter lending conditions at the same time**. This is the process of balance sheet recession (Koo (2008)), there is also empirical evidence for the appearance of this phenomenon in Europe after 2008. According to the calculations of Kuchler (2015), in Denmark the high pre-crisis indebtedness explains 15–20 per cent of the fall observed in investment. The finding of the IMF (2015) was also similar, establishing that following the outbreak of the crisis the companies more dependent on external funds reduced their investment to a significantly greater extent. At the same time, it may be even more significant in the case of periphery countries, as in this region a much higher build-up of debt was observed prior to the crisis than in the case of core countries (Chart 2-10). In addition, corporate debt accumulated before the crisis has not declined completely, and thus the level of debt may continue to be a factor restraining investment.

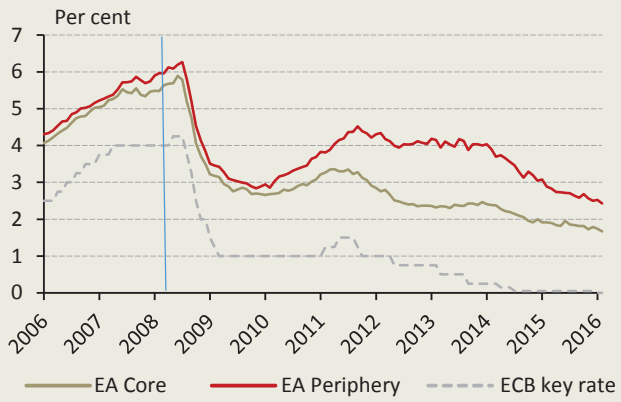
Chart 2-10
Outstanding loans of the corporate sector



Note: Euro-area core countries: Belgium, France, the Netherlands, Luxembourg, Germany. Euro-area periphery countries: Greece, Italy, Portugal and Spain.

Sources: Eurostat.

Chart 2-11
Corporate loan interest rates and the ECB's key interest rate



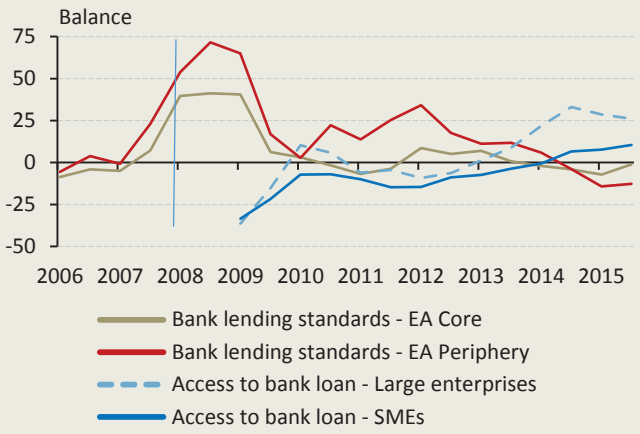
Note: Key interest rate represents the ECB's rate for main refinancing operations. Euro-area core countries: Belgium, France, the Netherlands, Luxembourg, Germany. Euro-area periphery countries: Greece, Italy, Portugal and Spain. The aggregates are averages weighted by outstanding corporate loans.

Source: ECB.

The balance sheet recession not only forced companies to reduce their leverage, it also encouraged the banking sector to **tighten credit conditions**. This means that **not only demand, but also supply constraints evolved in the lending market**, which serves as a source for investment (ECB (2014a)). Right after the outbreak of the financial crisis and later in connection with the debt crisis, **the majority of banks in all parts of the euro area tightened their credit conditions and increased the spreads on loans** (Charts 2-11 and 2-12). The latter means that the decline in the central bank base rate to close to 0 per cent was not followed by proportionate decreases in the interest rates on corporate loans, thus weakening the transmission mechanism (Barkbu et al. (2015)). Credit spreads varied significantly across the euro area (Deutsche Bundesbank (2016)). Whereas prior to the crisis there had been no major differences in spreads between core and periphery countries, a 70 basis point difference evolved in parallel with the debt crisis. Although credit spreads returned to the pre-crisis level in the case of the core countries, this did not occur in Greece, Italy, Portugal and Spain. Accordingly, tighter credit conditions as an investment restraining factor are primarily valid for these countries. At the same time, as a result of the looser monetary environment, the real user cost declined even despite the higher interest rate spreads, and thus it can be a smaller obstacle to the recovery of investment (Lewis et al. (2014)). Therefore, supply-side constraints may mainly be constituted by other conditions of borrowing, which have not eased considerably since the tightening implemented since the debt crisis.

Changes in lending conditions had different impacts on enterprises of various sizes. **Compared to large enterprises, the access to loans of the SME sector – which is more dependent on bank loans in terms of external funding – deteriorated to a greater extent** (Chart 2-12). As a result, SMEs' investment activity fell to a greater extent and recovered more slowly after the crisis, because a higher ratio of SMEs' loan applications was refused (ECB (2014b)). The slower recovery of SME investment is also attributable to the fact that the lower costs of funds concern only the less risky, large enterprises due to the banking sector's difficult financial situation (Lewis et al. (2014)).

Chart 2-12 Credit conditions and access to bank loans of enterprises

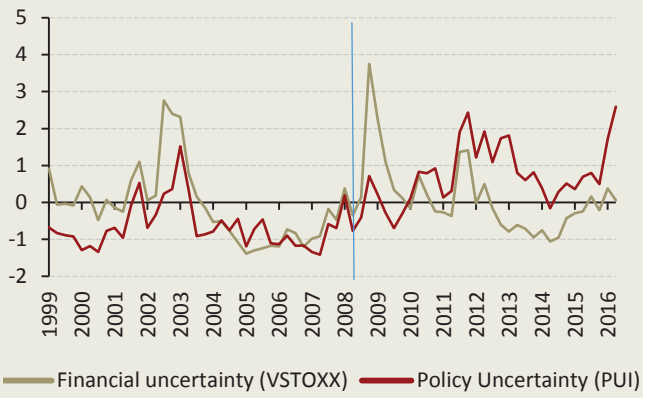


Note: In the case of credit conditions, the indicators show the difference between the ratios of tightening and loosening banks (a higher value indicates greater tightening), while in the case of access they show the difference between the ratios of companies that have easier and more difficult access to loans (a higher value denotes easier access). Euro-area core countries: Belgium, France, the Netherlands, Luxembourg, Germany. Euro-area periphery countries: Greece, Italy, Portugal and Spain. The aggregates are averages weighted by outstanding corporate loans.

Sources: ECB lending survey and SAFE.

The literature dealing with the subject of European investment uniformly considers the **increase in uncertainty** since the crisis as a significant factor, while the European Investment Bank deems it the most important reason (EIB (2013)). This points to lower investment, as by definition investment is a forward-looking and irreversible decision, which is significantly influenced by expectations concerning the future. **Uncertain economic policy and environment may prompt companies to postpone their investment** (Bloom et al. (2007)). The existence of a correlation between economic policy uncertainty and the investment level is confirmed by empirical data as well (Julio and Yook (2012)). Uncertainty influences investment in an indirect manner as well, by increasing money market frictions (Gilchrist et al. (2014)). Nevertheless, of the above reasons, uncertainty can be brought in parallel with not only the tight lending conditions, as according to Balta et al. (2014) **there is high uncertainty behind the low demand as well.**

Chart 2-13
Uncertainty indicators (standardised deviation from the average)



Note: The VSTOXX index is an indicator reflecting the expectations concerning the volatility of European stock exchanges. The policy uncertainty index is a composite indicator comprised of economic and political news appearing in the press and differences in experts' expectations concerning the performance of the economy.

Sources: Baker et al. (2016), vstoxx.com.

Although the effect of uncertainty is usually short-term, **the shocks impacting the euro area in several waves made uncertainty a persistent factor** (Palenzuela and Dees (2016)). This is also shown by the various indicators that measure uncertainty (Chart 2-13). They include indicators based on the volatility of stock exchanges and measuring money market uncertainty (e.g. the VSTOXX index) as well as indicators based on differences between experts' forecasts or on news appearing in the media. The composite indicator comprised of the latter two elements is the Policy Uncertainty Index (PUI) prepared by Baker et al. (2016). It can be established that since 2008 the uncertainty experienced in Europe has been higher than average. While financial uncertainty was extremely high at the outbreak of the crisis, since 2011 the low investment level may have mainly been attributable to policy uncertainty.

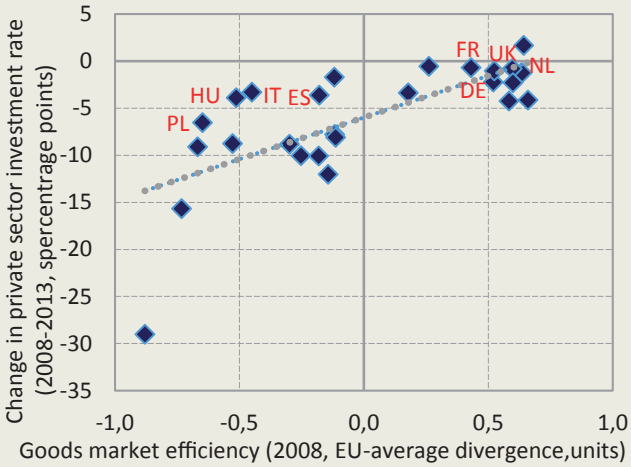
2.3 Structural reasons for low investment

In addition to cyclical reasons, structural factors, which prevail over the longer term, also contribute to the persistently low level of the investment rate in Europe. Investment is reduced by labour market rigidities and permanent unemployment. Similar obstacles are the product market rigidities as well as administrative and regulatory burdens and costs, including in the area of network industries the factors that hinder market competition and the excessive market entry restrictions. Moreover, the low level of the investment rate is a result of the lack of infrastructure investment, the slowdown in FDI as well as of the challenges stemming from the structural changes in the economy (mainly from the expansion in the services sector).

The reasons for the low investment rate include permanent and youth unemployment as well as the ensuing persistent deterioration in the abilities of the workforce (labour market hysteresis). As a result of the crisis, the problem of structural unemployment strengthened in the periphery countries of the European Union. In Spain and Greece, permanent unemployment is an especially significant challenge. At the time of the crisis, it rose to around 25 per cent and is declining very slowly even with the passing of the crisis. Among the active population aged between 15 and 24 years, the unemployment rate was 19.4 per cent in Spain and 25 per cent in Greece in the years before the crisis, i.e. between 2004 and 2007. During the crisis, between 2008 and 2013, this value surged to 43 per cent and 40 per cent in Spain and Greece, respectively (Eurostat). These negative labour market developments were exacerbated by labour market hysteresis as well, i.e. the process when the ability and willingness of the workforce becomes 'eroded' due to lack of employment. The main risk of youth and permanent unemployment is that it damages the abilities and skills of those concerned in the long run as well, and thus they do not reach their potential level on the career path. The longer the period of unemployment, the lower the chance for an unemployed person to become an employee again later. In order to avoid the hysteresis, the flow of labour between countries may be a favourable factor in the long run, but it is not possible if the problems arise in the region as a whole, and it may even exacerbate the competitive disadvantage of the areas from which labour is drained (Economist (2012)).

The propensity to invest may be improved by further simplification of the entry and functioning constraints as well as by more intensive competition in product markets (OECD (2015)). In the area of the rationalisation of product market regulations much remains to be done in the EU as a whole. According to the ECB's (2015) survey, factors that hinder investment within the EU include unsatisfactory competition (high entry and functioning constraints) and the under-utilisation of the advantages of economies of scale. Similar conclusion can be drawn from the correlation between the indicator of the World Economic Forum which measures product market efficiency in a complex manner (intensity of local competition, efficiency of anti-monopoly policy, tax incentives for investment purposes, presence of commercial constraints etc.) and the fall in the business investment rate (Chart 2-16). In the case of more efficient product market regulation, the investment rate of the private sector declined to a lesser extent during the crisis.

Chart 2-14
Relationship between product market rigidities and the change in the investment rate of the business sector



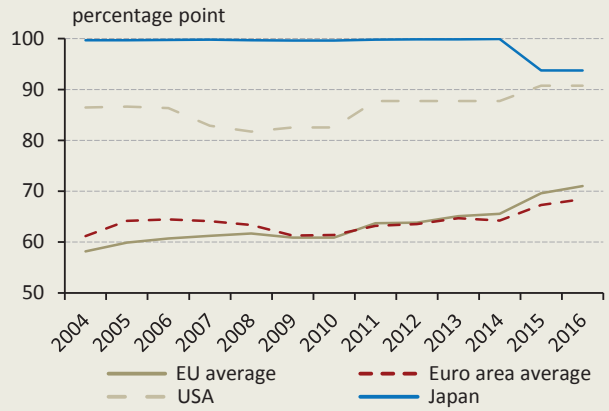
Note: The Goods Market Efficiency indicator of the World Economic Forum measures the efficiency of the product market between 1 and 7. The complex index used as part of the Global Competitiveness Report comprises, inter alia, the degree of local competition, the time of launching the enterprise, the efficiency of anti-monopoly policies as well as tax incentives for investment purposes and the presence of commercial constraints. The dots indicate the EU countries in the chart; Malta and Luxembourg are not shown due to the lack of data sources.

Sources: World Economic Forum, Eurostat.

For risk-taking and for even more efficient resource allocation, a bankruptcy proceedings framework is

needed that does not excessively punish business mistakes and company failures, as that restrains the investment rate as well (OECD (2015)). Based on the indicator of the World Bank's annual 'Doing Business' survey on the quality of the insolvency system, the EU has been steadily improving its position since 2004, but it does not reach the quality of the bankruptcy proceedings systems of the United States of America or Japan (Chart 2-17). According to the ECB, bankruptcy legislation that entails an even lower burden for companies facilitates the preservation of capital and is faster would be needed in Europe (Palenzula and Dees (2016); Bluedorn and Ebeke (2016)).

Chart 2-15
Quality of the insolvency system



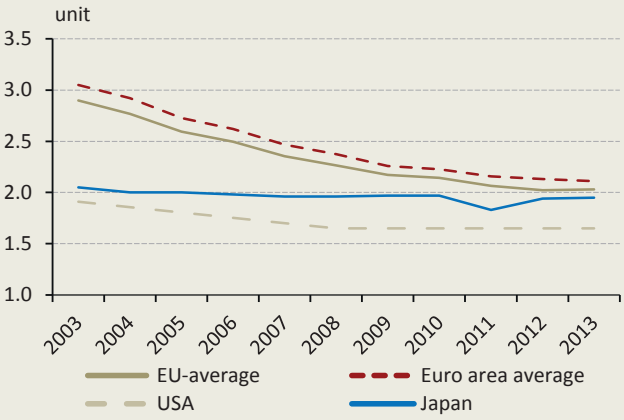
Note: The indicator of the World Bank's 'Doing Business' survey regarding the quality of the insolvency system measures in units between 0 and 100. 100 means the country that performs best in the given area, and thus the scale shows in percentage points the lag of individual countries behind the best performing one. In the case of individual countries, the complex index takes into account, inter alia, the costliness of the bankruptcy proceedings, the time requirement of the process and the quality of the institutional infrastructure.

Source: World Bank Doing Business Survey.

The investment rate is influenced not only by insolvency legislation, but also by the regulation of network industries (energy sector, transport, communications) (OECD (2015)). The existing regulation in the area of network industries limits achievable profits, entails more costs and makes entering the market more difficult. These regulations are measured by the OECD's energy, transport and communications regulation (ETCR) indicator, which shows that between 2003 and 2013 the number of restrictions declined considerably in the EU. Nevertheless, this decline is decelerating gradually, and the degree of regulation still exceeds the level measured in the United States (Chart 2-16).

From a regulatory aspect, the investment rate is often restrained by the nature and inefficiency of the tax structure and the lack of tax incentives. The greatest disadvantage of taxes burdening capital revenues (e.g. the corporation tax) is that they distort savings and investment decisions, thus hindering capital accumulation and decelerating the productivity growth of the economy. A conceptionally simple way of eliminating the distortions caused by profit taxes that also ensures neutrality may be the shifting of company taxes towards the cash basis approach, which approximates the structure of income taxes to that of value added taxes, which are much more favourable in terms of growth (Nobilis and Svraka (2014)). In this approach, the main change concerning the accounting of investment is that the total amount of the investment could be accounted for as cost in the year of the activation, thus reducing the tax base. By contrast, the current practice is that investment is not a cost, and thus it does not reduce the tax base, but appears as cost in a delayed manner, in the form of depreciation.

Chart 2-16
Regulatory strictness of network industries



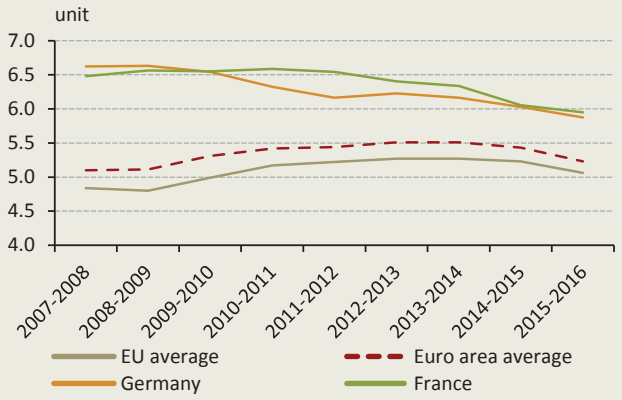
Note: The regulatory constraints of network industries are measured by the OECD's complex indicator, the ETCR (energy, transport and communications regulation). The indicator measures in units between 0 and 6, and examines the restrictions existing in the areas of electric energy, telecommunications, gas supply, postal services, railway traffic, air transport and transport of goods by road. Due to lack of data, the averages calculated for the EU and the euro area do not contain Bulgaria, Cyprus, Croatia, Lithuania and Romania.

Source: OECD.

The low investment rate is also explained by the lack of investment in infrastructure. The unsatisfactory degree of investment in infrastructure is partly attributable to the general tightening of fiscal policy following the outbreak of the European debt crisis in 2011 as well as to the slowdown in private investment with such purpose. The underlying reason for the latter is partly the lack of funds and partly the fact that infrastructure investment is especially sensitive to regulations and market structure (OECD (2015)). The ECB's analysis attributes the above to the decline in credit

supply resulting from banks' balance sheet adjustment,[25] but points out that the banking sector is less willing to finance infrastructure investment in general, as the return on this type of investment is slow and its cost is high. The consequence of insufficient investment is that in 2011 the European Commission estimated the value of missing infrastructure investment to amount to EUR 1.5–2 trillion (European Commission (2011)). Based on the general infrastructure quality indicator of the World Economic Forum – which shows deteriorating infrastructure in various EU Member States, including Germany and France – the quality of infrastructure is stagnant in both the EU and the euro area. Consequently, the implementation of further infrastructure investment would add to the investment rate and the growth rate of the real economy (Chart 2-19).

Chart 2-17
Quality of infrastructure

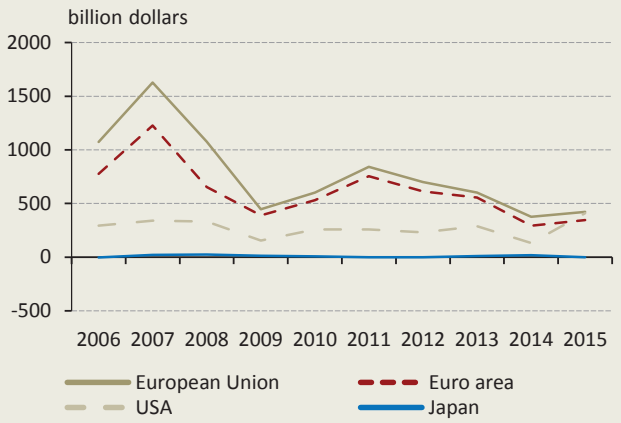


Note: The infrastructure quality indicator of the World Economic Forum measures in units between 1 and 7; higher values mean better quality infrastructure.

Source: World Economic Forum.

In addition to the decline in domestic funds, the slowdown in FDI inflows also plays a role in the evolution of the lower investment rate. While in the 1990s 30–35 per cent of all FDI flowed into European countries, in the period 2011–2013 only approximately 15 per cent was received by the continent (OECD (2015); Chart 2-20). Nevertheless, it must be taken into account that there is no definite answer as to what impact the flow of FDI has on the domestic investment rate, i.e. whether it multiplies investment or supplants existing ones (OECD (2015)). According to the ECB, inflowing FDI adds to the receiving country's economic growth through the contribution to capital accumulation. In addition, the incoming funds may facilitate the funding of local enterprises and may encourage the implementation of productive investment (Palenzula and Dees (2016)).

Chart 2-18
Net FDI inflows

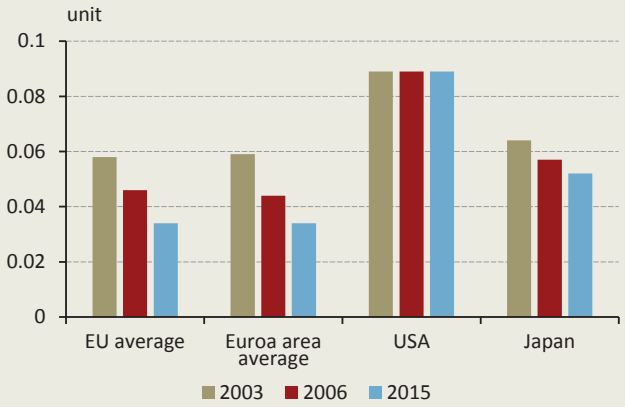


Sources: World Bank, IMF.

EU Member States attempt to attract more capital by easing the FDI regulations. According to the OECD, if the factors that limit FDI flows between two countries decline by 20 per cent, FDI inflows may increase by some 15 per cent. The obstacles to FDI inflows are measured by the OECD's FDI Restrictiveness Index. It assesses individual countries' business environment related to the reception of FDI mainly through the restriction of the presence and forms of foreign capital, the conditions of screening and approving the inflowing capital, the regulations related to foreign key personnel and their employment as well as other restrictions on corporate operations (access to domestic resources, profit repatriation possibilities, land acquisition possibilities in the FDI target country) (OECD (2015)). Conditions for FDI inflows became easier in the past period. The number and degree of factors that hinder FDI inflows have been declining steadily in the EU, and in 2015 were lower than in the USA or Japan (Chart 2-21).

25 The correlation between significant fiscal adjustment and the shortage of infrastructure investment in parallel with that is corroborated by the examples of the Czech Republic, Greece, Iceland, Slovakia and Slovenia (OECD [2015a] p. 245).

Chart 2-19
Factors limiting free flows of FDI



Note: The OECD's FDI Restrictiveness Index measures in units between 0 and 1, where 1 means the highest restriction.

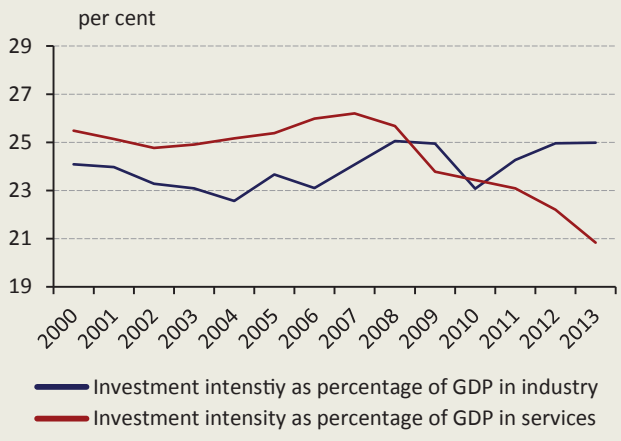
Source: OECD.

Beside these factors, the investment activity also may be hindered by the short-term approach of financial market and by the high yield expectations (MNB (2015)). The financial market primarily focuses on dividends and capital gains, and undervalues the present value of projects with short term expenditures and long term return. Investments fall into this category, and thus the incorporated enterprises may invest less than the optimal level.

