CRISIS AND ECONOMIC GROWTH IN THE EU

Medium and Long-term Trends

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The study analyses the impacts of the financial and economic crisis on potential growth in the European Union. It identifies the main channels of impact mechanism and carries out quantitative estimations in order to reveal the medium and long-term trends. According to over findings the impacts of the crisis are significantly different in the main country-groups of the EU. The basic structural problem of the EU is considered the decreasing trend in potential growth which might be further strengthened through the lasting consequences of the crisis.

Keywords: potential economic growth, growth accounting, production function, convergence crisis

JEL classification indices: F15, O10, O40, O52

INTRODUCTION

The dramatic decline in *GDP of the European economy is considered to be more than a cyclical deviation from potential output.* Moreover, the previous financial and economic crises have had lasting negative impact on output and employment, too. Both the level and growth rate of potential output show an unfavourable development. On the one hand the economic performance is getting closer to its potential level only slowly after combating the recession. On the other hand – and this implication is more serious – if the crisis has a negative impact on me-

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dium-term and long-term growth potential, Europe will follow a more unfavour-
able growth path for a long time. (The erosion of European growth potential has
progressed particularly during the last one and a half decade.)

Taking these aspects into account *the paper is aimed at revealing medium-term
and long-term trends in potential growth in the European Union following the cri-
sis (2008–2010)*. In the analysis the *production function approach* was applied.
The study outlines the essence of potential growth and the methodology of its
analysis (Section 1). Afterwards the impacts of the financial and economic crisis
on potential growth are described (Section 2). This part contains on the one hand
the impact mechanism of the crisis, and on the other hand the main experiences
gained during previous crises. The impacts of the crisis on potential growth were
revealed by means of broad mid-term quantitative analyses (for the period
2010–2014) using the production function approach. The study includes growth
trends in the EU27 (both EU15 and EU12) and the USA (Section 3). The focus
was set, however, on the relatively homogeneous country-groups of the EU (5
country-groups) elaborated by the authors (Section 3.1). At the end, alternative
long-term scenarios are outlined (Section 4) and main conclusions are drawn.

1. METHODOLOGY OF POTENTIAL GROWTH ANALYSIS

Potential growth is a cumulative indicator showing the sustainable and non-infla-
tionary growth generating capacity of the economy. The potential growth rate in-
dicates steady-state economic dynamics. Unlike actual growth rate it does not
contain cyclical factors. The difference between actual and potential output is
considered the output gap i.e. a fundamental indicator of conjuncture.

Potential growth can be analysed in the light of past development path. There
is an advantage in *ex-post* analysis, namely that the degree of actual output is
known. At the same time potential growth can be measured through future projec-
tions, too. There are methodological difficulties linked to both cases.

Potential growth can be calculated by using growth accounting, production
function approach. Focus is principally set on the supply-side of the economy (la-
bour, capital accumulation, total factor productivity (TFP), the main driving
forces of output). In production function potential growth can be calculated based
on labour and capital inputs and the development of TFP. While analysing poten-
tial output the cyclical factor is removed as regards both labour and capital.

In the framework of production function approach directly the determining
factors of the neoclassical growth model are taken into account. Recent growth
theories (the same as development theory) emphasise also the importance of addi-
tional – mainly – quality factors (innovation, geographical location, institutional

relations, macroeconomic policy, etc.). The latter factors are important also in *ex-post* analyses. Uncertainty involved in *ex-ante* analyses is, however, extremely high. In production functions these factors have an impact through the development of total factor productivity. (Important qualitative factors of economic system are taken into account in implicit way.) At the same time it is difficult to quantify some of the mentioned factors. That's why *ex-ante* analyses need to be carried out very cautiously. After all the production function approach can be applied in researches on growth and development.