2.4 Structural changes in the economy and the Industry 4.0 concept

Structural changes in the economy and the decline in the services sector's investment intensity[26] also reduce the investment rate. The weight of the tertiary sector in GDP is increasing, and the ratio of investment compared to the added value of the sector is declining. Before 2007, investment intensities were similar in industry and services in the EU, but during the crisis the difference increased to the detriment of the services sector (Chart 2-20). An even greater difference of 11 percentage points was found between the investment intensities of the two sectors in the country group examined by the OECD (OECD (2015)). Accordingly, the future increase in investment related to services may be one of the keys to a general increase in the investment level.

Chart 2-20
Investment intensity in industry and services

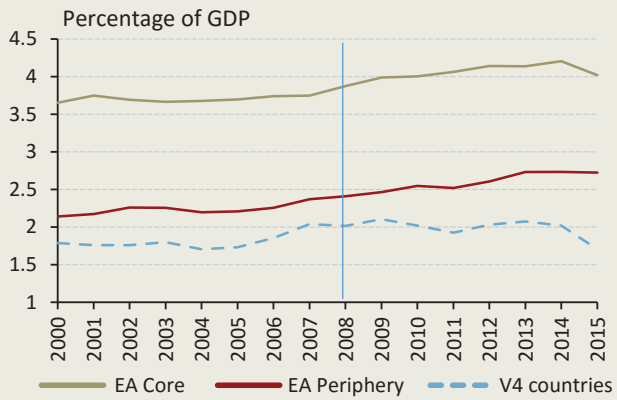


Source: Eurostat.

26 Investment as a proportion of the value added produced by the given sector.

An alternative explanation to the low investment intensity of the services sector may be that, as a result of the nature of the statistics, the increase in the importance of human capital and information-communication technologies also reduces the investment rate, as the statistics do not consider a major portion of the amounts spent on these as investment. Although rapid changes in technology raise the value of investment in human capital, it does not appear in the statistics. The situation with investment based on information-communication technology (ICT) and knowledge capital is similar. At present in Europe, in the system of national accounts, on average, some 56 per cent of knowledge-based capital is accounted for under intangible investment (OECD (2015); Chart 2-23).

Chart 2-21
Investment in intangible assets



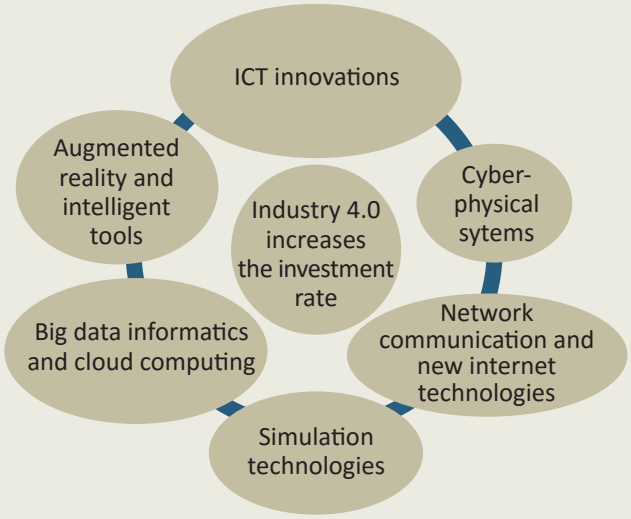
Note: Euro-area core countries: Belgium, France, the Netherlands, Luxembourg, Germany. Euro-area periphery countries: Greece, Italy, Portugal and Spain.

Source: Eurostat.

Closely related to the spread of investment into knowledge-based capital is the progress in Europe of the so-called Industry 4.0 concept, which facilitates the spread of digital technology. The term is a reference to the fourth industrial revolution, in which industrial production is entwined with Internet technology (industrial Internet). All of this also covers the adaptation of production value chains and business models to modern technologies. Industry 4.0 takes place through the following developments in the production processes of the economy:

- **spread of information-communication innovations** for the integration of production systems
- **installation of cyber-physical systems** (spread of sensors, intelligent robots and additive production processes, e.g. 3D printing),
- **introduction of network communication**, including the latest Internet technologies,
- expansion of **simulation technologies** related to production processes,
- implementation of **big data** and **cloud-based information technology** methods within production processes,
- **augmented reality** and production supported by other **intelligent tools** (Chart 2-22) (European Parliamentary Research Service (2015)).

Chart 2-22
Correlation between the Industry 4.0 concept and the investment rate



Source: MNB, based on European Parliamentary Research Service.

According to a survey by the Boston Consulting Group (BCG), the successful introduction and widespread use of Industry 4.0 in Europe will require a 35 per cent increase in investment activity during the next 10–20 years (BCG (2015)). The concept of Industry 4.0 (Industrie 4.0) was originally elaborated for the German economy, but appears in various forms in Europe as well. The changing production and economic model requires high-value investment. In order to achieve the maximum success, the amount spent on it must be spread over the value chain as a whole, as the industrial Internet solutions allow the improvement of business efficiency, and reduce costs in the value chain as a whole (Strategy& – PwC (2015)).

It poses a risk that, in view of economies of scale, the SME sector is less able to involve Industry 4.0 in its production structure. Therefore, the already existing difference in productivity between the SME sector and large enterprises is increasing further. In terms of

the amount of investment, the European Parliament considers the SME sector the most endangered group. In its opinion, the main challenge is that SMEs do not comprehend how their role in the value chain will be affected by the digital changeover (European Parliamentary Research Service (2015)). The attenuation of these concerns may be facilitated by the Horizon 2020 programme, which supports the practical implementation of the Industry 4.0 concept with approximately EUR 80 billion, the European Structural and Investment Funds, which facilitate the process with at least EUR 100 billion, as well as the ICT Innovation for Manufacturing SMEs (I4MS) programme, which also promotes the digital changeover (primarily in the areas of cloud-based information technology, robotics and simulation economy) with some EUR 77 billion, especially encouraging the investment activity of SMEs in manufacturing (European Parliamentary Research Service (2015)).

In the near future, the propensity to invest in digital technologies may be increased by the expectation that if a company implements digital investment faster than its competitors, it may have a higher rate of return and faster return as well. This may contribute to a decline in the amount of missing investment (PwC (2016)). In addition, the analysis prepared in connection with the Industry 4.0 concept by the consulting firm Roland Berger points out that the cost of additional investment may be offset by an increase in productivity (Roland Berger (2016)).

2.5 Solutions to structural challenges

The low investment rate may successfully be remedied by responding to the above described challenges with economic policy and structural-regulatory changes.

Labour market rigidities, which have an unfavourable impact on the level of the investment rate, can be eased by increasing the flexibility and the deregulation of the labour market. In order to improve labour market conditions it is also essential to prevent the unit labour cost from departing from productivity and to make wage determination more flexible. Harmonising sectoral and company-level productivity also has a positive effect on the long-term investment rate (OECD (2015); ECB (2015); Palenzula and Dees (2016)).

In the product markets, increasing competition, reducing entry and functioning constraints and simplifying regulations may contribute to the longer-term rise in the investment rate (Palenzula and Dees 2016; OECD (2015)). Beyond the modifications of market regulation, **the investment rate can be improved by the simplification and harmonisation of the tax system as well as by the introduction of preferences**. First, the investment may be influenced by the cut of taxes on profits. Second, Jacquinot et al. (2016) elaborated a growth-friendly tax system that proposes lower tax burdens on labour from both the demand and supply sides. In addition, temporary tax allowances and tax credits (e.g. temporary exemption) as well as the accelerated depreciation accounting of capital equipment from a taxation aspect also have an encouraging impact on investment (OECD (2015)). Concerning capital taxes, the spread of the cash-based approach may create a possibility for increasing the investment rate (Nobilis and Svraka (2014)). For the further stimulation of intangible assets and knowledge-based investment as well as in order to terminate the negative discrimination of new undertakings,[27] making R+D tax incentives reimbursable may be the solution (OECD (2015)).

The investment rate could also be improved by increasing public investment expenditures – taking into account aspects of fiscal discipline. Community investment has a significant fiscal multiplier effect as well. It is one of the reasons why this tool is important for increasing the investment rate. In addition, the investment rate could also be increased by improving the efficiency of public investment (OECD (2015)). At the level of the European Union, the Investment Plan for Europe intends to facilitate this objective. With the simultaneous involvement of government resources and private capital, it intends to achieve the implemen-

27 The negative discrimination of new undertakings means that the initial conditions for businesses (typically micro, small and medium-sized companies) newly appearing in the market are less favourable in credit scoring and granting tax allowances than for enterprises that have been operating for a longer time.

tation of investment worth EUR 315 billion which contributes to structural reforms in EU Member States (OECD (2015); Palenzula and Dees (2016)). In order to promote infrastructure investment related to public investment but implemented in the private sector, in the first place it is necessary to dismantle the regulatory, management-type and administrative barriers, thus letting the business sector play a greater role in this segment. Infrastructure investment may represent expenditures in the energy sector, water management, telecommunications and transport as well (OECD (2015)).

An important element of the **policy that facilitates FDI inflows** is the harmonisation of competition rules and the regulation of network industries, which vary across countries. According to calculations, the termination of one fifth of the regulatory differences between two countries would increase the amount of FDI inflows by 15 per cent. The importance of FDI inflows also lies in the fact that they help in the expansion of domestic financing possibilities, and also facilitate domestic investment multiplier effects (OECD (2015); Palenzula and Dees (2016)).

In addition, increasing the investment rate may be facilitated by reducing financial fragmentation, strengthening the coverage of expenditures from bond and stock markets, and further reducing non-performing loans (NPL), for example by the acceleration and simplification of bankruptcy proceedings (Palenzula and Dees (2016)). A general improvement of the stability of the banking system may also contribute to increasing the investment rate. Easing the access to financing for the SME sector may entail a similar effect (Barkbu et al. (2015)). Strengthening non-bank modes of covering corporate expenditures, such as the standardisation of the methods of financing from the bond and stock markets, strengthening the forms of financing through securities, insurance companies and asset managers, extending risk capital to a wider range as well as making crowd financing solutions more popular also have an improving impact on the level of the investment rate (Palenzula and Dees (2016); Bluedorn – Ebeke (2016)).

REFERENCES:

Barkbu, B., Berkmen, S. P., Lukyantsau, P., Saksonovs, S., Schoelermann, H. (2015): *Investment in the Euro Area: Why Has It Been Weak?* IMF Working Paper, No. 32, https://www.imf.org/external/pubs/ft/wp/2015/wp1532.pdf

BCG (2015): *Industry 4.0: The Future of Productivity and Growth in Manufacturing Industries.* Boston Consulting Group, April 2015, http://www.bcg.com.cn/en/newsandpublications/publications/reports/report20160517003.html

Bernanke, B. S., Gertler, M., Gilchrist, S. (1999): *The Financial Accelerator in a Quantitative Business Cycle Framework*. In: Taylor, J. B. and Woodford, M. (eds.) Handbook of Macroeconomics, Vol. 1, 1341–1393.

Bond, S., Elston, J. A., Mairesse, J., Mulkay, B. (2003): *Financial Factors and Investment in Belgium, France, Germany and the United Kingdom: A Comparison Using Company Panel Data*. Review of Economics and Statistics, Vol. 85, 153–165.

Bloom, N., Bond, S., Van Reenen, J. (2007): *Uncertainty and investment*. Review of Economic Studies, Vol. 74, 391–415.

Bluedorn, J. C. – Ebeke, C. (2016): *Sluggish Business Investment in the Euro Area: The Roles of Small and Medium Enterprises and Debt*, iMF Direct – IMF, August 2016, https://blog-imfdirect.imf.org/2016/08/04/sluggish-business-investment-in-the-euro-area-the-roles-of-small-and-medium-enterprises-and-debt/

Deutsche Bundesbank (2016): *Investment in the euro area*. Monthly Report, January 2016, URL: https://www.bundesbank.de/Redaktion/EN/Downloads/Publications/Monthly_Report_Articles/2016/2016_01_investment.pdf?__blob=publicationFile

Economist (2012): *The brain drain in Spain is mainly to Spain's gain,* 30 April 2012, http://www.economist.com/blogs/freeexchange/2012/04/labour-markets-0

ECB (2011): *Investment needs, DG ECFIN,* http://ec.europa.eu/economy_finance/financial_operations/investment/europe_2020/investment_needs_en.htm

ECB (2014a): *Monthly Bulletin, April*.

ECB (2014b): *Monthly Bulletin, June*.

ECB (2014c): *Monthly Bulletin, December*.

ECB (2015): *What is behind the low investment in the euro area? Responses from a survey of large euro area firms*, Economic Bulletin Issue 8/2015 – Box 2, https://www.ecb.europa.eu/pub/pdf/ecbu/eb201508.en.pdf

EIB (2013): *Investment and Investment Finance in Europe*. http://www.eib.org/infocentre/publications/all/investment-and-investment-finance-in-europe.htm

European Commission (2011): *Investment needs, DG ECFIN*, http://ec.europa.eu/economy_finance/financial_operations/investment/europe_2020/investment_needs_en.htm

European Parliamentary Research Service (2015): *Industry 4.0 – Digitalisation for productivity and growth*, Briefing, September 2015. (by Ron Davies), http://www.europarl.europa.eu/RegData/etudes/BRIE/2015/568337/EPRS_BRI(2015)568337_EN.pdf

Gilchrist, S., Sim, J. W., Zakrajšek, E. (2014): *Uncertainty, Financial Frictions, and Investment Dynamics*. NBER Working Paper, No. 20038.

IMF (2015): *Private Investment: What's the Holdup?* World Economic Outlook, April 2015, Chapter 4.

Jacquinot, P. – Lozej, M. – Pisani, M. (2016): *Macroeconomic effects of reducing labor tax in the euro area. A structural model-based approach,* 14 February 2016, https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=CEF2016&paper_id=453

Julio, B., Yook, Y. (2012): *Political Uncertainty and Corporate Investment Cycles*. The Journal of Finance, Vol. 67, No. 1, 45–83.

Koo, R. (2008): *The Holy Grail of Macroeconomics – Lessons from Japan's Great Recession.* John Wiley & Sons.

Kuchler, A. (2015): *Firm Leverage and Investment During the Crisis*. Danmarks Nationalbank Working Papers, No. 96.

Lewis, C., Pain, N., Strasky, J., Menkyna, F. (2014): *Investment Gaps after the Crisis*. OECD Economics Department Working Papers No. 1168.

Nobilis, B. – Svraka, A. (2014): *Hungarian Small Business Tax and Possibilities to Minimize Distortions from Capital Income Taxation, Köz-Gazdaság, Különszám az adópolitikáról (Special issue on tax policy), Volume IX, No. 4.*

MNB (2015): Growth Report, Chapter 1, https://www.mnb.hu/en/publications/reports/growth-report

OECD (2015): *Lifting Investment for Higher Sustainable Growth*. OECD Economic Outlook, Vol. 2015/1, 205–279, http://www.oecd-ilibrary.org/economics/oecd-economic-outlook-volume-2015-issue-1_eco_outlook-v2015-1-en

Palenzuela, D. R., Dees, S. (2016): *Savings and investment behaviour in the euro area*. ECB, Occasional Paper Series, No. 167, https://www.ecb.europa.eu/pub/pdf/scpops/ecbop167.en.pdf

PwC (2016): *Industry 4.0: Building the digital enterprise*, PricewaterhouseCoopers, https://www.pwc.com/gx/en/industries/industries-4.0/landing-page/industry-4.0-building-your-digital-enterprise-april-2016.pdf

Reinhart, C. M. and Rogoff, K. S. (2008): *Is the 2007 US Sub-Prime Financial Crisis So Different?* An International Historical Comparison. American Economic Review, Vol. 98, No. 2, 339–344.

Roland Berger (2016): *The Industry 4.0 transition quantified*, Roland Berger GmbH, https://www.roland-berger.com/en/Publications/pub_the_industrie_4_0_transition_quantified.html

Strategy& – PwC (2015): *Industry 4.0 – Opportunities and challenges of the industrial internet*, http://www.strategyand.pwc.com/reports/industry-4-0

3 Analysis of Hungarian corporate investment using micro data

The second chapter of our Growth Report provided an overview of international developments in investment. It raised the question whether the low investment level in Europe and the United States is the consequence of the crisis or there are structural reasons behind it. It comes to the conclusion that – although the global decline in investment is fundamentally attributable to cyclical reasons – structural factors also contribute to the still moderate investment activity. The downturn following the crisis is mostly related to companies. Therefore, in this chapter we focus on Hungarian companies and present the heterogeneity of corporate investment before, during and after the crisis. The analysis is carried out on firm-level data, which allows an in-depth examination of the composition of and trends in corporate investment.

The significant structural change characterising the Hungarian economy in the 1990s was mostly completed by the early 2000s. In parallel with that, companies' investment rate (the ratio of their investment as a percentage of capital stock) also declined, and following the dynamic period of the second half of the 1990s, for most of the 2000s it was stagnant at a level higher than that of the euro area and lower than that of the countries of the region. Structural problems were already seen in the pre-crisis period: the share of expansionary investments was declining, and the share of companies that did not invest at all was rising. During the crisis, between 2009 and 2012, the investment rate dropped sharply. Signs of recovery were seen from 2013, but companies' investment performance remains below the pre-crisis level.

Historically, large companies account for about one half of Hungarian corporate investment. Investments are concentrated; on average, the 20 largest investment projects constitute one quarter of the total annual investment. Similar concentration is observed in the distribution of investment by corporate ownership and export status: foreign-owned companies carry out one half of total investment, while exporting companies implement 40 per cent. A duality is also observed in the impact of the crisis on investment. Large corporations' major investment projects, and especially foreign-owned, exporting companies were less shaken by the crisis for demand reasons, and recovered more quickly than their counterparts.

The composition of investment, the dominance of large, foreign-owned and export-oriented companies reflect the dual structure of the Hungarian economy, i.e. the coexistence of smaller companies that produce for the domestic market and operate with low efficiency and the competitive large companies that produce for export markets. This duality is also reflected in the changes over time in investment performance. The decline/stagnation observed in the pre-crisis investment rate is primarily the result of the declining investment rate of smaller firms and ones producing for the domestic market. Not only the investment performance of smaller (especially micro) companies declined, but in parallel with that the rise in their sales revenues also decelerated, and the ratio of firms moving up into higher size categories also decreased. The turning point was in 2013, when the transition to larges size categories strated to increase again. The increase in firm size is key, because this allows to exploit scale efficiencies, which can have major contribution to the long-run growth of the economy.

The ageing of the sector played an important role in the weak investment performance of smaller firms. Irrespective of size, companies tend to invest more and grow faster in the years following their entry. However, while smaller firms invest less and less as they become older, ageing above a certain age results in no further deterioration in investment performance in the case of larger companies. This explains why ageing had a major negative effect on investment performance only in the case of smaller companies, although firms were growing older in every size categories in the period under review.

It also leads to a decline in investment performance if the number and weight of newly established companies decreases, which, at the same time, also contributes to the ageing of the corporate sector. Traditionally, the contribution of new entrants to the investment rate is significant. The impact of new entrants is felt not only in the

year of the entry; younger companies usually grow dynamically in the first years of their lives. In the pre-crisis years, entries significantly raised the investment rate. However, the outbreak of the crisis resulted in a change: entering firms' contribution at the moment of entry declined, and the contribution of young companies to the investment rate fell. Accordingly, the persistently low level of the investment rate observed after the crisis and especially the weakness of the recovery is also attributable to the weaker contribution of new entrants. Following the crisis, the ratio of large firms in the investment of new entrants increased, indicating that smaller firms are missing the most.

According to our results, changes in the sectoral structure did not play a role in the developments in the investment rate. This holds for both smaller and bigger companies. We did not find any evidence that changes in individual sectors' weight in the economy contributed to the low corporate investment rate.

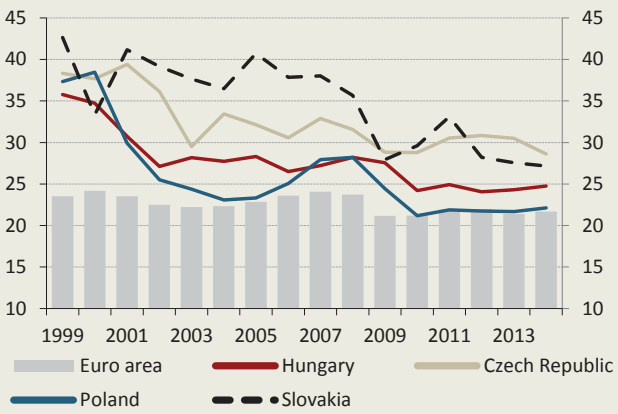
In addition to the factors examined above, companies' investment decisions are also influenced by the average costs at which investment can be implemented at a given point in time. The costliness of corporate investment is captured by the user cost of capital. Although the user cost of capital has been steadily declining since the mid-2000s, for the time being this fact has not resulted in an increase in the investment rate. The effect of the declining user cost on investment was weakened by the above mentioned factors: the fall in the number and investment of new entrants, the high number of ageing and not growing micro enterprises and the concentration, as a result of which the volume of aggregate investment may be affected even by a few large projects.

3.1 Introduction

The significant structural change that characterised the Hungarian economy in the 1990s was mostly completed by the early 2000s. In line with that, investment activity of the corporate sector weakened in the first years of the decade, before becoming stagnant until the outset of the crisis. A higher investment rate means faster convergence to developed countries. The investment rate of converging countries usually exceeds that of developed economies. This is shown in Chart 3-1: in the past 15 years, the investment rate of the non-financial corporate sector in the V4 countries was much higher than in the euro area. Within the V4 countries, Hungary is a weak performer and Hungarian corporate investment is lower than the level seen in the Czech Republic or Slovakia, but higher than in Poland. It is also evident that the investment rate declined in all of the countries of the region in the 2000s, which is related to the aforementioned completion of the transition period. It is also a common experience that the crisis entailed a decline in the investment rate of all the countries in the region.

Corporate investment plays an important role in both the short-term and long-term development of an economy. This analysis aims to contribute to a better understanding of the reasons for Hungary's low investment performance. To date, mainly macro level analyses have been prepared on the investment performance of the Hungarian economy.

Chart 3-1
Investment rate of the non-financial corporate sector (compared to GDP produced by the corporate sector, per cent)



Source: Eurostat.

The novelty of this analysis is that it is the first paper to examine firm-level investment from the early 2000s to the end of 2014.[28] **The advantage of micro-level analysis is that it allows one to capture the heterogeneity behind the aggregate performance as well as the relevant changes over time. The use of firm-level data**

28 As far as we know, only two studies analyse firm-level investment using domestic data. Kátay – Wolf (2004) examine the impact of user cost. Reiff (2010), using the same database, analyses the presence and role of non-convex costs. Both studies use data through 2002. This means that the micro-level analysis of investment in the past one and a half decades is completely missing.

allows the examination of the role of firm characteristics. In the first part of the analysis, the changes in investment between 2001 and 2014 are analysed by firm size, ownership and export activity. This is followed by a discussion of the role of the age of companies, sectoral changes and firm entries.

3-1. Box
THE DATA AND THE INVESTMENT RATE

The financial statements of companies with double-entry accounting, i.e. the corporate tax database of the National Tax and Customs Administration (NAV), are used in the analysis. As of 2004, all companies changed over to double-entry accounting; accordingly, starting from that year our sample covers all Hungarian companies. The database does not contain information on capital stock and investment; therefore, estimates are provided for these using the information reported in the balance sheets and profit/loss statements.

In line with the literature, we define the firm-level investment rate as investment as a proportion of capital, instead of the investment rate usually applied in macro analyses, where investment is expressed as a proportion of GDP. Firstly, capital stock is a more persistent indicator. Secondly, in this way it is not necessary to control for the change in capital intensity, which presumably may have been present in the period under review.

The investment rate is the ratio of investment in the given year and the previous year's capital stock (I_t/K_{t-1})[29]. Investment is determined as the sum of the change in tangible assets and accounting depreciation.[30] Real investment is calculated from nominal investment with the help of sector-level investment price indices. The PIM (Perpetual Inventory Method) is applied to calculate the capital stock. When determining the depreciation, the (accounting) depreciation rate accounted for by the company is used. Accounting depreciation reflects the composition of a company's capital, which is important, because there are significant differences between the average useful lives and depreciation of equipment, buildings and structures. However, its disadvantage is that – in line with the accounting rules – companies can write off their capital goods much faster than implied by their actual useful life. Consequently, investment rates will be higher compared to the case when economic depreciation is used.[31]

We faced a number of challenges during the analysis. The investment we calculated at company level is different from the aggregate investment recorded in macro statistics. In the latter case, only the purchase or creation of new assets is considered to be investment, while at micro level, tangible assets change with the purchase/sale of used equipment as well; therefore, they are also accounted for as investment. At the same time, the buying and selling of used equipment offset one another at the aggregate level; the probability that used machines are sold abroad and not to domestic agents is low.

Our estimates for investment may be distorted and the deviations from macro data may be increased by corporate transformations as well. For example, if a firm outsources a part of its activity to another company, (not real) investment is recorded upon the appearance of the new firm and a downsizing at the original one simultaneously. This will have no impact on aggregate investment, but may influence firm-level analysis. Finally, aggregate data are also affected when a company is transformed by termination. In this case a new firm is set up, distorting not only micro, but macro level analyses as well; there is new investment accounted for, but there is no disinvestment. Therefore, higher-than-actual aggregate investment is seen.

29 This is the statement resulting from the capital accumulation equation, as the difference of I/K(t-1) and the depreciation rate gives the percentage of increase in capital.

30 In contrast to the study by Kátay – Wolf (2004), we disregard intangible assets. Although the share of these assets has increased gradually since the 2000s, we know very little about their behaviour; therefore, we stuck with the machine and building/structure types of investment, which is the focus of the investment theory. In addition, upon calculating the investment, we take into account not only planned but also accelerated depreciation.

31 Accounting rules may also cause systematic differences by company size. For example, according to the current rules, assets with a value below HUF 100,000 may be written off in one year, i.e. a 100% depreciation rate applies to them.

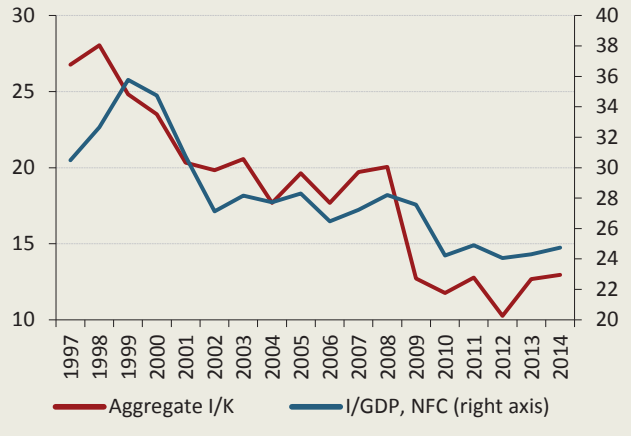
3.2 Changes in investment in the entire corporate sector

The change in investment performance over time is described below in two ways. Firstly, we present the developments in companies' aggregate investment rate; secondly, we examine their investment activity. Analysing the latter is of interest, because it covers newly established companies and also the ones that are becoming inactive, for which we cannot calculate an investment rate.

The aggregate investment rate as a proportion of the previous year's capital is shown in Chart 3-2, which shows a steep fall in the investment rate at the end of the 1990s, followed by a slight decline and stagnation in the investment rate in the 2000s, until the outbreak of the crisis. This is more or less in line with the investment-to-GDP ratio as well, which is also shown in the chart and is based on macro statistics. The impact of the crisis on the investment rate is first seen in 2009, when a significant decline occurred. A slow recovery is observed following the crisis: the rise of investment rate began in 2013, following the trough in 2012.

Accordingly, starting from the early 2000s, the developments in the investment rate divide the period under review into three well distinguishable phases: a pre-crisis period of stagnation between 2001 and 2008, the crisis between 2009 and 2012, and the phase of recovery in 2013–2014. The rest of this analysis focuses on these three phases.

Chart 3-2
Aggregate investment rate and investment ratio (as a percentage of capital in the previous year and as a percentage of GDP produced in the corporate sector, respectively)



Source: MNB calculation based on the NAV database and Eurostat.

Investment activity is a categorical variable, with the help of which we can also capture the investment of those companies for which we cannot calculate an investment rate. We create various categories, of which – in view of their importance – we take a detailed look at new entrants, spikes and non-investors. Spikes are investments of companies which have an investment rate higher than 35 per cent in the given year.[32] Most probably, these investments cover expansion-type projects. The companies that do not invest at all in a given year are classified in a separate category. Finally, new entrants are treated with special attention. For the latter, we cannot calculate an investment rate as they do not have capital in the previous period.

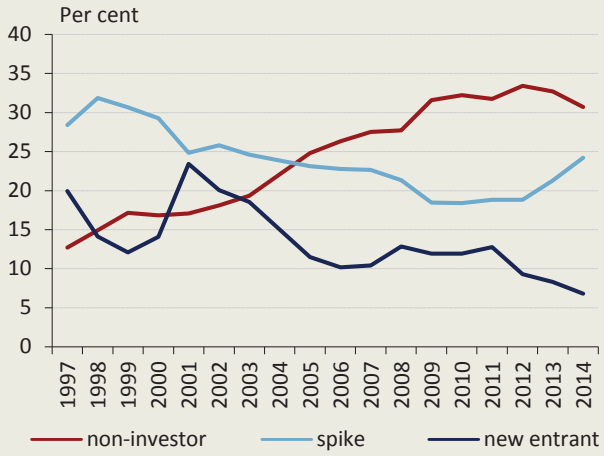
Looking at the developments in investment activity over time, significant rearrangements are observed (Chart 3-3). Although as seen is Chart 3-2, the aggregate investment rate was rather stagnant in the 2000s, a declining trend is already observed in investment activity from the early 2000s on: the ratio of spikes declined steadily, while the ratio of inactive companies which did not invest at all increased, and the ratio of new entries also decreased. The different developments in the two performance indicators (investment rate and activity) in this period are partly explained by the fact that the investment rate is dominated by large companies due to the concentration of investment, while investment activity is dominated by smaller firms because of their high number.

During the crisis, these negative trends continued or even deepened in certain cases. Thus, for example, one third of the companies did not invest at all in this period. However, in 2013–2014 signs of a recovery are already seen, and the previous negative trends become reversed: the ratio of companies which do not invest at all declines, and the ratio of spikes increases. The share of new entrants takes a different path and tends to stagnate between 2008 and 2011, before declining again. The temporary rise in new entries in 2011 followed by a decline in 2012 may be attributable to

32 In determining spikes, the literature usually indicates a 20% threshold. We raised this considerably (to 35%), because the use of accounting depreciation resulted in much higher levels of investment rates, and thus the usual definition would result in too many spikes. Our aim was to approach the values documented in literature in terms of the frequency of spikes.

changes in legislation (raising the minimum paid-up capital and other tightening measures). However, the subsequent further decline shows a deterioration in the willingness to establish companies, which may have a material impact on growth in later years as well, as a company's investment activity is especially high not only in the year of founding, but in the subsequent years as well.

Chart 3-3
Trends in investment activity
(ratio of companies belonging to individual categories)



Note: Single-entry bookkeeping ceased in 2004; therefore, a large number of new companies appeared in the sample. In order to avoid breaks, the values for 2004 were substituted with the average of the years 2003 and 2005.

Source: MNB calculations.

3.3 Differences in the changes in investment by company size

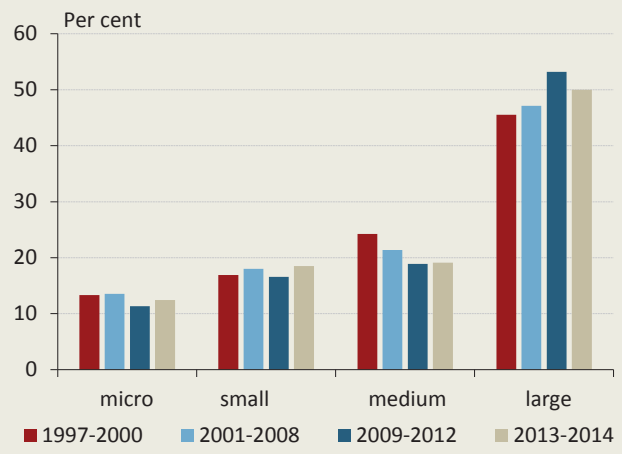
There are different behaviours behind aggregate developments by certain characteristics of the corporate sector. One of the most important characteristics is the size of the company. First, we examine the composition of investment, and then the developments in the investment rate and investment activity. For the classification by size (micro, small, medium-sized and large companies), the standard EU thresholds are used.[33]

Large companies dominated investment in the period under review. The weighting of groups by firm size hardly changed, and only the crisis resulted in some shift. According to Chart 3-4, large firms implement about one half of the investment. Not only is the total weight of large firms high, the largest investment projects related to them also show high concentration: in the whole period, the top 20 projects account for nearly one quarter of total investment.

While smaller companies increased their share slightly in the 2000s, following the crisis this process reversed, and the share of the sector of large firms increased to the detriment of all other size groups. This is partly attributable to cyclical and demand effects, as the demand of smaller companies producing for the domestic market declined permanently, while that of large companies producing for export markets picked up more rapidly. Following that, during the recovery, the shares returned to the levels typical of the 2000s. The Funding for Growth Scheme had also contributed to that.

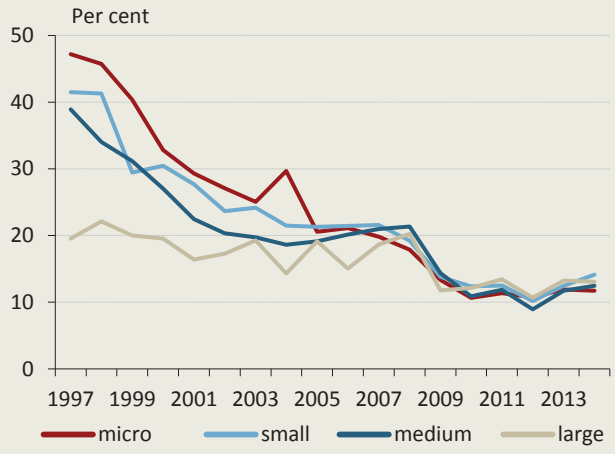
33 For employment they are: 10, 50 and 250 people; for sales revenue: EUR 2, 10 and 50 million; for the balance sheet total: EUR 2, 10 and 43 million. In categorising, we deviate from the usual EU rules: if the company exceeds the threshold for at least one indicator, it is classified into the higher category. According to the EU definition, either employment or the balance sheet total and sales revenue together have to be above the threshold for classifying the firm into the higher category. Our aim with the modification of the definition is to avoid the incorrect classification of new entries: e.g. upon launching its investment projects, Mercedes would be among the micro enterprises because although its balance sheet total is high, it does not have sales revenues or employment, or they are low, as it has not started production yet in the period of the large investment.

Chart 3-4
Distribution of investment by firm size



Source: MNB calculations.

Chart 3-5
Aggregate investment rate by firm size
(as a percentage of capital of the previous year)



Source: MNB calculations.

The aggregate investment rate broken down by company size is shown in Chart 3-5. There are various lessons to be drawn from the chart. Firstly, prior to the crisis, the investment rate was higher in the smaller size categories. This is explained by smaller companies' different asset composition (they typically keep assets whose depreciation is faster and replacement needs are higher) and by the fact that on average they are younger and more rapidly growing companies.

Secondly, in the 2000s it was primarily the investment rate of micro and small enterprises that declined,[34] while that of medium-sized ones was stagnant, and that of large companies even increased to some extent between 2004 and 2008. Accordingly, the decline/stagnation observed in the full sample is mainly the consequence of smaller companies' decreasing investment rate. As already mentioned, a higher investment rate usually belongs to lower capital, and thus it is a negative development that in 2007–2008 the investment rate of smaller-size companies declined to a level similar to that of large companies as a result of the earlier declining trend.

Following the outbreak of the crisis, in 2009, a similar decline in the investment rate took place across companies of various sizes. Until 2012, the investment rate was practically stagnant in all size categories at this low level. Improvement is seen in 2013–2014.

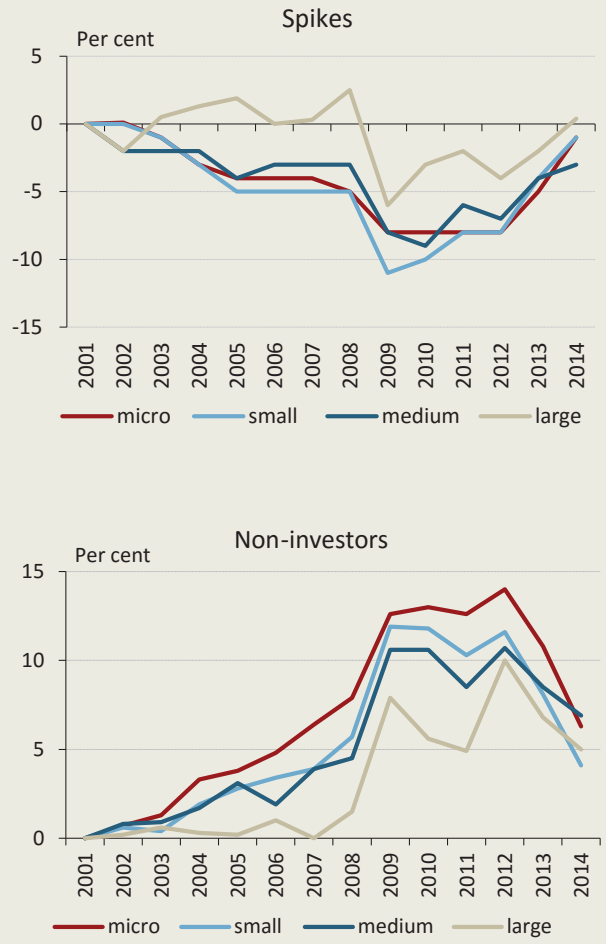
The developments in investment activity also reveal similar heterogeneity by size. The increase in inactivity observed prior to the crisis – the rise in the ratio of non-investors and the decline in the frequency of spikes – was mainly typical of smaller companies. Chart 3-6 does not show the actual frequencies, but, compared to 2001, it depicts the change in frequencies after controlling for the impact of firms characteristics (ownership, age, sector, financial performance, etc.).[35] Accordingly, the findings suggest that the pre-crisis fall in inactivity is not attributable to changes in the composition by sector, ownership, age or other features.

The crisis affected the activities of all size categories in a similar manner. The frequency of expansion-type investment declined significantly, while the frequency of companies which did not invest at all surged. The signs of recovery can also be observed irrespective of size: the probability of spikes is growing strongly, and the frequency of non-investing companies is declining to the pre-crisis level. Presumably, at that time companies started to make up for a part of the investment postponed during the crisis. This may have contributed to the decline in the ratio of companies which do not invest at all and an increase in the ratio of spikes.

34 In 2004, a temporary increase in the investment rate is observed among micro enterprises. This is related to the fact that as of 2004 the introduction of double-entry accounting became compulsory for a number of companies. As a result, at this time a large number of smaller companies that existed before entered our sample.

35 The results were obtained using a regression estimate.

Chart 3-6
Development of the frequency of spikes and non-investors by firm size (percentage points, relative to 2001)

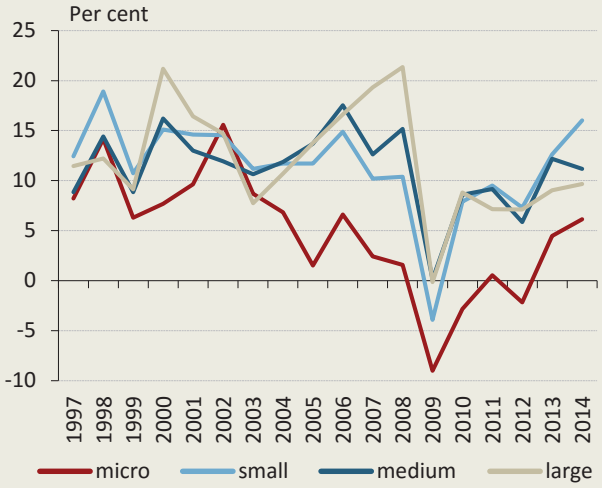


Note: The change in frequency after filtering out the effect of firm-level variables, compared to 2001.

Source: MNB calculations.

As seen, the investment performance of micro enterprises mainly declined in the 2000s. It seems that these companies were less and less willing or able to grow. This is corroborated by other indicators as well, in addition to investment rates and activity. For example, **in the case of micro enterprises the dynamics of sales also weakened in the period between 2001 and 2008**. The dynamics of sales of companies of various sizes are shown in Chart 3-7, according to which a declining trend in the growth rate of average sales revenue is observed only among micro enterprises.

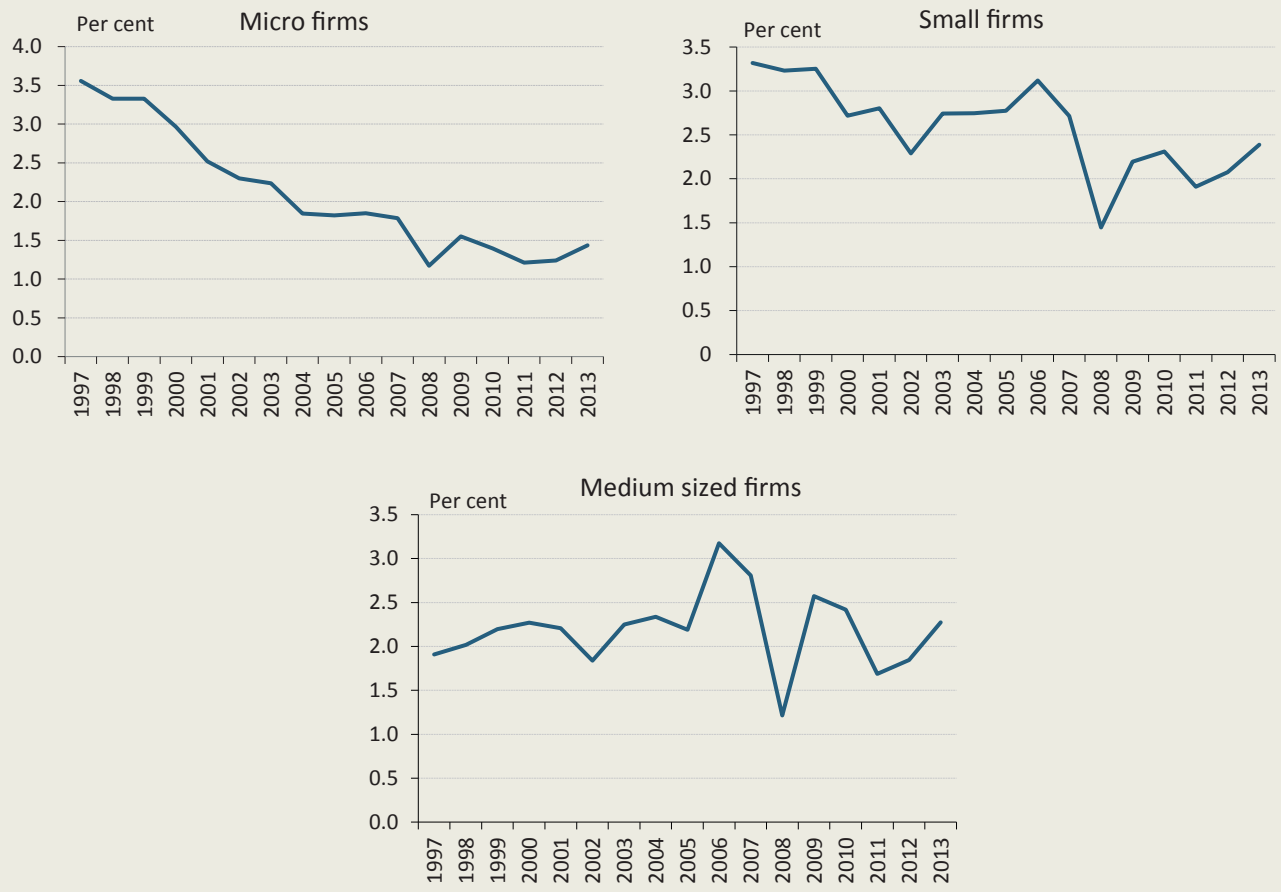
Chart 3-7
Average real growth rate of sales (calculated from firm level growth rates of sales deflated by producer prices, per cent)



Source: MNB calculations.

The declining dynamism and lower growth performance of micro enterprises is also corroborated by the fact that the frequency of the transition to a higher size category declined strongly and steadily: this is also a micro enterprise phenomenon; no similar unfavourable trend is observed in other size categories (Chart 3-8).

Chart 3-8
Frequency of transition to a higher size category by firm size
(number of transitions in the following year/number of firms, per cent)



Source: MNB calculations.

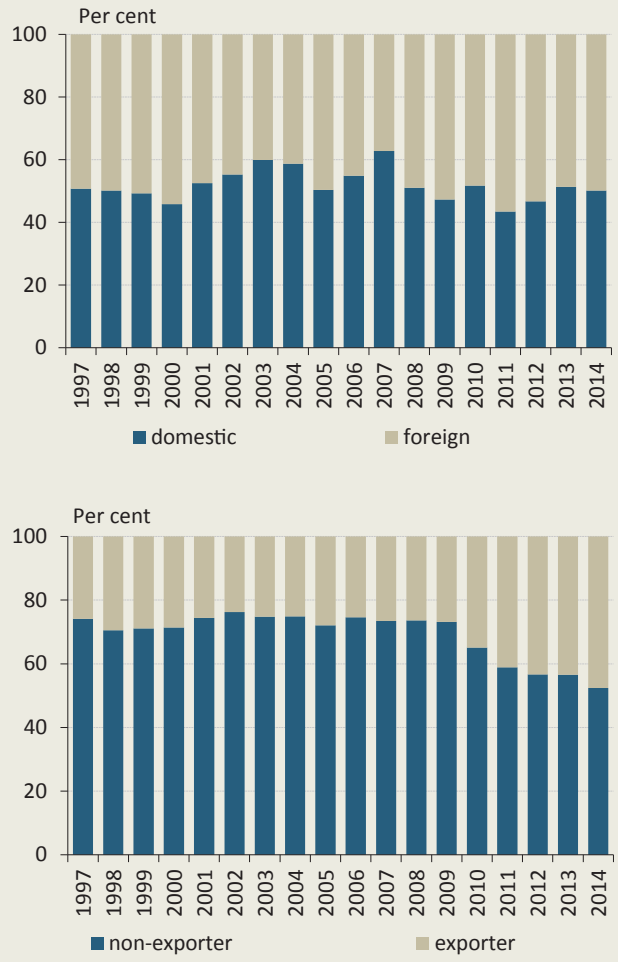
3.4 Developments in investment by ownership and exporting status

In this section, we examine heterogeneity by ownership and exporting status. A company is deemed foreign-owned if the foreign share in paid-up capital is above 50%,[36] and it is considered to be an exporter if its exports exceed 10% of the sales revenue.

The share of domestic and foreign companies within total investment is roughly fifty-fifty. Even the crisis did not change that (Chart 3-9). The breakdown by exporting status shows that the share of exporting companies started to increase as a result of the crisis. The weight of exporting companies in investment increased from the earlier stable 25% to above 40% by the end of the period. This was partly driven by changes in demand, as demand started to recover much earlier and more strongly in the case of exporters than in case of firms producing for the domestic market.

36 This is different from the 10% threshold used in the definition of FDI. Changing the threshold does not have a material impact on our results.

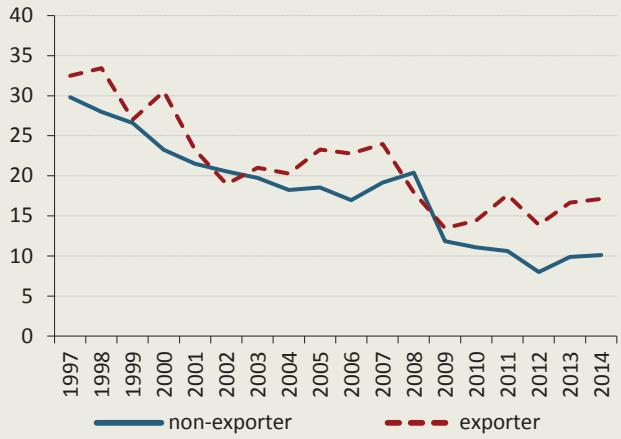
Chart 3-9
Composition of investment by ownership and export status)



Source: MNB calculations.

Examining the investment rate of exporters and non-exporters, it is observed that in the 2000s the investment rate of those producing for the domestic market declined (Chart 3-10). In the case of exporters, the effect of the crisis is already seen in 2008 in the decline in the investment rate, while in the case of non-exporters the rate falls only in 2009. This is in line with the fact that external demand started to deteriorate sooner than domestic economic activity as a result of the crisis. Also in line with the developments in economic activity, the recovery after the crisis started earlier and was stronger in the case of exporters.

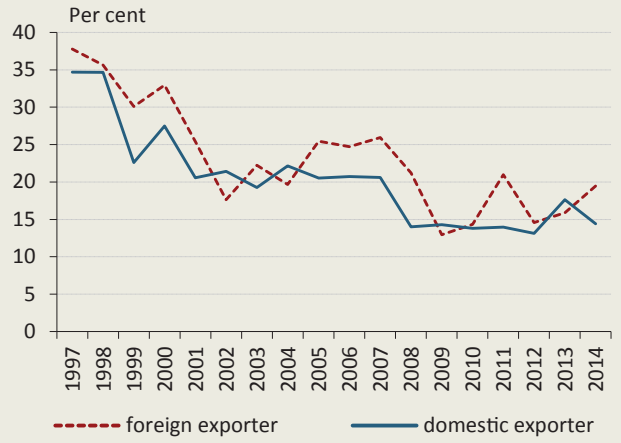
Chart 3-10
Aggregate investment rate of exporters and non-exporters (investment/ capital of previous year, per cent)



Source: MNB calculations.

There is a strong overlap between exporting and foreign ownership; therefore, a further breakdown of exporters is applied according to ownership (Chart 3-11). After the crisis, the investment rates of foreign-owned exporters show a faster and stronger recovery compared to domestic-owned firms.

Chart 3-11
Aggregate investment rate, foreign and domestic exporters (investment/capital in previous year, per cent)



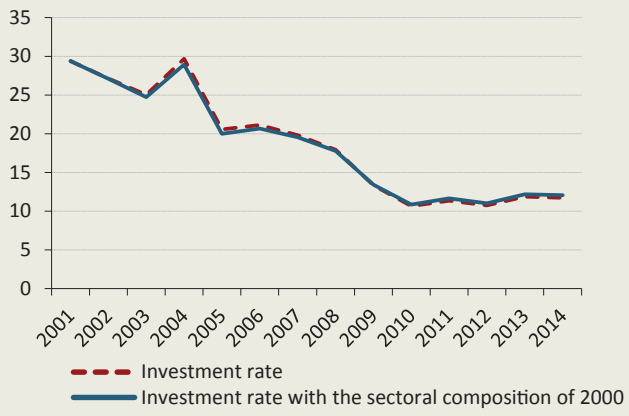
Source: MNB calculations.

3.5 The role of sectoral composition and age

The size of the investment rate is affected by various factors. Companies grow most dynamically in their first years; therefore, we expect that the investment rate depends on the age of the company. In addition, the composition of tangible assets also affects the investment rate. While a machine is used by a company for 5–10 years on average (the useful life of a computer is even shorter), the age of buildings and structures is many times that. Accordingly, companies and sectors that need machines typically have higher investment rates. The changes in investment rate over time may be significantly affected if the composition of companies changes either according to age or sector. Therefore, in this section we examine whether the sectoral structure and the age distribution influenced the investment rate, and if so, in what direction. As a pre-crisis decline in the investment rate was observed mainly in the case of smaller, especially micro companies, we pay special attention to their investment performance.

First, the impact of the sectoral structure is examined. The impact of the sectoral composition may be filtered out from the aggregate rate if the aggregate rate is expressed as the average of sectoral investment rates weighted by capital, in a way that the weights are fixed in a given year. The capital figures for 2000 – which were used to calculate the investment rate in 2001, the first year in our sample –were chosen as fixed weights.[37] Based on Chart 3-12, **the change in sectoral structure does not result in a significant change in the aggregate investment rate;** consequently, it is not the change in the sectoral structure that causes the decline in the investment rate. The chart shows results for the micro enterprises, because the investment rate declined the most in their case, but the result is similar for small, medium-sized and large companies as well. Changes in sectoral structure did not have an impact on the investment rate in any of the size categories.

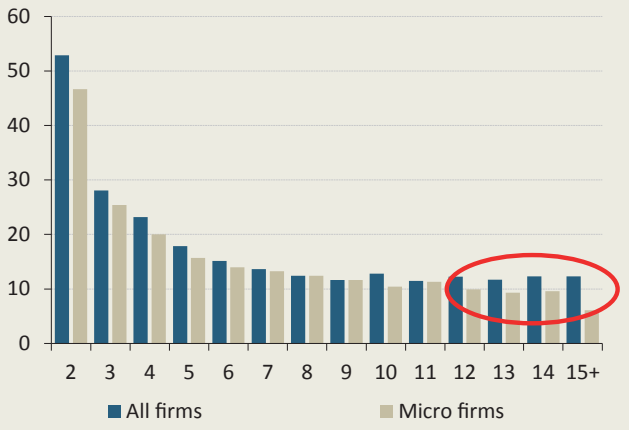
Chart 3-12
Aggregate investment rate including and excluding the effect of sectoral composition, only for micro enterprises (average of letter-level sectoral investment rates weighted by capital of previous year and 2000)



Source: MNB calculations.

A strong relationship is observed between the age and the investment rate of companies: the investment rate of young companies 2-4 years old is much higher than that of older ones. However, in the case of micro enterprises, the investment rate declines steadily with age, while in the case of the entire corporate sector, which also contains larger enterprises, no decline is observed above a certain age (Chart 3-13).

Chart 3-13
Investment rate by age, in the case of all firms and micro firms (investment/capital in the same year, per cent)

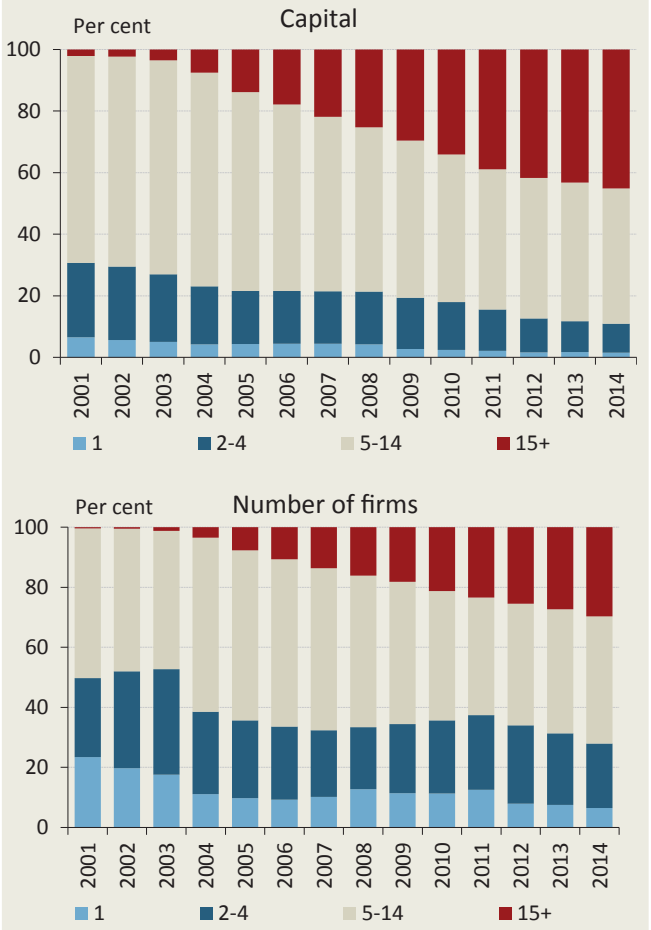


Source: MNB calculations.

37 The sectoral breakdown was prepared according to national economy sections (i.e. identified by alphabetical letters A to U).

Accordingly, the decline in the investment rate of micro enterprises and of smaller companies in general in the 2000s may also be attributable to changes in the composition of companies by age. The average age of firms is actually increasing in the sample. Chart 3-14 shows ageing in the case of micro enterprises, although it is observed in each size category. It is important to note that not only can the decline in the ratio of new entries contribute to the increase in average age, it may have a similar impact if there are many young ones among the companies that cease to exist.

Chart 3-14
Changes in the age distribution of firms, micro firms (according to number of firms and capital)



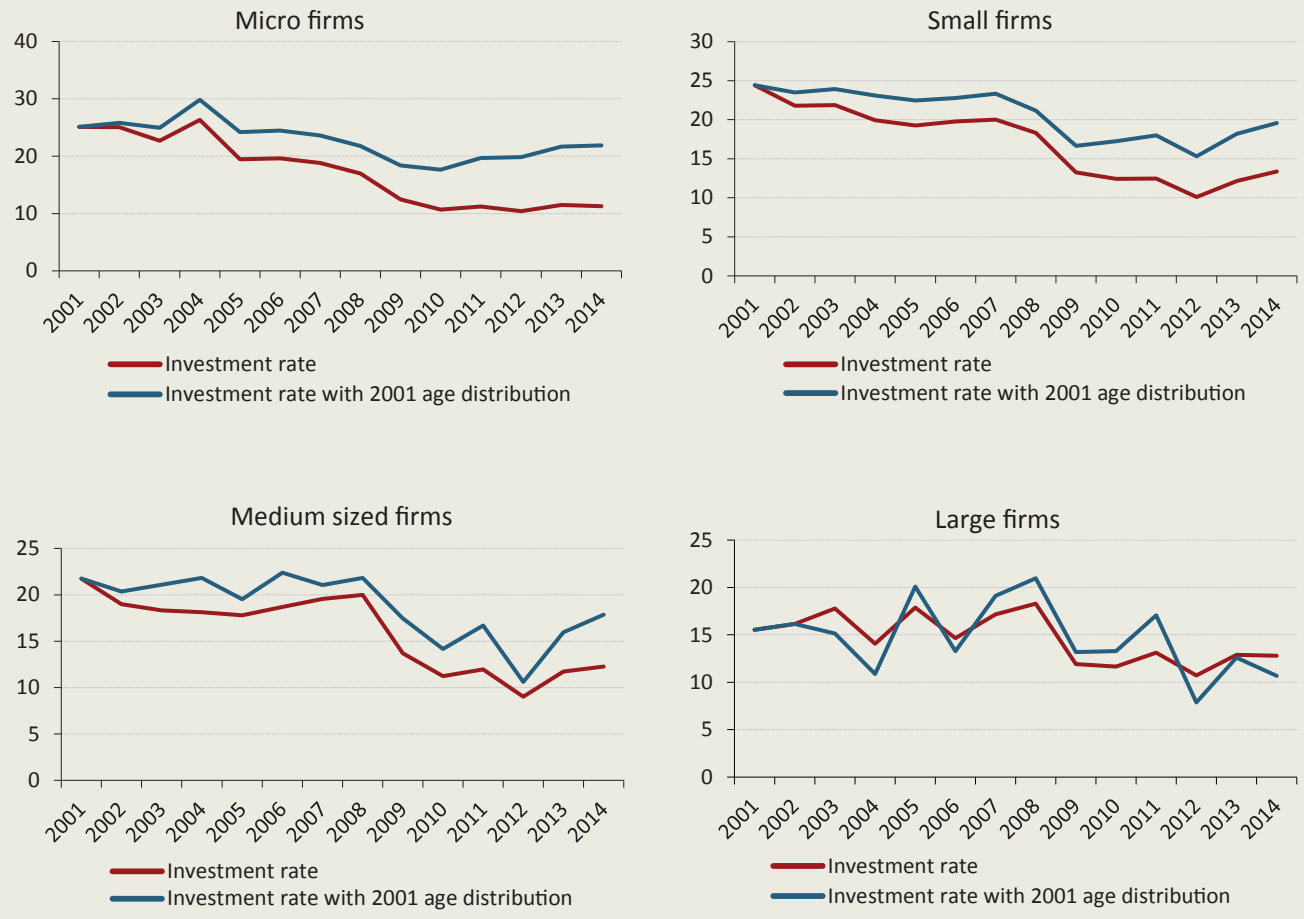
Source: MNB calculations.

The impact of the ageing of companies can be examined similarly to the compositional effect of the sectoral structure. The investment rates by individual ages are averaged weighted by capital corresponding to the age distribution of a fixed year, thus excluding the compositional effect of the age.[38] Chart 3-15 depicts the investment rate weighted by 2001 capital and the actual aggregate investment rate.[39] According to the results, the ageing of companies partly – but not completely – explains the pre-crisis decline in the investment rate of micro enterprises. Ageing also hinders the recovery following the crisis. To a lesser extent, ageing contributes to the declining investment rate in the case of small companies as well. As opposed to smaller companies, the investment rate of medium-sized companies was more favourable before the crisis, but the ageing of companies impaired the rate in their case as well. At the same time, in the case of large companies no unfavourable impact of ageing is observed. It is explained by the fact – as shown in Chart 3-13 – that the investment rate does not decline continuously with the age in the case of large firms.

38 In this case, the aggregate investment rates are calculated by dividing the investment by simultaneous capital, because dividing by the capital of the previous period is problematic in the breakdown by age.

39 We also performed the calculation with 2008 weights, and according to the chart the same conclusions can be drawn.

Chart 3-15
Aggregate investment rate, including and excluding the composition effect of age by firm size (average of investment rates by age weighted by capital according to age distribution of the actual year and of 2001)



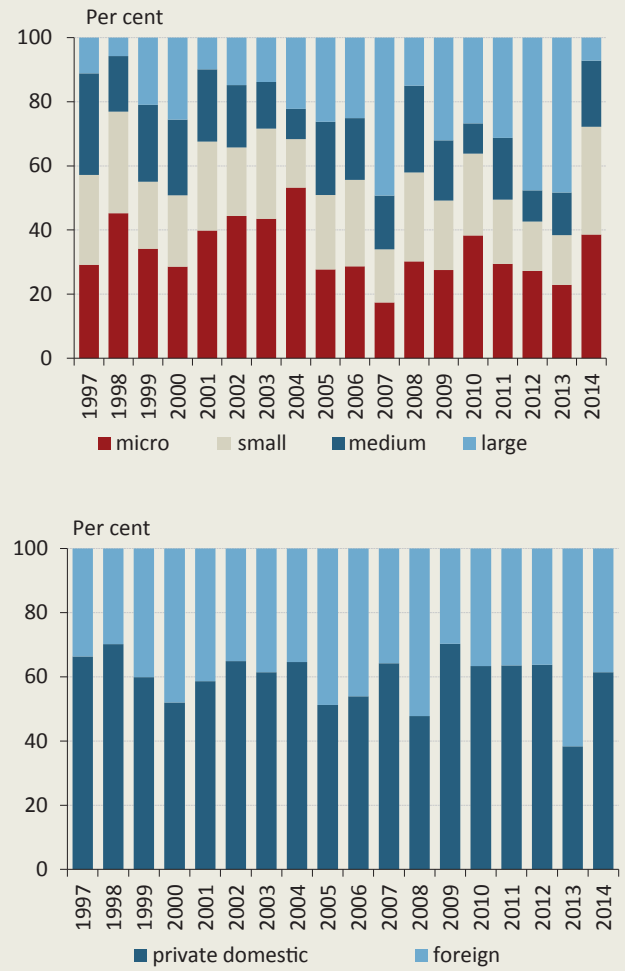
Source: MNB calculations.

3.6 The role of new entrants

A considerable portion (some 10%) of total investment is related to new entrants. Moreover, companies typically grow and invest above the average not only upon entry, but also in the first years of their life; therefore, developments in new entries have an impact on investment over the longer term as well. Chart 3-3 in Section 2 shows that the ratio of new entries did not start to grow even after the crisis; moreover, a steady decline is observed after 2011. In the following, we examine the composition of new entries according to company size and ownership as well as newly entering firms' contribution to the investment rate.

The composition of the investment of newly entering firms according to firm size is volatile (Chart 3-16, above panel). While large companies account for about one half of the total investment, in the case of new entries the share of smaller companies is higher. The composition of new entries by company ownership is more stable; the ratio of domestic and foreign companies' investment is 60 to 40 (Chart 3-16, below panel).

Chart 3-16
Composition of the investment of new entrants by size and ownership

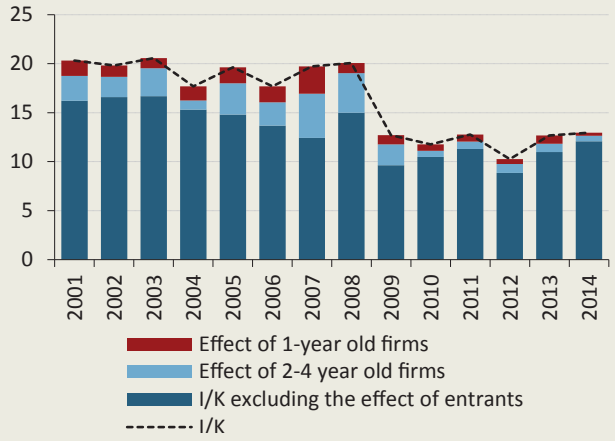


Source: MNB calculations.

In the following, we analyse the impact of new entrants on the investment rate. Entering companies are typically more active following entry as well, and their investment rate is higher than that of their older peers. Therefore, fewer entries in a given year may impair the following years' investment rate as well. Accordingly, when examining the impact of entering firms it has to be taken into account that they add to the investment rate not only at the moment of entry.

In order to present the role of entering firms, the total aggregate investment rate is decomposed into the impact of the investment rate excluding young companies and the impact of new entrants (1-year-old) and 2-4-year-old companies. The latter shows the impact of the later activity of companies that entered in previous years (Chart 3-17). In the pre-crisis years, entries significantly raised the investment rate. However, with the outbreak of the crisis, from 2009 this changed significantly: the contribution of 2-4-year-old companies to the investment rate declined. Entering firms' contribution at the moment of entry also decreased, starting from as early as 2008. The conclusion to be drawn from the above is that the persistently low level of the aggregate investment rate observed after the crisis is also attributable to the weaker positive effect of entering firms. One of the underlying reasons is the lower number of entering companies and another is their investment activity, which is lower than observed prior to the crisis.

Chart 3-17
Effect of entrant firms on the development of the aggregate investment rate (investment/capital in the previous year, per cent)



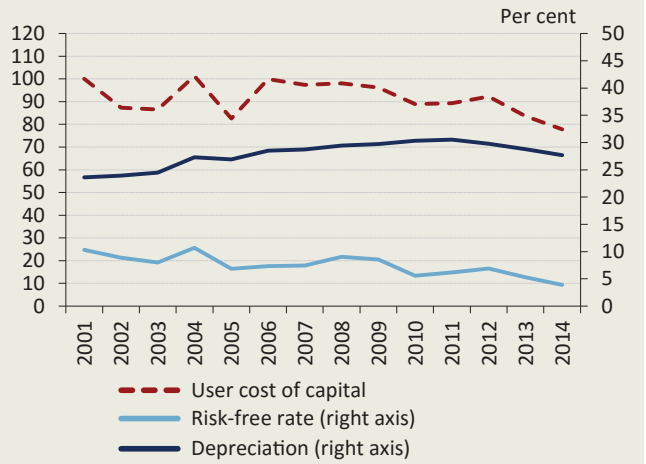
Source: MNB calculations.

3.7 The user cost of capital

In addition to the factors examined above, companies' investment decisions are also influenced by the average costs at which the investment can be implemented at a given point in time. The costliness of corporate investment is captured by the indicator called the user cost of capital. The user cost of capital is fundamentally determined by price changes in physical capital (real estate, machinery, equipment, etc.), the relative price of the capital compared to output, interest rates and depreciation (for details, see the box).

In Hungary, the average user cost declined considerably in the late 1990s and at a slower pace from the early 2000s (Chart 3-18). The declining trend in interest rates and relative prices had a favourable impact on the user cost. This was partly offset by the rise in depreciation rates, which took place as a result of changes in the composition of tangible assets (increasing share of machines) and in accounting rules. Both led to a faster depreciation of capital stock, thus increasing the user cost. At the end of the period, following the launch of the easing monetary cycle, all the factors lowered the user cost.

Chart 3-18
Development of the user cost of capital (2001=100, per cent)



Source: MNB calculations.

Although the user cost of capital has been steadily declining since the mid-2000s, for the time being this has not resulted in an increase in the investment rate. In this analysis, the causal effect of the user cost on investment is not examined. However, our findings reveal that in relation to the development of Hungarian corporate investment, the effect of the user cost was weakened by the aforementioned factors: the fall in the number and investment of new entrant companies, the high number of ageing and stagnant micro enterprises, the deterioration in market conditions for the companies producing for the domestic market and concentration, as a result of which the volume of aggregate investment may be affected even by a few especially large projects.

3-2. Box
THE USER COST OF CAPITAL

The user cost of capital (hereinafter referred to as the 'user cost') is a rate of return on capital implying the rent of a unit of new capital good. User cost plays a central role during the optimisation of corporate investment decisions because in the course of profit maximisation, *inter alia*, the price of capital as a factor of production must be produced.

The user cost is determined by the following factors: the cost of funds (own or external funds), the price change of physical capital, the relative price of capital compared to output, as well as depreciation, as it matters how long the given capital good takes part in the production, and how the price of the good changes during its involvement in production. In addition, the effective tax rate reduces the user cost, as the cost of external funds is accounted for by enterprises to the debit of pre-tax profit, thus reducing the tax base.

For the estimation of the used cost, the following formula is taken as a basis (see, for example, Kátay – Wolf, 2004):

$$UC_i = P_i\left(\frac{E_i}{V_i}\times r_E + (1-\tau_i)\times\frac{D_i}{V_i}\times r_D - \Delta P_i + (1-\tau_i)\times\delta_i\right)/((1-\tau_i)\times VAPI_i)$$

where i indicates the company, P_i is a sector-specific investment price index, E indicates the company's equity capital, D means the external funds, and V denotes all funds of the company, τ_i is the effective tax rate, δ_i is depreciation, which increases the user cost through the wear and tear of the capital good. $VAPI_i$ indicates the price index of the value added. The percentage change in the price of capital is denoted by ΔP_i ; it correlates negatively with the user cost. The average interest cost of disbursed forint loans is indicated by r_D, adjusted for risk on the basis of size, based on available surveys concerning SMEs (MNB 2013). In the case of large companies – due to lack of other information consistent with the other size categories – we took into account the risk premium of medium-sized companies that have the best ratings. Of course, domestic lending is not covered completely by the forint loans granted, and at the same time, unfortunately, we do not have reliable information on the company-level ratio of FX loans; therefore, the cost of external funds is approximated with forint loans. The required rate of return on equity is indicated by r_E, calculated on the basis of the one-year benchmark government security yields, also adjusted for risk by company size.[40] From the user cost estimated at company level, we calculate an aggregate average user cost;[41] this is shown in Chart 3-18.

REFERENCES:

Kátay, G. – Wolf, Z. (2004): Investment Behaviour, User Cost and Monetary Policy Transmission – the Case of Hungary *MNB Working Paper,* 2004/12.

Magyar Nemzeti Bank (2013): Trends in Lending, May 2013, *MNB publication.*

Reiff, Á. (2010): Firm-level adjustment costs and aggregate investment dynamics – Estimation on Hungarian data *MNB Working Paper,* 2010/2.

40 The cost of equity was adjusted for the size-specific risk and the market risk premium, thus the cost of equity is higher than the credit cost not only because of the effect of the tax shield (i.e. the 1-τ).

41 The aggregate user cost was interpreted as the simple average of the corporate user cost. The estimation was also conducted for the user cost weighted by capital, which showed a similar trend over time. However, based on the literature and our own estimates there is no definite weighting methodology, and at the same time, in the case of weighting by capital, due to composition effects the results were contradictory in the case of the breakdown by company size.

4 Changing global production trends and Industry 4.0

In the past decades, emerging countries have made an increasing contribution to global industrial production, primarily due to the Chinese economy's export-oriented growth model, built on foreign direct investment, cheap labour and on the application of foreign advanced technology. In parallel with China's progress, the contribution of advanced economies to global industrial production dropped, and the sector's weight within GDP typically fell.

In the case of the European economies, a shift towards production with higher value added may serve as a response to the challenges posed by the emerging economies and the relative of the industry in the past period. Among the European countries, the real economy importance of industry is still high in Germany and in the CEE countries. The German economic strategy, formulated with a view to preserving the competitiveness of the sector, aims at making the economy comply with the new requirements by focusing on the stimulation of technological progress and innovation.

The key point of the German economic strategy is Industry 4.0, the purpose of which is to prepare German industry for the changing production processes by the more focused application of the advanced technological achievements and procedures (digitalisation, cyber-physical systems, Big Data). The basis of the concept is that machinery and equipment, as well as the manufacturing units participating in the production and the suppliers – i.e. the entire real economy – are integrated in an intelligent information system. As a result of the robotisation and the higher complexity of the production processes, the role of education, vocational training and data protection gains importance. The application of new technology may result in changed consumer expectations and may thus also alter corporations' product development and innovation activity. The technological solutions coming the forefront of Industry 4.0 may fundamentally change companies' operation and transform the production chain.

Hungary joining in these changing value chains essentially depends on the preparedness of the country. The support of the appropriate technological infrastructure and of the research and development activities, as well as the alignment of the education and training system with the new requirements, may greatly contribute to the technological changeover of Hungarian production. The wider use of robotisation and digitalisation may put the emphasis of labour force substitution, which increases the importance of mobility between sectors on the labour market. On the other hand, the transformation of the production structure generates higher demand for certain skills, qualifications and jobs.

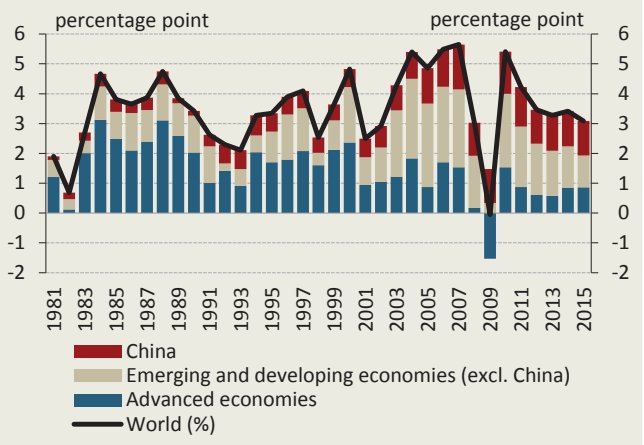
Production with higher value added entails an increase in the importance of the service sector. Services connected to production and the end-product significantly enhance corporations' value-creating capability. The competitiveness of the domestic industry may be strengthened by increasing the domestic value added content of manufactured exports, which may be supported by raising the domestic, complex service content of exports. The easing of corporate duality, development of the domestic supply chain, as well as the higher innovation and service performance of the SME sector may contribute to enhancing the Hungarian economy's value-creating capacity.

4.1 Global production processes and challenges in the past decades

Since the 1980s, for almost two decades the advanced economies dominated developments in global GDP, which was also influenced by various structural factors. The accelerating world trade, resulting from the reintegration process that followed the political transitions of the CEE countries and the continuous expansion of the European Union, as well as the broadening of the global value chains both had a positive impact on the performance of the advanced economies. The information and communication technology progress in the 1990s facilitated the growth in value chains, and thus supported the increase in GDP through improved economies of scale and productivity.

In recent decades, the global economy was restructured, and higher growth performance was increasingly a characteristic of the emerging and developing countries. China's export-oriented growth strategy is a determining structural factor, which was at its peak particularly in the years after accession to the World Trade Organisation (2001). Since 2001, the Chinese economy has expanded at a rate of over 9.5 per cent annually, substantially outstripping the growth rate of the developed countries. The global economic crisis primarily impacted the performance of the advanced economies, and thus in recent years China's contribution has become increasingly important in global GDP growth (Chart 4-1).

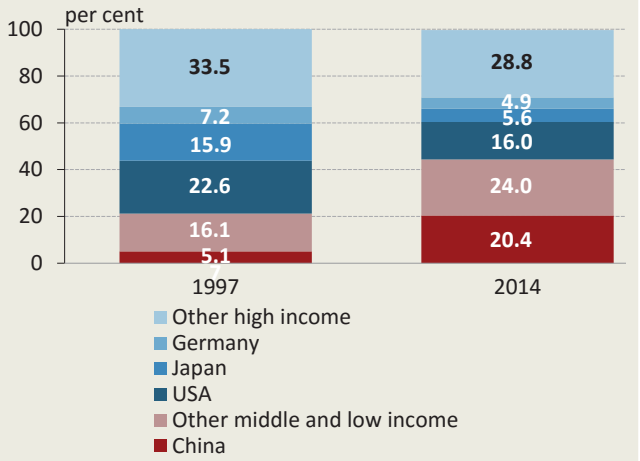
Chart 4-1
Contribution to the annual change in global GDP



Source: IMF, MNB calculation.

As a result of the growth model dominated by foreign direct investment (FDI), cheap labour force and copying advanced foreign technology, the economic growth of the country accelerated substantially. China's outstanding economic performance related primarily to the rebound in construction and industrial output in recent decades. As a result of the expanding production of emerging countries, their weight rose considerably in global industrial production (Chart 4-2). **China's industrial value added accounted for more than 20 per cent of global output in recent years, which is an almost fourfold rise compared to the end of the 1990s.**

Chart 4-2
Global distribution of industrial value added



Source: World Bank.

As a result of economic development process, the weight of agriculture and the industrial sector usually continuously decreases, while the importance of services increases (Herrendorf et al. 2014). Thus, the decline in the industry of countries of high income status in recent decades is a natural process to some extent; however, the emerging countries, competing with low wages, pose extraordinary challenge for the industrial competitiveness of the advanced economies.

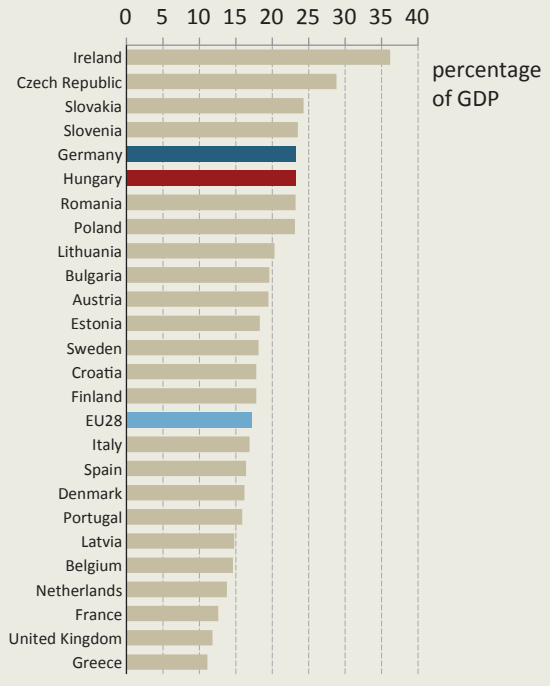
On the other hand, the decrease in the economic importance of industry can be observed not only in the advanced economies. Rodrik (2016) reminds us that, contrary to the theories of economic transformation, **since the 1980s the share of industry has been substantially decreasing in most of the emerging economies as well,** both within total production and the number of

employees. In parallel with this, the role of services has increased significantly in the very same economies.

The author defines the phenomenon as "premature deindustrialisation", which is explained primarily by the poor interest enforcement ability of the emerging economies in global trade, their appearance in the world market with less competitive industrial goods, and the spontaneous importing of developed countries' deindustrialisation processes. The decrease in the importance of industry may be disadvantageous in this phase of economic development, as the manufacturing sector can be regarded as the most dynamic economic sector with the highest growth potential (Rodrik (2013)). As a result of this, **premature deindustrialisation may also substantially hinder the prospects of convergence.**

The relative decline of industry takes place to varying degrees and speeds in the individual economies. Depending on the country-specific features and the different industry policies, differences in the economic importance of industry can be identified even in the case of the European countries. The industry of the United Kingdom, France, the Netherlands and Belgium lost importance to a significant degree in recent decades, with their weights at below 15 per cent of GDP. However, the industry of the largest European economy, i.e. Germany, and that of Hungary and the countries of the CEE region still account for almost 25 per cent of gross value added (Chart 4-3).

Chart 4-3
Share of industry in the GDP of EU countries in 2015



Source: Eurostat.

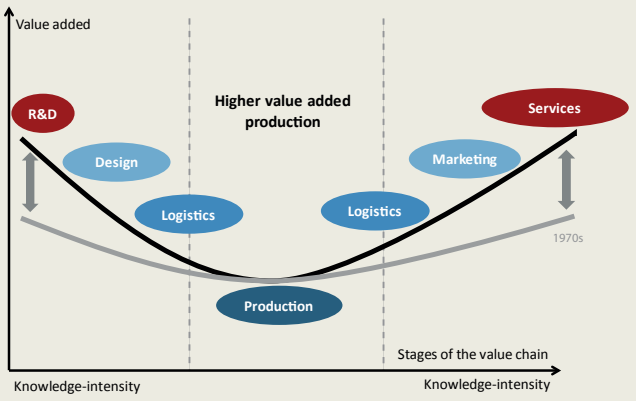
In the case of the European economies, a shift toward production with higher value added may serve as a response to the challenges posed by the emerging economies and the relative deterioration of industry in the past period. **With a view to preserving the competitiveness of the industrial sector, strengthening innovative capacity and restructuring the production system may appear as primary goals.** The commitment of the European Commission to raising the share of industry in GDP to 20 per cent also aims at stopping European deindustrialisation.

However, the growth model based on factor utilisation – characterising the emerging countries belonging to the medium income status – is no longer satisfactory when approximating or reaching the high income status (Perez–Sebastian (2007)), and thus the model cannot be applied to most of the European countries. The advantages resulting from the labour cost usually run out with the restructuring of the economy upon reaching the high income status, and with the utilisation of the surplus labour force outflow from the sectors of lower productivity (agriculture) competitiveness typically declines through the rise in the real wage dynamics (Agenor–Canuto (2012)).

Accordingly, **in the case of the European countries maintaining persistently fast economic growth may be feasible primarily by raising productivity and stimulating innovation.** Based on international experience, the shift toward high-value services, investment in advanced infrastructure, the protection of ownership rights, the accumulation of human capital of appropriate quantity and quality and the high importance of high-tech export may all result in the rise in domestic productivity (Eichengreen et al. (2012), Aiyar et al. (2013)). Diversification toward production with higher value added and services may also support competitiveness and the external shock absorbing capacity (OECD (2014)).

Baldwin (2012) and Koopman et al. (2014) also emphasise the link between the global value chains and value added, which is depicted by a U curve. Based on these, the **activities with the highest value added are at the beginning and the end of the production chain.** In the beginning of the value chain, i.e. during the research and development and planning, substantial value added is generated; thereafter production takes place with the generation of relatively low value added, while the services related to the distribution and the product also represent higher value added (Chart 4-4).

Chart 4-4
Value added generated in the value chain



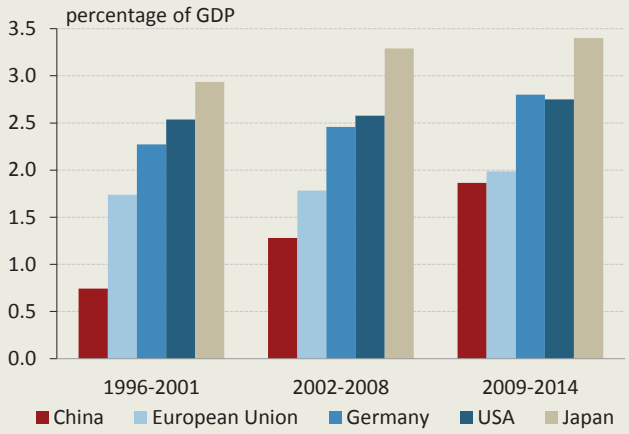
Source: Based on Baldwin (2012).

According to Ye et al. (2015), **the advantages of participation in the international value chains depend on whether the given country is in the high or low end of the value chain in terms of value added.** The developed countries typically join the process at the higher value added parts of the production chain – i.e. in the area of R&D, branding, services and logistics – while the emerging countries participate primarily in the production and assembly, representing lower value added.

The accumulation of human capital of adequate quality and quantity, and the support of research and development are essential to expand domestic innovation capacities. The rise in innovation performance may increase the output of the economy through the performance of the more productive sectors possessing more advanced technology, and through the positive externalities (spread of know-how, higher qualifications).

The precondition of activities requiring high innovation capacities (digital infrastructure, human capital) is strengthening research and development. In past decades, research and development expenditures in the developed countries were steadily around 2-3 per cent of GDP, which – even despite the substantial growth in Chinese expenditures – still exceeds the ratio characterising the emerging countries, and thus this spending may represent a competitive advantage in stimulating innovation activities (Chart 4-5). In case of Hungary research and development expenditures are 1.3 per cent of GDP at present.

Chart 4-5
Changes in research and development expenditures



Source: World Bank.

Apart from increasing expenditures, supporting R&D can be achieved by improving the efficiency of this spending, the cooperation of the state and the private sector, as well as by the alignment of education and training with the new requirements. According to Agenor et al. (2012), there is two-way causality between innovation and education. Real wages will not increase to an adequate degree, if the innovative sectors are short of a qualified workforce. As a result of this, there will be no sufficient motivation for obtaining the necessary skills and qualifications, and thus for the investment in education.

The maintenance of the industry's competitiveness through technological progress and innovation appears as a requirement primarily in those countries where the sector still has a substantial weight. **Of the European countries, the share of industry in GDP is still relatively high in Germany and Hungary, and thus the approximation of the industry policies to the new requirements is of outstanding importance.** German industry policy was the first to formulate the modernisation of the industry and the alignment thereof with the new requirements as a strategic goal.

4.2 The German economic strategy and Industry 4.0

Global knowledge and technological competition appear in parallel with the change in industrial production. In addition, the economies must provide adequate responses to the problems of resource utilisation, climate change and social changes. The application of new technological and innovative solutions for the efficient management of these new challenges is essential, and these days the primary area of their use is industry and the IT sector.

Germany was one of the first to announce programmes that support technological progress and the stimulation of innovation, the primary goal of which is to preserve and strengthen the leading role of the German economy in the respective areas. At present, German industry is among the most competitive and most innovative; the German economy is in the vanguard of R&D expenditures, the application of innovative manufacturing technologies and the control of complex industrial processes. In addition, the country has a considerable knowledge base in the area of embedded systems, automation and information technology. An additional advantage of the German economy is that, in contrast to other industrial countries, it preserved its stable manufacturing labour force, and meanwhile gradually integrated the technological innovations in its industrial production (GTAI (2014)).

In addition to the present favourable technological maturity, the attainment of a leading position by Germany is also facilitated by the strategic plans announced in recent years. The first major, national initiative was the *High-Tech Strategy* programme announced in 2009 to simulate innovation and technological progress. Within the framework of the programme, an annual amount of EUR 4 billion was provided for state-of-the-art technological development and as a result thereof the private sector's R&D expenditures rose by 19 per cent in three years, and the number of technological researchers and experts also increased (BMBF (2010)). The level of GDP-proportionate R&D expenditures also rose, and at present it is close to 3 per cent, which is one of the objectives of the *Europe 2020* strategy (BMWi (2015)).

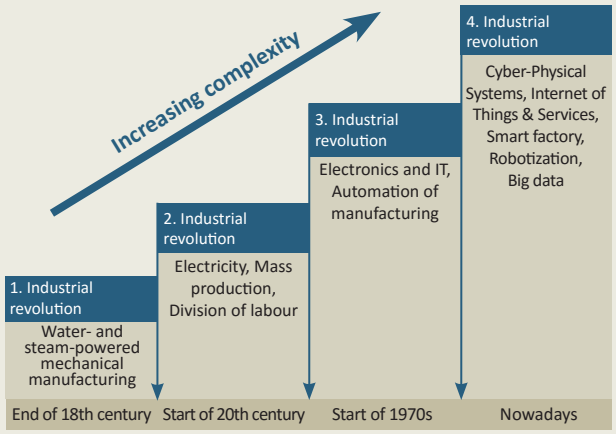
To continue the strategy, the German government also launched additional comprehensive programmes (*High-Tech Strategy 2020, New High-Tech Strategy*), the primary goal of which is to strengthen Germany's leading position in the high-technology industry, innovation, internet-based production and in services. The programmes intend to encourage the application of scientific and technological solutions in the next decade in five areas, i.e. energy, healthcare, mobility, security and communication. The strategy pays special attention to stimulating enterprises' innovation activity, the regional, national and international cooperation of science and industry, the support of the SME sector, the provision of qualified labour supply and the social commitment to technological development. The *Industry 4.0* concept takes a primary position among the objectives.

4.2.1 INDUSTRY 4.0

The purpose of Industry 4.0 is to prepare German industry for the changing production processes by more intensively applying digitalisation and cyber-physical systems. The concept, first formulated by the German government, refers to the fourth industrial revolution, and to the measures taken in response to the challenges thereof. The title also suggests that the technological progress seen these days may generate similar substantial transformation in the industrial production as the inventions that gave rise to the industrial revolutions of past centuries.

The industrial revolutions were always founded on major technological innovations, which caused considerable changes in the production processes and made a great contribution to social transformation. The first industrial revolution was launched by the appearance of steam and water-powered machinery at the end of the 18th century, which caused a substantial shift from agriculture-based economy to production with mechanical methods. This was followed, in the beginning of the 20th century, by the revolution of electricity, mass production and labour division, which facilitated the development of the manufacturing industry. The third industrial revolution commenced in the 1970s and the development of electronics and information technology facilitated the spread of industrial automation, thereby generating significant efficiency growth in production (Chart 4-6).

Chart 4-6
Industrial revolutions and their key achievements



Source: Based on Acatech (2013).

In the technological progress of our days, digitalisation and automation still play a key role; however, according to the World Economic Forum, the process can be clearly separated from the previous years' technological innovations due to its speed, wide coverage and impact. The significance of the process is evidenced by the fact that it covers a number of areas in addition to industry, as the new technological achievements may appear e.g. in the area of services, data protection, education of labour force, business models and product life cycles, thereby generating both social and economic impacts (WEF (2016a)).

The basis of Industry 4.0 and the fourth industrial revolution is that machinery and equipment, the manufacturing units and suppliers participating in production – and thereby the real economy – are integrated in a single, intelligent information system. The intelligent network thus created is the *Internet of Things, (IoT)*, where the participating units are able to communicate between each other (*machine-to-machine communication, M2M*), collect data, and after the processing of the information, to exchange data in the entirety of production and value chain, thereby linking the real and virtual world.

The connected equipment in the smart factories are able to control their operation, setting and the production conditions through the cyber-physical systems, creating a more flexible and cost efficient production structure. The application of the cyber-physical systems results in a substantial shift from centrally-controlled production to decentralised production. In the case of decentralised production, the production line is capable of creating the product and also communicating with it, which facilitates the fast conversion of the production, *bottom-up* production and customised mass production (GTAI (2014)).

In addition, it permits the proactive maintenance of machinery, equipment and production lines, and thus problems may be eliminated before failure, which contributes to increasing productivity and efficiency. The network solutions facilitate the connection and cooperation with customers and users by providing information on the product during the use thereof to the manufacturers, which in turn can better comply with the consumers' needs (McKinsey (2015)). As a result of the emerging vertical (within the factory) and horizontal (outside the factory) integration, the advantage of the smart factories compared to the former classic production units is that due to the real-time feedback they are able to save time, energy and costs (Acatech (2013)).

As a result of the above processes, the interrelated equipment, products, services, data and the user's systems (*Internet of Things, Services, Data and People*) fundamentally change industrial production. **The innovations and procedures of the fourth industrial revolution facilitate the acceleration of production processes, an increase in capacity utilisation and the optimisation of technical, human and natural resources** (Sogeti 2014). In addition, consumer expectations, the process of product development and innovation may be transformed, and the business models, supply chains and corporate organisational forms may also change (McKinsey (2015)). **However, the complexity of the system – in addition to its productivity and efficiency increasing feature – requires adequate skills from the companies.**

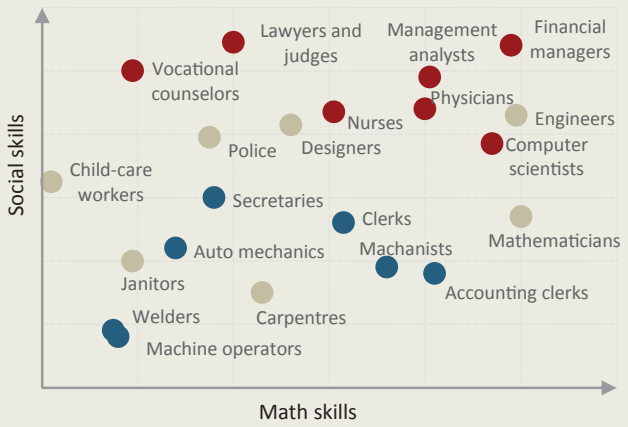
Due to its data and technology-intensiveness, the changing production poses challenges to companies such as the analysis, use and storage of large volume and complex datasets (*Big Data)*, IT security issues, protection of industrial know-how, the provision of proper knowledge base or the integration of digital data in the production processes. Furthermore, in the course of digitalisation the manufacturing plants must provide adequate analytical systems supporting the human-machine link (McKinsey (2015)).

In the fourth industrial revolution, the companies need a proper network infrastructure and a well-defined regulatory environment, as well as the application of standardised and benchmark manufacturing processes, which are indispensable for the cooperation of the manufacturing units (Acatech (2013)).

The impact of Industry 4.0 on the German economy may manifest itself in full over a horizon of 20 years, albeit it may also have a tangible impact in the next 5-10 years. According to the estimations, the strategy in the next ten years may support the growth of the German GDP by almost 1 percentage point annually, generating industrial investments worth EUR 250 billion and creating 390,000 jobs (BCG (2015)).

In parallel with technological progress, the world of labour has also changed in the past decades. Jobs requiring mathematical knowledge and social skills were both marked up, while the ratio of more labour-intensive jobs typically requiring lower qualification decreased (Chart 4-7).

Chart 4-7
Changes in jobs by skills between 1980 and 2012

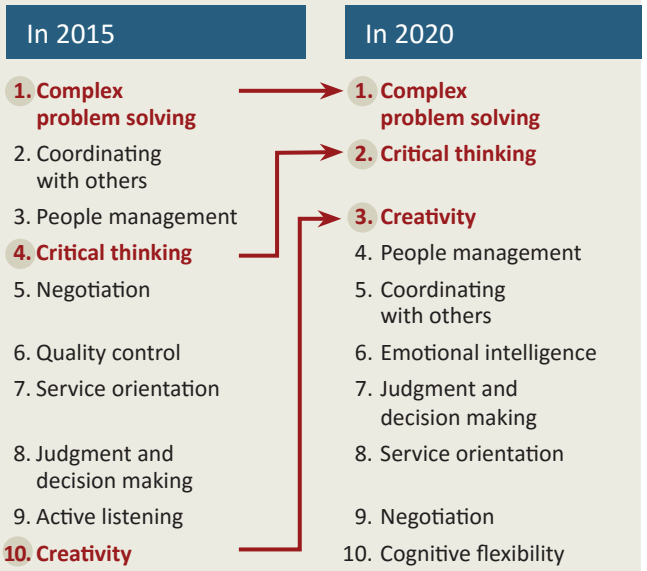


Note: Red: the employees' ratio increased, gold: no substantial change, blue: decreased.

Source: Based on Deming (2015).

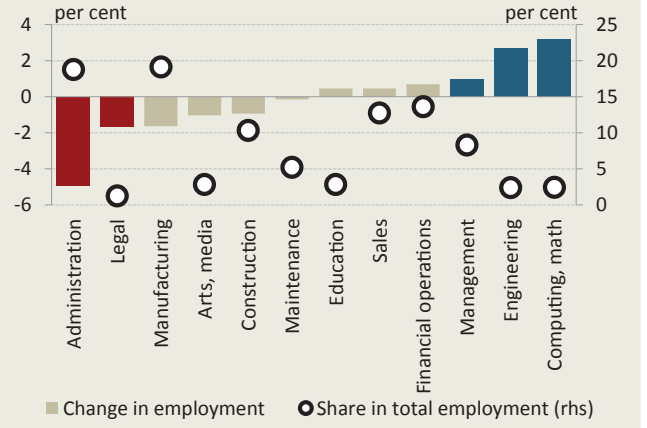
Industry 4.0 requires new types of skills and knowledge from employees. In addition to the knowledge necessary for the technological changes, critical thinking, creativity and complex problem solving also gained importance (Chart 4-8). As a result of the technological progress, current jobs may cease to exist, but new ones may also be created, primarily in hard-to-automate areas requiring higher qualifications. The development of the technology may result in rising employment in the case of IT, mathematical, engineering and management jobs at the global level, while the more easy-to-automate jobs (administration, manufacturing) may disappear in the coming years (Chart 4-9).

Chart 4-8
Transformation of skills required for employees



Source: Based on WEF (2016b).

Chart 4-9
Employment prospects by job types in 2015-2020



Source: WEF.

According to the World Economic Forum, 5 million current jobs may cease, but 2.1 million new ones may be created by 2020. As a result of robotisation and more complex production processes, it is also necessary to reshape the education, vocational training and enterprises' own trainings on a continuous basis (WEF (2016b)). The modernisation of production processes may intensify labour market tensions in the short run; however, by aligning the medium and long-term training and education with the new requirements, the more highly qualified labour supply and the changing labour demand will be balanced.

4-1. Box
CHINESE INDUSTRIAL STRATEGY – MADE IN CHINA 2025

The buoyant growth of the Chinese economy seen in recent decades was strongly attributable to the performance of the manufacturing sector, and thus the share of industry in GDP and the ratio of those employed in the sector remains significant. However, **China's manufacturing sector is characterised by low value added and labour-intensive production.** China is a global leader in the manufacturing and export of high-tech products, but due to its import-intensiveness this product group makes a relatively small contribution to the expansion of value added.

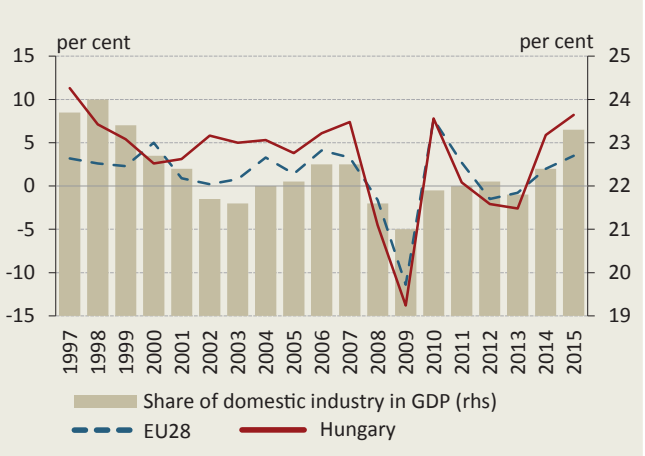
Similarly to many other countries, China also recognised the current technological changes that are shaping industrial production, and thus in 2015, as part of the 13th five-year plan, it launched the *Made in China 2025* initiative. **The objective of the programme is to create an innovative, sustainable and intelligent manufacturing sector built on quality and network integration,** which helps China become one of the major manufacturing economies by 2025, while in the decades thereafter it may further strengthen its position among the most important manufacturing powers. The initiative, similarly to the German Industry 4.0 strategy, puts emphasis on innovation and quality in Chinese industrial production, and its objective is to shift from low to high quality end products representing high value added (rather than to increase the volume), and to discontinue obsolete, less efficient capacities, while at the same time applying energy-efficient, environmentally-friendly solutions.

They wish to achieve the transformation of the production structure by promoting key innovative industries (e.g. new generation information technology, robotics, energy-efficient car manufacturing, modern rail, astronautic and electric equipment). **In addition to innovative production procedures, key areas also include increasing the ratio of related services and strengthening the companies' international presence.** The measures are supported by the establishment of innovation centres, the development of the industrial infrastructure, the setting of standards and the protection of intellectual property rights (HKTDC (2016)).

4.3 Industry 4.0 in Hungary

In recent years, Hungarian industry expanded at a rate far exceeding the average of the European Union, as a result of which the share of the sector within gross domestic product increased substantially (Chart 4-10). Hungarian industry, which is relatively significant even among the European countries, became a key growth determinant in recent years, in line with the rise in the number of people employed in the sector and the services related to industry.

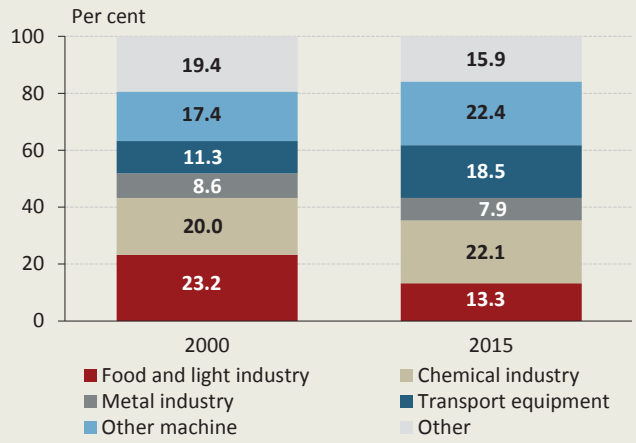
Chart 4-10
Annual change in industrial value added and its share in domestic GDP



Source: Eurostat.

The rise in industrial value added was primarily linked to the production capacities soaring as a result of the large vehicle industry investments of recent years, as well as to the domestic supply chain being created. The substantial increase in the domestic engineering industry is a trend that characterised the past decades. The weight of the subsector, which accounted for 29 per cent of industrial production at the millennium, rose to above 40 per cent by 2015, mostly related to the spread of the vehicle industry (Chart 4-11). In parallel with this, the importance of the food and light industries substantially declined, while the weight of mining and energy, representing a modest weight before as well, decreased further.

Chart 4-11
Structure of industrial value added

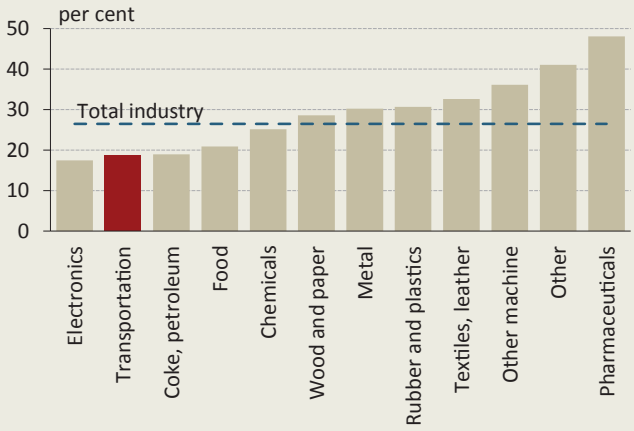


Source: Eurostat.

4.3.1 VALUE-CREATING CAPACITY OF DOMESTIC INDUSTRY

On the whole, the realignment within the structure of industry shifted towards the production of lower value added. In recent years, the value added per one unit of output was below 20 per cent in the vehicle manufacturing subsector, which fell significantly short of the light and pharmaceutical industries' value added content (Chart 4-12). Within the framework of Industry 4.0, the shift to the production of higher value added necessitates, in the case of the dynamically expanding subsectors (primarily the vehicle manufacturing), the development of production units and the advancing of domestic production units in the value chains.

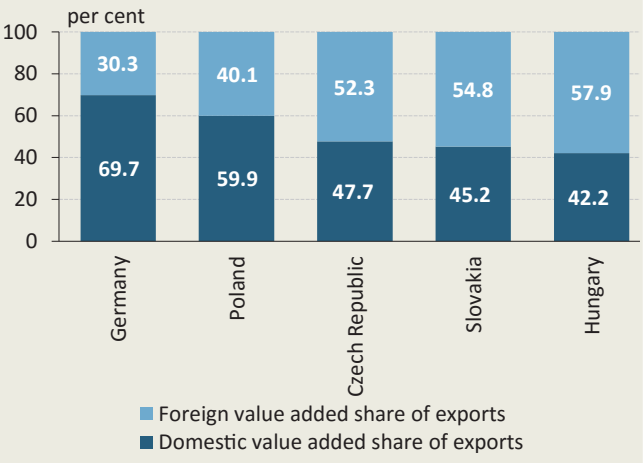
Chart 4-12
Value added per output unit in the industrial subsectors



Source: HCSO.

Hungarian industry typically produces for export, and thus the need for production of higher value added can be also identified in the export structure. In the case of our regional competitors, industrial products also have a dominant weight in exports, but the domestic production units make a higher contribution to production – and thereby to exports – than in Hungary. The competitiveness of industry and the exposure to external impacts are significantly influenced by the domestic value added content in exports. **In Hungary, the domestic contribution to the end-product is merely 42 per cent in the case of manufacturing export – the rest is added abroad – which lags behind the average of the CEE countries and Germany** (Chart 13). In the case of vehicle manufacturing, which raised its importance substantially in recent years, this ratio is even lower, i.e. of 100 units of vehicle industry exports only 39 per cent is produced in Hungary.

Chart 4-13
Domestic value added content of manufactured exports



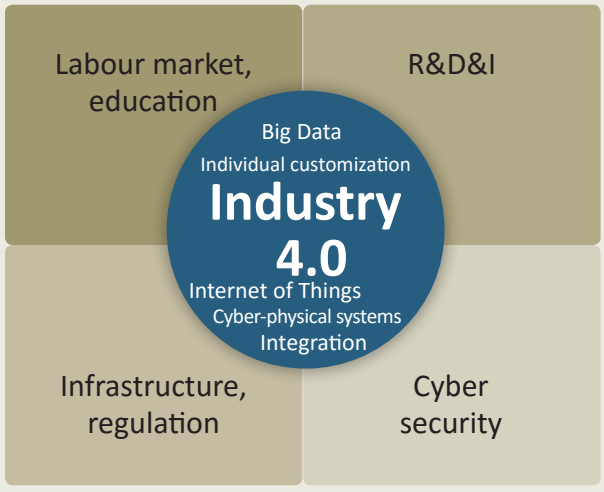
Note: Based on 2011 figures.
Source: OECD-WTO.

The maturity of the production and its exposure to external effects is strongly influenced by the performance of the domestic production units. On the one hand, the relatively high domestic value added content of export suggests that there is an advanced supplier network in Germany, and on the other hand, within the framework of Industry 4.0, it facilitates a shift towards production of higher value added.

The tighter connection with changing European production chains is determined by the country's preparedness for the new challenges. In Hungary, the relatively low contribution of the domestic production units to the end product, may represent a challenge in respect of belonging to the cutting edge of technology; however, Hungary's considerable integration in the European industrial production chains may facilitate the satisfaction of our export partners' – primarily Germany's – changing needs. Data related to domestic value added within exports are available for 2011, and thus they do not reflect capacities built in recent years and the expansion of the domestic supply chain.

Hungary's industrial competitiveness may be strengthened by a shift to production of higher value added. The more advanced processes, coming to the fore as part of Industry 4.0, require Hungary to be prepared for the challenges in the area of technology, labour market and the protection of intellectual property, which may be influenced by the economic policy (Chart 4-14).

Chart 4-14
Strategic areas in the development of domestic industry



Source: MNB.

Upward progress in the production chain may be achieved in Hungary primarily by creating intellectual products or by participating in the creation thereof. Since a major part of domestic output is for export, more marked participation in the early phases of the products' life cycle (R&D, planning) may raise the value added of the given production phase. Production with higher value added entails an expansion in services, and thus the **strengthening of the competitiveness of industry is also accompanied by a rise in the performance of the service sector.**

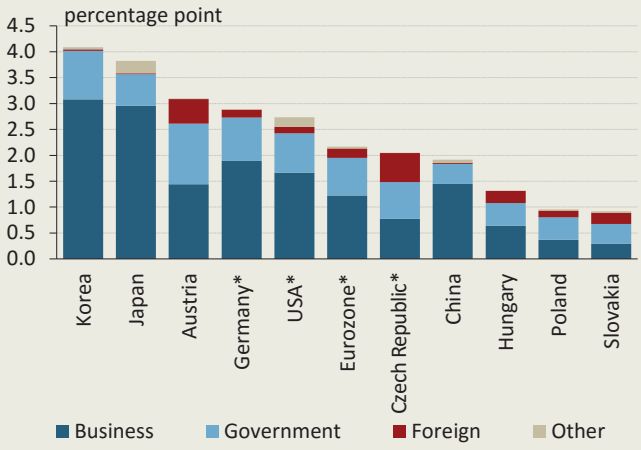
With the government's support of the R&D activities and by raising the innovation capacity of the companies, universities and research institutions, the domestic capacities may be able to live up to the expectations of the new production culture. The involvement of SMEs is of priority importance, and thus with the expansion of the sector's productivity, domestic suppliers may integrate more deeply in production chains, thereby raising the sectors' value creating capacity and mitigating its exposure to external impacts.

The changing production processes represent a challenge for the labour market and education. The new skills coming to the fore and the changing labour demand raise the significance of technological and scientific education, which may be addressed by the alignment of the education and training system with the new requirements. By enhancing the popularity of sciences as a possible career path and increasing access to higher education, economic policy may support the labour market changeover.

4.3.2 DOMESTIC INNOVATION CAPACITY

The basis of the shift towards production of higher value added and the meeting of the new challenges posed by Industry 4.0, is the stimulation of research and development activities, which significantly determines the innovation capacity of a country. **Based on R&D expenditures, Hungary lags behind the level of developed countries with major innovation capacity (Korea, Japan, Austria, Germany) and is close to the regional average.** In recent years, Hungary spent almost 1.5 per cent of GDP on research and development, which is only half of the 3-per cent target set in Austria's and Germany's innovation strategy (Chart 4-15).

Chart 4-15
Research and development expenditures by type of funding in 2013

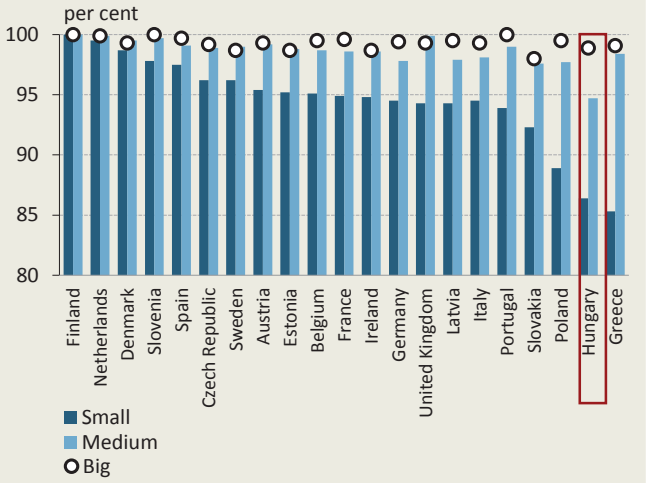


*Note:*Based on 2013 figures.*
In case of the eurozone, no data available for Cyprus, Malta, Latvia and Lithuania.
Source: OECD.

Technological progress and strengthening the domestic innovation capacity is largely driven by the R&D performed by the business sector, but cooperation between the state and the private sector, and the connection to the international knowledge networks is also crucial. Domestic research and development expenditures show a shortfall compared to the developed countries primarily in the business segment. Joining the production chains, which are being transformed as a result of Industry 4.0, requires higher innovation capacity from Hungary as well, which can be achieved by strengthening the enterprises' – particularly of the SME sector's – research and development activity and by cooperation between the research and corporate sectors.

Production with higher technological needs generates demand for advanced infrastructure and qualified labour force. The presence of the communication networks, the spread of information and communication technology, and the coverage of the mobile and internet networks essentially determine the possibilities of changing production. In European countries, large enterprises' access to broadband internet is typically close to full coverage, while there are major differences in the case of SMEs. In Hungary, in the case of the small and medium-sized enterprises there is a substantial lag in broadband internet coverage compared both to the CEE countries and the countries with the most advanced infrastructure (Finland, the Netherlands, Denmark) (Chart 4-16).

Chart 4-16
Broadband internet coverage by enterprise size in 2014



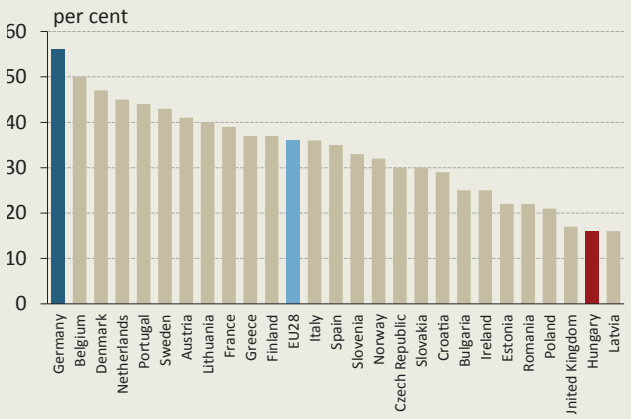
Source: OECD.

Digital infrastructure is the basis of the adaptation of the changing production technologies and the involvement of small and medium-sized enterprises in the production chains. Raising the SME sector's technological quality may facilitate connection to the supplier networks, which are changing as a result of Industry 4.0, and thus the production of these companies may increase, while the duality of the domestic economy may decrease.

In addition to the expansion of the infrastructure and research and development expenditures, enterprises' internal technological solutions are also of key importance. As in the case of international research networks, intra-company information flow also plays an outstanding role in the development of the new production chains. Despite the fact that the capacity of information flow between the functional areas typically increased in the European countries in recent years, there are still large differences between individual countries.

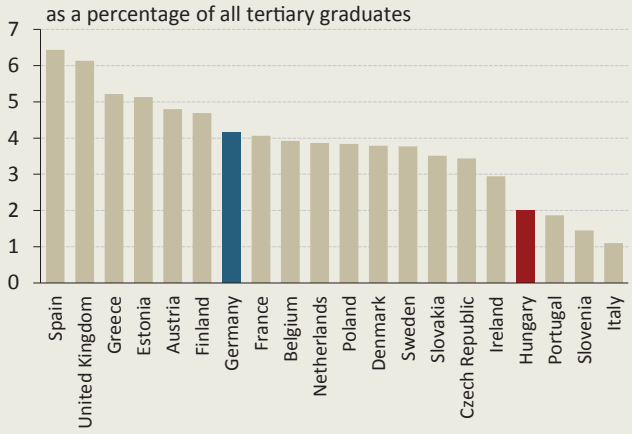
The internal information flow capacity in Hungary lags substantially behind that of the developed German companies and also of the CEE countries (Chart 4-17). The high preparedness of companies in Germany may ensure the leading role in the production chains which are changing as a result of Industry 4.0.

Chart 4-17
Ratio of enterprises with software supporting the flow of information between functional areas in 2015



*Note: *Based on 2014 figures.*
Source: Eurostat.

Chart 4-18
Ratio of information technology graduates in 2012



Source: OECD.

4.3.3 LABOUR MARKET CHALLENGES

In addition to developed infrastructure and enterprises' technological development, the quantitative and qualitative characteristics of the labour force also determine a country's innovation capacity. The production structure, changing due to Industry 4.0, poses challenges for countries' labour markets. The wider use of robotization and digitalisation may put the emphasis on labour force substitution, ousting part of the undertrained labour force from the labour market. Productivity, which may rise as a result of robotisation, increases enterprises' economic performance and sales revenues, and thus on the whole the application of the more expensive technologies does not lower profits in the medium term.

The technological changeover results in a decrease in jobs requiring low qualification and a rise in jobs requiring IT skills. The spread of technological achievements also poses challenges for the education system.

According to OECD (2016), in most of the examined countries the demand for information and communication technology skills rose in recent years, while the demand for appropriate skills still significantly exceeds the supply. The ratio of IT graduates in the total number of higher education students was around 2 per cent in recent years in Hungary, which is a lag compared to most of the European countries (Chart 4-18).

Information and communication technology skills is a basic criterion for the satisfaction of the new requirements arising as a result of Industry 4.0; however, the new production culture may also intensify demand for other qualifications. Complex problem resolution, critical thinking and creativity may lead the lists of the future labour market demands (WEF (2016b)), which highlights the role of domestic education and training in the changing production and labour market processes.

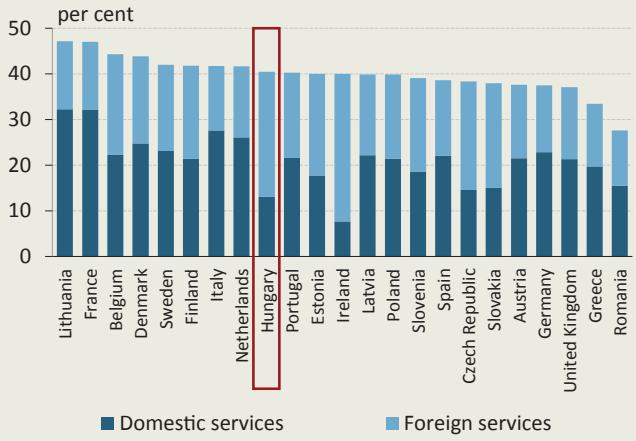
4.3.4 ROLE OF SERVICES

The shift towards production of higher value added entails the strengthening of the service sector. The higher service needs of the products to be manufactured, the adaptation of new technologies and the expanding innovation capacities all entail a rise in the significance of services. Accordingly, the production structure, changing in the framework of Industry 4.0, is fundamentally linked to the performance of the service sectors. Production-related services may increase the value added during the production process and through value-adding services related to the end product (business services, transportation, logistics) and also through repair and maintenance services linked to the product. The services linked to the end-product permit the creation of a long-term relationship between the manufacturer and the end user.

In Hungary, the service content of the exports' value added is around 40 per cent, which generally corresponds to the ratio observed in the developed European and CEE countries. **On the other hand, in contrast**

to most of EU countries, the share of domestic services is markedly low in Hungary (Chart 4-19).

Chart 4-19
Service content of value added in manufactured exports



Note: Based on 2011 figures.
Source: OECD-WTO.

Several studies emphasise the corporate advantages resulting from the provision of services, which may be allocated to three groups based on Baines et al. (2009). Services raise the enterprises' profitability, starting from research expenditure through the procurement of inputs and better organisation of human resources to making the industrial production more efficient. Since **the services are less sensitive to business cycles, revenues from the sales of these are more stable** (Borchert and Mattoo (2009)).

Secondly, companies may decide on the involvement of services in the production process considering strategic aspects. By differentiating their products by services that cannot be easily copied by the competitors, they may obtain competitive advantage. Thirdly, the sales considerations may also play a role in linking services to other products. Services facilitate the development of long-term customer relations (e.g. maintenance services).

According to the study of Crozet and Milet (2015), based on French corporate data, 70 per cent of manufacturing companies provided some sort of services in 2007, which increased further during the years. As a result of the services, companies usually become larger and more profitable, and thus they can broaden their product portfolio. The positive impact from the provision of services can be traced mostly at the smaller enterprises. In addition, services may also improve export performance. Typically, the manufacturing companies that also provide services become the largest exporters (Lodefalk (2013)) and services often provide enterprises with an opportunity to survive and grow (highly qualified labour force, sales revenue) (Bernard et al. (2016)).

Rariga (2016) examined the impact of external trade of services on the corporate performance using Hungarian corporate level data. Almost 10 per cent of the manufacturing companies export goods, and 1.5 per cent of them export goods and services, or services only.

According to the estimations, **a manufacturing company performs better if in addition to goods export it also participates in services exports.** Of the exporter companies those that also render services are typically large and more productive – also measured in labour productivity and total factor productivity – while the most productive companies are exclusively services exporters. The same applies to those manufacturing companies that use imported services for their production.

On the whole, the supplementation of the production process or the final product with services is becoming common practice at domestic companies. Those companies that also provide complex services and even sell abroad, are typically more productive, thus they contribute to the increase in the manufacturing sector's value added and competitiveness.

REFERENCES

Acatech (2013): *Recommendations for implementing the strategic initiative INDUSTRIE 4.0.* http://www.acatech.de/fileadmin/user_upload/Baumstruktur_nach_Website/Acatech/root/de/Material_fuer_Sonderseiten/Industrie_4.0/Final_report__Industrie_4.0_accessible.pdf

Agenor, P-R. – Canuto, O. – Jelenic, M. (2012): *Avoiding Middle-Income Growth Traps*. World Bank Other Operational Studies 16954, The World Bank.

Agenor, P-R. – Canuto, O. (2012): *Middle-income growth traps*. Policy Research Working Paper Series 6210, The World Bank.

Aiyar, S. – Duval, R. – Puy, D. – Wu, Y. – Zhang, L. (2013): *Growth Slowdowns and the Middle-Income Trap*. IMF Working Papers 13/71, International Monetary Fund.

Baines, T.S. – Lightfoot, H. W. – Benedettini, O. – Kay, J. M. (2009): *The servitization of manufacturing; a review of literature.* https://core.ac.uk/download/files/7/17192779.pdf

Baldwin, R. (2012): *Global supply chains: Why they emerged, why they matter, and where they are going*. CEPR Discussion Paper No. 9103, August 2012

BCG (2015): *Industry 4.0. The Future of Productivity and Growth in Manufacturing Industries.* http://www.zvw.de/media.media.72e472fb-1698-4a15-8858-344351c8902f.original.pdf

Bernard, A. B. – Smeets, V. – Warzynski, F. (2016): *Rethinking Deindustrialization*. NBER Working Paper 22114, March 2016.

Borchert, I. – Mattoo, A. (2010): *The crisis-resilience of service trade*. The Service Industries Journal, Vol. 30, Issue 13, pp. 2115- 2136.

Bundesministerium für Bildung und Forschung (2010): *Ideas. Innovation. Prosperity. High-Tech Strategy 2020 for Germany.* http://www.effizienzcluster.de/files/9/4/958_bmbf_high-tech_strategy_2020.pdf

Bundesministerium für Wirtschaft und Energie (2015): *National Reform Programme 2015.* http://ec.europa.eu/europe2020/pdf/csr2015/nrp2015_germany_en.pdf

Crozet, M. – Milet, E. (2015): *Should Everybody Be in Services? The Effect of Servitization on Manufacturing Firm Performance*. GSEM working paper series 15-10-2.

Deming, D. J. (2015): *The Growing Importance of Social Skills in the Labor Market*. NBER Working Paper No. 21473, August 2015.

Eichengreen, B. – Park, D. – Shin, K. (2012): *When Fast-Growing Economies Slow Down: International Evidence and Implications for China*. Asian Economic Papers, MIT Press, vol. 11(1), pp. 42–87, February.

GTAI (2014): *Industrie 4.0. Smart Manufacturing for the Future.* http://www.gtai.de/GTAI/Content/EN/Invest/_SharedDocs/Downloads/GTAI/Brochures/Industries/industrie4.0-smart-manufacturing-for-the-future-en.pdf

Herrendorf, B. – Rogerson, R. – Valentinyi, Á. (2014): *Growth and Structural Transformation*. Handbook of Economic Growth, Volume 2, Chapter 6, pp 855–941.

Hong Kong Trade Development Council (2016): *China's 13th Five-Year Plan: The Challenges and Opportunities of Made in China 2025.* http://economists-pick-research.hktdc.com/business-news/article/Research-Articles/China-s-13th-Five-Year-Plan-The-Challenges-and-Opportunities-of-Made-in-China-2025/rp/en/1/1X000000/1X0A6918.htm

Koopman, R. – Wang, Z. – Wei, S. J. (2014): *Tracing Value-added and Double Counting in Gross Exports*. American Economic Review, 104(2): 459-494.

Lodefalk, M. (2013): *Servicification of Manufacturing – Evidence from Sweden*. International Journal of Economics and Business Research, 6(1), 87-113.

McKinsey (2015): *Industry 4.0. How to navigate digitization of the manufacturing sector.* https://www.mckinsey.de/files/mck_industry_40_report.pdf

OECD (2014): *Perspectives on Global Development 2014: Boosting Productivity to Meet the Middle-Income Challange*. OECD Publishing. http://dx.doi.org/10.1787/persp_glob_dev-2014-en

OECD (2016): *New skills for the digital economy: measuring the demand and supply of ICT skills at work*. OECD Digital Economy Papers No. 258.

Perez-Sebastian, F. (2007): *Public Support to Innovation and Imitation in a Non-Scale Growth Model*. Journal of Economic Dynamics and Control, 31 (December 2007), pp. 3791–3821.

Rariga, J. (2016): *Service and Good Traders in Hungary. Comparative Analysis on Firm Level Data*. Manuscript.

Rodrik, D. (2013): *Unconditional Convergence in Manufacturing*. Quarterly Journal of Economics, Volume 128, Issue 1, pp. 165-204.

Rodrik, D. (2016): *Premature deindustrialization*. Journal of Economic Growth. Volume 21, Issue 1, pp 1–33.

Sogeti (2014): *The Fourth Industrial Revolution. Things to Tighten the Link Between IT and OT.* http://www.fr.sogeti.com/globalassets/global/downloads/reports/vint-research-3-the-fourth-industrial-revolution

World Economic Forum (2016a): *The Fourth Industrial Revolution: what it means, how to respond*. https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/

World Economic Forum (2016b): *The Future of Jobs. Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution.* http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf

Ye, M. – Meng, B. – Wei, S. J. (2015): *Measuring Smile Curves in Global Value Chains*. IDE Discussion Paper No. 530.

5 Pre- and post-crisis scenarios of finance-neutral economic growth

EXECUTIVE SUMMARY

In Hungary, following the crisis, there was a substantial decline in the private sector's loans outstanding even in an international comparison, while the disorders in the financial sector were mostly reflected by the fall in corporate lending. In the decade before the crisis, Hungary experienced excessive, unsustainable credit outflow to the private sector, and this debt-creating development carried major risks not only in terms of its extent, but also its structure. On the one hand, the prevalence of household foreign currency loans, and on the other hand, the corporate project financing also resulted in vulnerability and a substantial increase in non-performing loans outstanding in the post-crisis years.

Taken together, the excessive, unsustainable pre-crisis lending, and the post-crisis "syndromes" are clear signs of a structural imbalance. Lending developments may considerably intensify business cycles, both in their boom and bust phases, and thus the GDP observed may materially differ from the economy's actual growth capacity. However, this accelerator effect is not necessarily symmetric: the economic downturn or the deleveraging phase may exceed the economic surplus "won" in the rising phase. Thus, on the whole, the financial cycles may have significant economic cost.

The realisation of the risks had a significant impact on the long-term trend of domestic economic performance. In this analysis, we examine how sustainable indebtedness can be identified in different scenarios, and how the effect of the thus presumed financial cycle on economic growth can be measured using various methodologies. The period 2002–2015 is of suitable length and allows us to evaluate the pre-crisis and post-crisis economic impacts of the excessive lending using different methodologies. We identified unsustainable indebtedness in five different scenarios, where we examined the indebtedness of the private sector.

Based on the results, it can be seen that the excessive outflow of credit generated a significant asymmetry in Hungary during the almost one and a half decades under review. As a result of financial imbalances, the domestic economy expanded on average by 0.4–0.8 per cent faster between 2002 and 2008, but after the crisis, during the same timeframe, it lost on average growth of 1.1–1.4 per cent annually due to economic agents' deleveraging.

Thus, in the pre-crisis years economic growth was faster as a result of the outflow of credits, but after the crisis the domestic economy lost considerable growth potential. On the whole, the balance is negative. That is, as a result of the financial cycle, by the end of 2015 the volume of domestic GDP was 4-5 per cent lower than it could have been in the case lending practices with sound growth and structure. As regards the interpretation of the results, it should be noted that the above follows from the private sector's indebtedness, and thus the total effect on the economy, also considering public debt developments, may well be greater.

5.1 Introduction

In the period before the financial crisis, favourable economic growth in many economies was accompanied by an expansion in lending and the resulting increase in demand. Financial development and the expansion of financial integration that took place in the emerging countries during the two decades that preceded the crisis were typically identified as a process that made a positive contribution to the long-term growth (for a fundamental and empirical review see Levine (2005)). However, the literature did not reach a consensus on the unambiguously positive nature of capital flows in the emerging countries. On the one hand, the growth-supporting role of inflows of external funding is generally questionable in the case of converging economies (Prasad et al. 2007), while on the other hand, some of the studies also highlighted the risk of excessive foreign currency lending (Backé et al. 2006, Kiss et al. (2006)).

Accordingly, the impact of credit expansion, i.e. the increase in indebtedness, does not only have a long-term growth-supporting effect. Credit expansion may also have a substantial cyclical effect, which was typically underestimated before the crisis, while the rate of sustainable growth was systematically overestimated (Borio (2012)). The reason for this is that – beyond the analysis of factors of production and inflationary pressure – no great importance was attached to the **development of financial risks and financial imbalances.** However, in addition to or instead of financial deepening, considerable financial cycles, spanning over business cycles, developed. The financial imbalances significantly intensify both economic upturns and downturn, and thus the observed GDP may substantially differ from the economy's actual growth potential. **This financial accelerator effect is not necessarily symmetric, and thus the economic cost of financial cycles may also be significant on aggregate**, in which case the growth surplus "won" before the crisis is substantially less than the economic downturn suffered after the crisis.

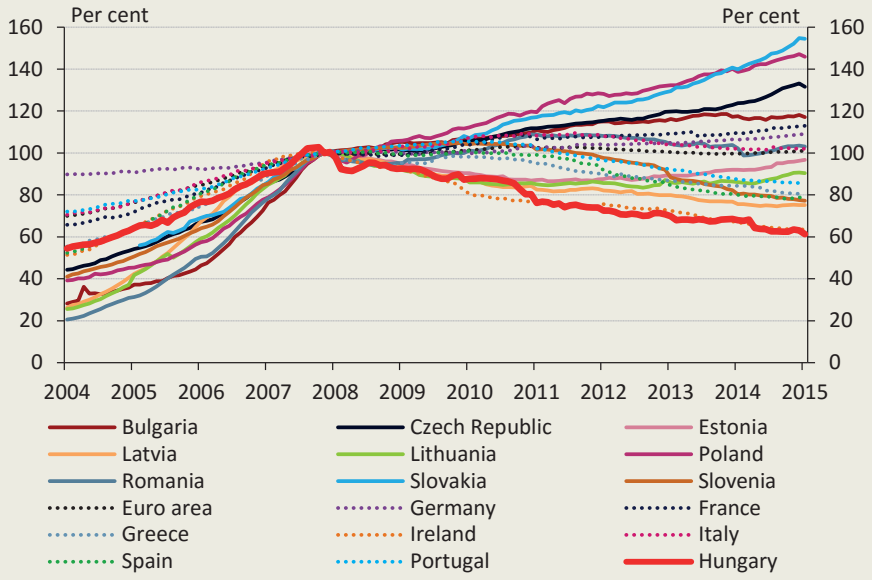
Rebalancing through deleveraging enforced by the financial crisis may also be a slow, prolonged process and **materially influence the rate and structure of a country's economic growth.** Between 2009 and 2015, Hungary experience substantial **deleveraging** in the corporate and household sectors, accompanied by a **major, prolonged cyclical downturn in recent years** through the decline in investment activity and the contraction of households' consumption expenditures. The purpose of this analysis is to examine, relying on existing methodologies, the magnitude of the economic impact generated by the **financial cycle in total, before and after the crisis**.

The period 2002–2015 is of **suitable length to allow us to evaluate** the pre- and post-crisis economic impacts of excessive lending **using different methodologies**. Dividing the period examined into two equal sequences (2002–2008 and 2009–2015), we examined **the build-up of the unsustainable indebtedness and the post-crisis deleveraging thereof.** Due to the methodological framework, the analysis covers only the review of the private sector's (households, corporations) indebtedness, and thus does not contain debt developments related to the general government.

5.2 Experiences FROM the domestic private sector's lending developments

After the crisis there was **a considerable decline**, even by international standards, **in the private sector's outstanding borrowings in Hungary.** The magnitude of the decline was similar to that observed in the countries suffering the strongest downturn, i.e. the Baltic States, and it **primarily affected corporate lending** (Chart 5-1). The credit contraction was of extraordinary magnitude despite the fact that there was no major credit expansion before the crisis, and on the whole, the indebtedness of the private sector was not outstanding in its extent (Fábián-Vonnák (2014)).

Chart 5-1
Outstanding loans to the private sector in an international comparison (October 2008 = 100 per cent)

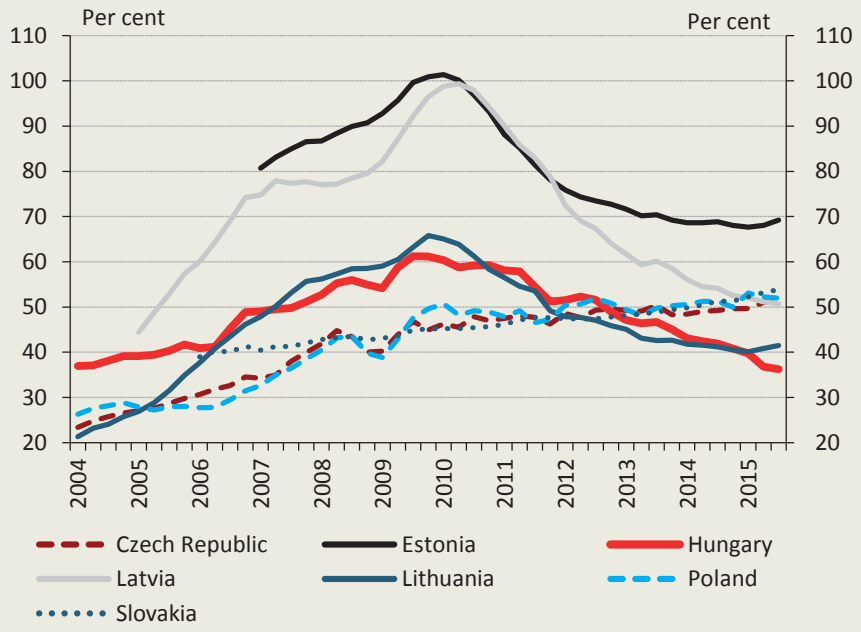


Source: ECB, MNB.

It somewhat qualifies the picture on Hungary's relative position, if we examine the indebtedness of the private sector as a proportion of nominal GDP (Chart 5-2). Although the relative indebtedness of the domestic private sector was characterised by a higher initial level than in the other Visegrád countries,[42] in the CEE region this cannot be described as an outstanding degree. In the Baltic States, which operate a currency board, we saw a much faster build-up in terms of dynamics and they reached a substantially higher credit-to-GDP ratio in term of its level as well. Nevertheless, the rate of deleveraging of the Hungary's private sector still resembled that of this latter group, while the relative indebtedness of the other peer countries continued to rise even after the crisis.

42 The so called Visegrád Countries consists of the Czech Republic, Poland, Slovakia and Hungary.

Chart 5-2
Private sector credit-to GDP ratios in an international comparison



Source: ECB, MNB.

The main cause of the downturn in lending, therefore, was not only the excessive lending that deviated from its long-term trend, but also the **unsound structure** thereof. The nature of this unhealthy development is primarily attributable to the fact that in Hungary lending in the 2000s was mostly built on external funding. As a consequence of this, i) on the hand, high-risk property project financing soared in the corporate sector, and ii) on the other hand, the spread of foreign currency lending to households considerably raised households' indebtedness (MNB (2015)).

After **the outbreak of the crisis**, the **unsound structure** of lending **intensified the risks arising from the earlier surge in lending,** and through the higher debt servicing burdens and the non-performing loans (NPL) it **contributed significantly to the decline in both credit demand and credit supply.**

While increased risks affected both household and corporate lending negatively, the **disorders of the financial sector were reflected, to a large extent, in the downturn in corporate lending.** The domestic banking sector was able to show **substantial adjustment** to the challenges of the crisis primarily in **corporate lending** (*deleveraging)*.

Between 2009 and 2013, loans outstanding in the corporate segment in Hungary shrank by 4-5 per cent on an annual basis, and while the contraction in lending typically ended in the fifth year after the crisis in most countries that had experienced a severe financial crisis, the loans outstanding of the Hungarian private sector were still declining in 2013.

The decline in corporate lending can be explained by both demand and supply factors; however, based on earlier research results (Sóvágó (2011)), **credit supply played a bigger role in that sense.**

Thus, Hungary's relative position is unfavourable in an international comparison, whereas poor credit supply was identified as key cause of credit contraction. However, in the peer countries of the region, i.e. **the other Visegrád countries, after a relatively fast adjustment, credit expansion could be observed as early as from 2010.** The Visegrád countries may serve as an appropriate benchmark, because in a number of structural aspects they feature **similar parameters as the Hungarian economy** (e.g. similar initial economic maturity, strong economic integration with the European Union). On the other hand**, before the crisis the V3 countries were characterised by lower indebtedness and greater financial balance,** and thus the deleveraging need was also smaller following the crisis.

The external and internal balance indicators of the V3 countries were characterised by a larger degree of sustainability. In their case, households were not extraordinarily indebted, as these economies are typically characterised by households with a high propensity to save, and the banking system's loan-to-deposit ratio also did not rise to unprecedented heights. In terms of proportions, foreign currency lending was not too widely spread, and due to the lower indebtedness of households, these countries were, on the whole, characterised by lower external debt and were thus less vulnerable. Due to these characteristics, we find their indebtedness indicators suitable for identifying the impacts that the financial imbalances of the Hungarian economy had on economic growth.

In the following, relying on multiple methods, we examine how Hungarian real **economic growth would have developed had the indebtedness of the domestic private sector (households and non-financial corporations) been characterised by sustainable and balanced dynamics.** The lending policies of the Visegrád countries and the estimation results that capture the tightness of the credit supply and their impact on economic growth serve as a basis for the analysis.

In our analysis, we employed the following scenarios, using different methodologies, to quantify the economic impacts of the lending cycle:

1. Long-term indebtedness without credit gaps in the concerned sectors;
2. Benchmark lending dynamics of the Visegrád countries;
3. Finance-neutral credit supply calculated on the basis of the Financial Conditions Index (FCI);
4. Lending developments without household foreign currency loans and corporate project financing;
5. Economic growth preserved by aggregate financial balance (finance-neutral potential output)

Below, for each scenario, we first quantify the economic impact arising from the financial cycle and then using this impact we try to determine a consensual interval to establish the **extent of the economic cost generated by the excessive lending cycle of the pre-crisis period in Hungary.**

5.3 Analysis of the individual scenarios capturing the lending cycle

5.3.1 EQUILIBRIUM INDEBTEDNESS WITHOUT CREDIT GAPS IN THE INDIVIDUAL SECTORS

Using a multivariate HP filter, Hosszú et al. (2015) decomposed the corporate and household credit-to-GDP indicators into a trend and a cycle, which can be used to generate a structural credit gap indicator. The trend-cycle decomposition includes, as control variables, the economic indicators that have an effect on i) the deviation of the actual indebtedness from its long-term trend, and ii) on the magnitude and development of the trend. Thus it reflects, among others

i) the long-term relation between lending and GDP;

ii) the long-term relation between household lending and wage income;

iii) short-term relation between lending and monetary conditions (loan interest rates, interbank rates);

iv) short-term relation between lending and banks' risk taking (leverage, loan-to-deposit ratio, marketing costs);

v) other short-term relations between lending and the cyclical position of the economy (output gap, global credit gap, business confidence indices).

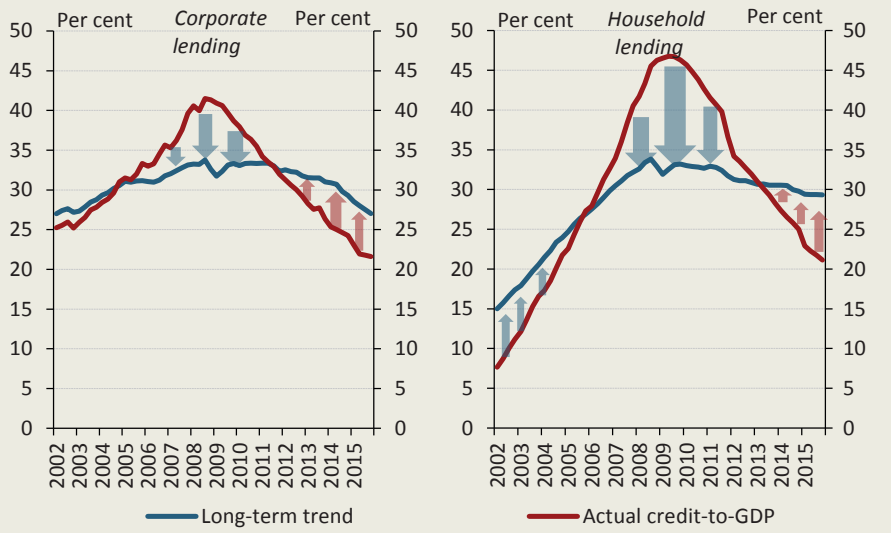
Accordingly, the **trend-cycle decomposition** obtained as a result of the estimation **decomposes the private sector's indebtedness level into a finance-neutral or, in economic terms, sustainable and a cyclical component.**

The obtained trend shows a seemingly contradictory decrease in indebtedness in both sectors. However, this does not necessarily mean that private sector lending declines in the equilibrium state. According to their relationship, this may be equivalent to **lending developments slower than the nominal GDP**. This may materialise in Hungary as well, as this **trend-cycle decomposition** captures the long-term trend not of the whole economy, but that of the **lending developments of the domestic private sector.**

In the case of Hungary, after the onset of the crisis the fall in aggregate demand resulted not only from the high indebtedness of the sector, but also – being a small, open economy – from **the depreciation of the domestic currency, the deceleration in the inflows of foreign direct investment and the cut in government expenditures** (MNB (2014)). **Therefore, the credit demand of households and corporations relying on domestic demand may also decrease irrespective of their indebtedness**, while the export sector, which typically uses external funding, accounted for the dominant part of domestic GDP up until 2015 (MNB (2016)).

In this scenario, we assume that both corporate and household lending was finance-neutral before and after the crisis (Chart 5-3).

Chart 5-3
Trend-gap decomposition of the corporate and household credit-to-GDP ratio



Source: MNB.

We quantified the impact of corporate and household lending on GDP based on our previous modelling results, according to which the **lending surplus is channelled into GDP growth through corporate investments** (Tamási-Világi (2011)) and **household consumption** (Endrész et al. (2014)). Accordingly, we quantified to what extent corporate investment, in the first case, and the volume of household consumption, in the latter case, would be smaller/larger as a result of lower/higher lending before/after the crisis, and we then converted these into volumes of GDP. Based on the above, in this scenario we obtained the following average economic impacts, before and after the crisis.

Table 5-1
Average impact of alternative indebtedness on the GDP growth rate before and after the crisis (Scenario 1)

	2002–2008	2009–2015
Impact on GDP through corporate lending	-0.6%	1.1%
Impact on GDP through household lending	-0.3%	0.3%
Total effect on GDP	**-0.8%**	**1.4%**

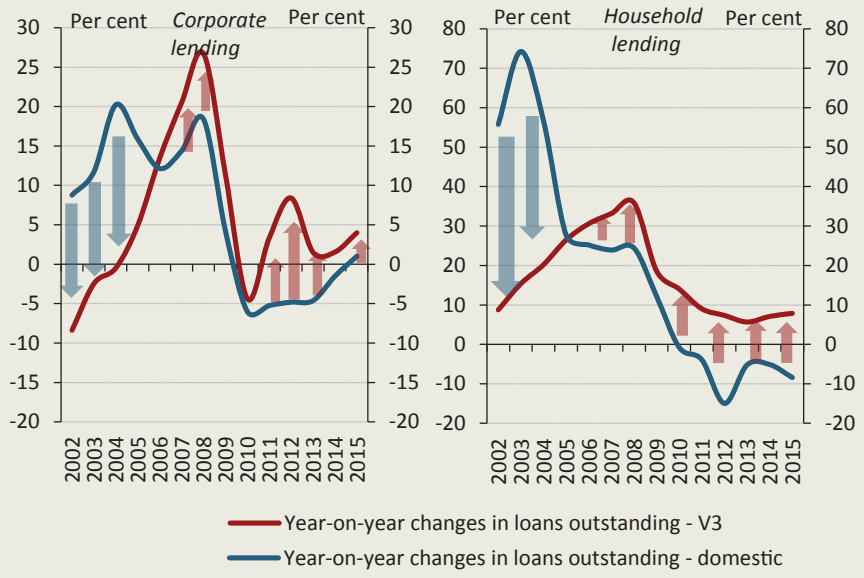
Source: MNB.

Thus, according to the above, the **GDP annual growth rate could have been lower in the pre-crisis year on average by 0.8 per cent**, while **after the crisis on the whole it could have been higher by 1.4 per cent** (Table 5-1).

5.3.2 BENCHMARK LENDING DYNAMICS OF THE VISEGRÁD COUNTRIES

In this scenario, we take as a benchmark the lending dynamics of the V3 countries characterised by a higher degree of external and internal balance. We examine how lending and GDP growth would have developed, had the domestic lending developments **followed the credit dynamics of the Visegrád countries that maintained their financial balance to a greater degree.**

Chart 5-4
Annual changes in corporate and household loans outstanding in the V3 countries and Hungary



Source: MNB.

The lending dynamics of the two sectors may be characterised similarly to what has been observed in the Visegrád countries. **At the beginning of the 2000s, there was a substantial expansion in Hungary both in corporate and household lending** (but in an unhealthy structure), while **the benchmark countries were characterised by slow upturn**, whereas in the post-crisis years we typically observed growth (Chart 5-4).

We quantified the impact of corporate and household lending on GDP similarly to the previous methodology. Based on the aggregate results, in this scenario we obtained the following average economic impacts, before and after the crisis.

Table 5-2
Average impact of the alternative indebtedness on the GDP growth rate before and after the crisis (Scenario 2)

	2002–2008	2009–2015
Impact on GDP through corporate lending	-0.5%	0.9%
Impact on GDP through household lending	-0.2%	0.3%
Total effect on GDP	**-0.7%**	**1.2%**

Source: MNB.

Compared to the economic growth rate obtained in the previous scenario, we can draw similar conclusions. According to this scenario, **the pre-crisis growth rate would have been 0.7 per cent lower**, while **domestic GDP would have risen on average by 1.2 per cent faster** had the credit dynamics seen in the Visegrád countries materialised in Hungary as well (Table 5-2).

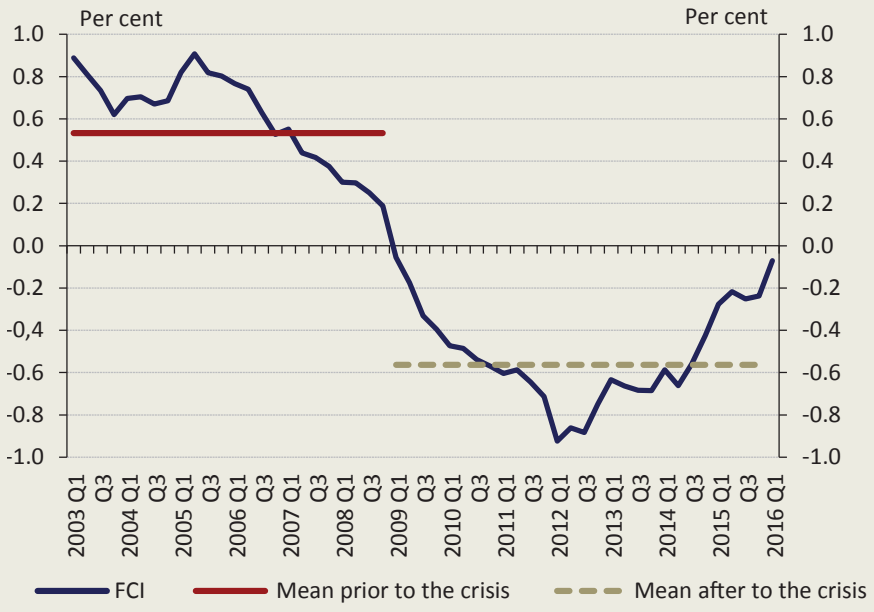
5.3.3 FINANCE-NEUTRAL CREDIT SUPPLY CALCULATED ON THE BASIS OF THE FINANCIAL CONDITIONS INDEX (FCI)

In our previous analyses, **we identified the tightness of credit supply as the primary cause of the** domestic **credit contraction**. One of the relevant indicators is the Financial Condition Index (FCI) (Hosszú (2016)). This index captures the relationships between the behaviour of the domestic banking system, presented through its risk-taking characteristics, and the macroeconomic developments. Within the applied methodology, first the factors describing the credit supply of the banking sector are identified, which are estimated by a dynamic factor model based on the individual banks' indicators describing their willingness and capacity to lend. The final FCI represents the relationship of these factors with the GDP based on a FAVAR model estimation result.

Therefore, as follows from its structure, the FCI shows the degree to which GDP growth could have been higher (lower) in the given period, had the domestic banking sector set its credit conditions less tightly (loosely). Based on the FCI result, we can **directly measure the magnitude of the procyclicality of lending developments expressed in terms of GDP.**

Since the **FCI only captures the supply conditions**, the result that can be obtained from it does not contain the entire economic impact, only the one that can be derived from the loose or tight credit supply. This has higher significance in respect of the post-crisis period. That is, we do not believe that demand constraint prevailed before 2008 in lending, while after the crisis the domestic households substantially restrained their borrowing, accompanied by deleveraging, thereby contributing to the cyclical reduction of debt. That is, **the FCI shows roughly the total economic impact of the deviation of lending from long-term trend for the pre-crisis period, while it presumably underestimates it for the post-crisis period.**

Chart 5-5
The Financial Conditions Index (FCI) in the period under review



Source: MNB.

Had credit supply developed in a sustainable way, then according to the FCI, GDP growth would have been by roughly 0.5 per cent lower on an annual average (Chart 5-5). However, after the crisis not only credit supply, but also the lack of credit demand resulted in credit contraction, i.e. the FCI does not contain the full impact of lending deviating from the long-term trend, but only the part thereof applicable to supply. The value of this is 0.5-0.6 per cent, but if we also consider that credit demand made the same contribution, at the most, to the credit contraction as credit supply, **the total impact may be around 1.1 per cent in 2009–2015, i.e. GDP growth could have been that much higher on annual average** (Table 5-3).

Table 5-3
Average impact of the alternative indebtedness on the GDP growth rate before and after the crisis (Scenario 3)

	2002–2008	2009–2015
Total effect on GDP	-0.5%	1.1%

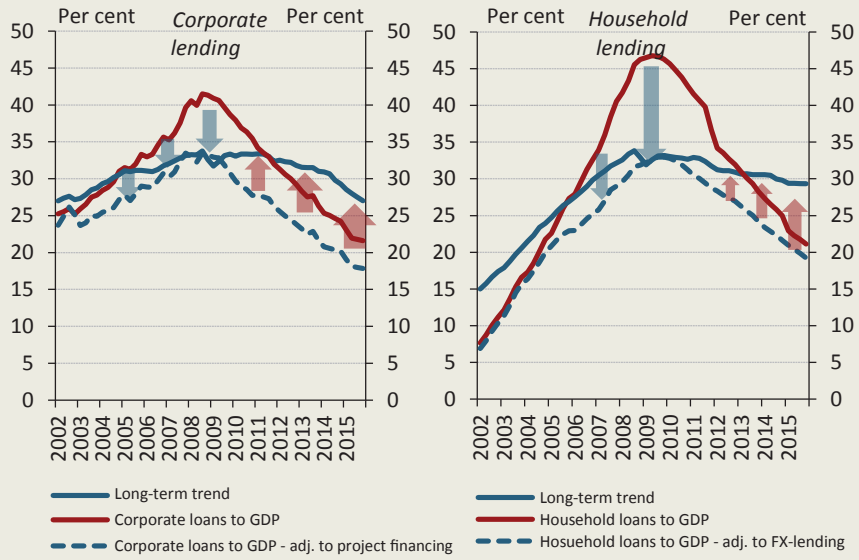
Source: MNB.

5.3.4 LENDING DEVELOPMENTS WITHOUT HOUSEHOLD FOREIGN CURRENCY LOANS AND CORPORATE PROJECT FINANCING

The domestic banking system's lending activity which relied on external funding resulted in the spread of foreign currency loans in Hungary. In the 2000s, a large part of **households borrowed in foreign currency** rather than in HUF, which was **encouraged** by the high interest rate spread and the **promise of higher loan amount available under constant instalment** (Csajbók et al. (2010)). However, by borrowing in foreign currency, households undertook an **implicit exchange rate risk**, which substantially **increased their indebtedness** and debt service burden **after the crisis.** The motives were similar in the case of project financing loans: the high interest rate differential and the expected return on the real estate market resulted in a large volume of foreign currency loan inflow to the corporate sector as well.

In this scenario, we assume that foreign currency loans were not available for households, and under constant initial instalment and loan interest rates they **became indebted only in HUF loans**[43] and that the **corporations did not draw down foreign currency project financing loans**. We compared the household and corporate credit path simulated in this way with the long-term indebtedness path, using a similar method as in the first scenario, thus quantifying the GDP impacts. Upon the estimation we proceeded as if **no imbalance had built up before the crisis as a result of the foreign currency loans,** and in accordance with this **lending would have followed a long-term trend after the crisis** (Chart 5-6).

Chart 5-6
Trend-gap decomposition of the corporate and household credit-to-GDP ratio without foreign currency loans and project financing



Source: MNB.

Based on the results it can be seen that this scenario would have yielded a very similar result for the economic growth as in the first scenario. **Before the crisis, lending would have built up more slowly** (at a rate similar to the original path before (2005)), **which would have resulted in a 0.5 per cent lower annual GDP growth on average.** However, in the **post-crisis years** the households' and corporations' indebtedness could have stayed on the long-term trend, thereby resulting in this period in an annual **growth that is faster by 1.4 per cent on average** (Table 5-4).

Table 5-4
Average impact of the alternative indebtedness on the GDP growth rate before and after the crisis (Scenario 4)

	2002–2008	2009–2015
Impact on GDP through corporate lending	-0.4%	1.1%
Impact on GDP through household lending	-0.2%	0.3%
Total effect on GDP	**-0.5%**	**1.4%**

Source: MNB.

43 We make no other assumption in that regard, thus we also assume unchanged monetary policy in the period under review, which on the whole is a strict assumption with respect to the alternative lending developments.

5.3.5 ECONOMIC GROWTH PRESERVED BY AGGREGATE FINANCIAL BALANCE (FINANCE-NEUTRAL POTENTIAL OUTPUT)

In addition to the above calculations, based on a sectoral breakdown, we can determine the growth path that maintains the financial equilibrium also in an aggregate approach. Following the so-called BIS methodology (Borio et al. (2013), Borio et al. (2014)), the financial indicators may also be used for the identification of the economy's cyclical position in addition to the **real economy indicators** (e.g. unemployment, capacity utilisation). Taking the financial indicators into consideration is important, because the build-up of financial imbalances may take place for a prolonged period regardless of real economy and inflation tensions, while **financial cycles are longer and have a higher amplitude compared to those of business cycles**.

For the estimation of the finance-neutral potential output, we used the data on industrial capacity utilisation, the real interest rate and the net financing capacity in terms of GDP. The applied framework is a state-space model, where the business and financial cycles are identified simultaneously.

According to the results, **in the period 2002–2008 Hungary grew 0.4 per cent faster on average compared to its financial and growth path that can be maintained in the long run**, while in the period 2009–2015 it showed an annual growth rate lower by 1.2 per cent (Table 5-5).

Table 5-5
Average impact of the alternative indebtedness on the GDP growth rate before and after the crisis (Scenario 5)

	2002–2008	2009–2015
Total effect on GDP	-0.4%	1.2%

Source: MNB.

5.4 Summary

The domestic lending developments **led to considerable vulnerability in the Hungarian economy in the decade preceding the 2008–2009 crisis.** This vulnerability resulted from the **faster-than-sustainable credit expansion** and the **unhealthy** structure thereof. This manifested itself in the household sector in the **spread of foreign currency lending**, while in the corporate sector it appeared in the form of high-risk **project financing**. Thus, the **credit outflow** to the private sector was clearly **excessive and unsustainable**.

In our analysis, based on our former research results, we quantified **the economic impact of the lending developments, deviating from their long-term trend, both in the pre-crisis and post-crisis periods.** The summarised results are included in the summary table below:

Table 5-6
Summary of the GDP impact of each scenario

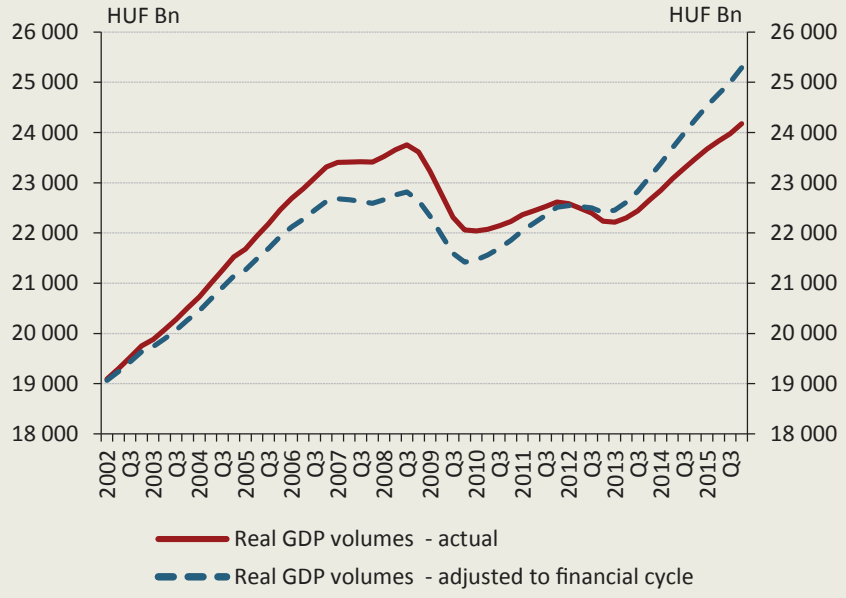
	2002–2008	2009–2015
Impact on GDP through corporate lending	-0.6% / -0.4%	0.9% / 1.1%
Impact on GDP through household lending	-0.3% / -0.2%	0.3% / 0.3%
Total effect on GDP	**-0.8% / -0.4%**	**1.1% / 1.4%**

Note: Separate result for the corporate and household lending was not available using all methodologies, and thus the minimum-maximum values of the total line do not necessary correspond to those of the detailed lines.

Source: MNB.

Based on the results obtained, it can be stated that the excessive outflow of credit generated significant asymmetry in Hungary during the almost one and a half decade under review. As a result of the financial imbalances, the **domestic economy expanded 0.4–0.8 per cent faster on average between 2002 and 2008; however, after the crisis, during the same timeframe it lost growth of 1.1–1.4 per cent annually on average**, due to deleveraging by economic agents.

Chart 5-7
Actual and estimated real GDP adjusted with the financial cycle (at 2005 prices)

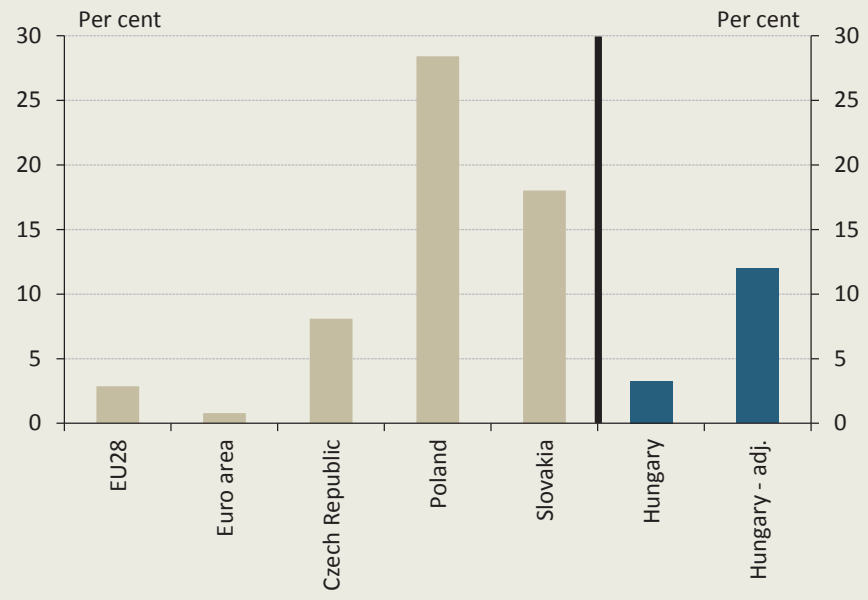


Source: HCSO, MNB.

Thus, in the pre-crisis years growth was faster as a result of the outflow of credits, **but after the crisis the domestic economy lost considerable growth potential.** On the whole, the balance is negative. That is, as a result of the financial cycle, by the **end of 2015 the volume of domestic GDP was lower by 4.5 per cent than it could have been in the case of lending practices with a sound growth rate and structure** (Chart 5-7). When interpreting the results, it should also be borne in mind that the above follows from the private sector's indebtedness, and thus **the total economic impact may as well be higher when also considering the general government debt developments**.

In the case of finance-neutral economic growth, **Hungary's relative international position in the post-crisis period would also be realigned.** While in 2007–2015 the aggregate expansion of Hungarian GDP at the rate of 3.3 per cent hardly exceeded the average of the EU countries, under sustainable and sound lending processes **domestic GDP would have risen in total by 12 per cent compared to its pre-crisis level, even outstripping the Czech economic expansion** (Chart 5-7).

Chart 5-8
Cumulative changes in GDP btw. 2007-2015 in the EU countries and Hungary (at 2005 prices)



Source: Eurostat and MNB.

REFERENCES:

Backé, P. – Égert, B. – Zumer, T. (2006): Credit Growth in Central and Eastern Europe: New (Over)Shooting Stars? European Central Bank Working Papers, No. 687.

Borio, C. (2012): The financial cycle and macroeconomics: What have we learnt?, BIS Working Papers 395, Bank for International Settlements.

Borio, C. – Disyatat, P. – Juselius, M. (2013) Rethinking Potential Output: Embedding Information About the Financial Cycle, BIS Working Paper 404.

Borio, C. – Disyatat, P. – Juselius, M. (2014) A Parsimonious Approach to Incorporating Economic Information in Measures of Potential Output, BIS Working Paper 442.

Csajbók, A. – Hudecz, A. – Tamási, B. (2010): Foreign currency borrowing of households in new EU member states. MNB Occasional Paper 87.

Endrész, M. – Kiss, R. – Virág, B. (2014) Consumption and lending – analysis of the Hungarian households' deleveraging, manuscript

Hosszú, Zs. – Körmendi, Gy. – Mérő, B. (2015): Univariate and multivariate filters to measure the credit gap MNB Occasional Papers, No. 118

Hosszú, Zs. (2016): The impact of credit supply shocks and a new FCI based on a FAVAR approach. MNB Working Papers 2016/1, Magyar Nemzeti Bank.

Kiss, G. – Nagy, M. – Vonnák B. (2006): Credit Growth in Central and Eastern Europe: Trend, Cycle or Boom? MNB Working Papers 2006/10, Magyar Nemzeti Bank.

Levine, R. (2005): “Finance and Growth: Theory and Evidence”, in Philippe Aghion and Steven Durlauf (edited): Handbook of Economic Growth, Vol. 1 (Elsevier).

Magyar Nemzeti Bank (2014): Growth Report, November 2014, MNB.

Magyar Nemzeti Bank (2015): Financial Stability Report, November 2015, MNB.

Magyar Nemzeti Bank (2016): Inflation Report, November 2016, MNB.

Prasad, E.S. – Rajan, R. G. – Subramanian, A. (2007): Foreign Capital and Economic Growth, NBER Working Papers No. 13619.

Sóvágó, S. (2011): Identifying supply and demand in the Hungarian corporate loan market, MNB Occasional Papers No. 94.

Tamási, B. – Világi, B. (2011): Identification of Credit Supply Shocks in a Bayesian SVAR Model of the Hungarian Economy. MNB Working Papers, 2011/7.

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Count István Széchenyi

(21 September 1791 – 8 April 1860)

Politician, writer, economist, minister for transport in the Batthyány government whom Lajos Kossuth referred to as 'the greatest Hungarian'. His father, Count Ferenc Széchényi established the Hungarian National Museum and Library; his mother, Julianna Festetich was the daughter of Count György Festetich, the founder of Georgikon, an institution for the teaching of agricultural sciences.

With his ideas – whose message remains relevant even today – and his activities both as a writer and a politician, István Széchenyi laid the foundation for modern Hungary. He is one of the most eminent and significant figures in Hungarian politics whose name is associated with reforms in the Hungarian economy, transportation and sports. He is also known as the founder and eponym of numerous public benefit institutions, a traveller all across Europe and an explorer of England as well as the champion of economic and political development at the time. István Széchenyi recognised that Hungary needed reforms in order to rise, and considered paving the way for a Hungary set on the path of industrialisation and embourgeoisement to be his calling in life.

Published in 1830, his Credit outlined the embourgeoisement of Hungary and summarised its economic and social programme. Count Széchenyi intended this writing to make the nobility aware of the importance of the country's desperate need for a social and economic transformation. Another work of his, Stádium [Stage of Development] (1833) listed the cornerstones of his reform programme in 12 points, including the voluntary and compulsory liberation of serfs; the abrogation of avicitas (inalienable status of noble property); the right of possession for the peasantry; and the freedom of industry and commerce. This work of Széchenyi already conveyed the idea of equality before the law and the general and proportionate sharing of taxation.

After the revolution in 1848 István Széchenyi joined the Batthyány government and as minister embarked vigorously on implementing his transportation programme.

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