Among the long term analyses e.g. the analysis on the issue of ageing in the European Union plays a significant role and it needs to be focused on also from the point of view of the methodology (e.g. Carone et al. 2006; EC 2009b). As an example of short-term approach and mid-term extension, growth accounting analysis carried out and actualised two times a year by the EU EPC Output Gap Working Group (OGWG) need to be mentioned.[1]

Production function approach focuses on the supply potential of economy. In the framework of production function approach, potential GDP is formed by the combination of factor inputs and technological level that is considered in broad terms (total factor productivity, TFP). While measuring potential output, the cyclical factor is removed in the case of labour and total factor productivity as well (D'Auria et al. 2010).

The Cobb-Douglas production function simplifies the analysis. Potential GDP can be calculated as follows:

$$Y = (U_L L E_L)^\alpha (U_K K E_K)^{1-\alpha} = L^\alpha K^{1-\alpha} * TFP \qquad (1)$$

$$TFP = (E_L^a E_K^{a-1})(U_L^a U_K^{1-a}) \qquad (2)$$

where U_L, U_K is excess capacity

E_L, E_K is efficiency level of production factors.

TFP summarises the degree of utilisation of production factors and their technological level. Factor inputs are measured in physical units. (Through hours worked for labour input and a comprehensive measure including spending on infrastructure and equipment for capital.)

The most important assumptions entering the specification of production function are: *constant returns to scale and factor price elasticity*. The main advantage of these assumptions is simplicity. These assumptions are largely consistent with empirical evidence at macro level. The assumption of unit elasticity is consistent with the relative constancy of nominal factor shares. Labour and capital elasticity

[1]   See its methodology in details: Denis et al. (2002, 2006); D'Auria et al. (2010).

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are represented by α and $(1 - \alpha)$. Under the assumption of constant returns to scale and perfect competition, the elasticity of these can be estimated from wage share.[2]

While moving from actual to potential output, potential factor use (labour and capital input) and the trend level (normal level) of efficiency of factor inputs need to be defined.

As regards production function approach, potential output refers to the level of output which can be produced with a 'normal' level of efficiency of factor input. This trend efficiency level is measured by using a bivariate Kalman filter model which is based on the link between TFP cycle and the degree of capacity utilisation in the economy.

Normalising the full utilisation of factor inputs as one, potential output can be described as follows:

$$Y^P = (L^P E_L^T)^\alpha (K E_K^T)^{1-\alpha} \tag{3}$$

In the model described briefly, the exogenous variables are as follows: population of working age (POPW), smoothed participation rate (PARTS), investment ratio (expressed as percentage of potential GDP, iypot) structural unemployment (Non-Accelerating Wage Rate of Unemployment – NAWRU), Kalman filtered Solow Residual and trend average hours worked (HOURST). Endogenous variables are potential employment (LP), investment (I), capital stock (K) and potential output (YPOT). Based on all these the equation of potential output can be described as follows:

$$YPOT = LP^{0.65} K^{0.35} SRK. \tag{4}$$

The output estimates derived from production functions show the present output capacity of the economy. Those make a *mid-term extension possible:* they indicate the likely development, *if past trends were to persist.*[3] (Possible shocks can be taken into account through sensitivity assessment.)

The OGWG database was used in the analyses. Furthermore the AMECO database and the database of the Ageing Report (EC 2009b) were used.[4]

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[2]   Based on the mean wage share for the EU15 over the period 1960–2003 $\alpha = 0.63$ and $(1 - \alpha) = 0.37$. The OGWG calculated with 0.65 and 0.35 as factor elasticity.
[3]   According to the assumption of the mid-term extension the growth rate of labour potential, capital stock and the TFP remains by and large also during the mid-term period. In the OGWG database projections of 2011–2015 are to be considered technical extensions and not forecasts.
[4]   The database mentioned can be found via the European Commission's website.

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2. THE POTENTIAL IMPACT OF CRISIS ON POTENTIAL GROWTH

Our hypotheses is that the financial and economic crisis must have a significant impact on medium- and long-term potential growth. In the short run the significant decrease in the level of potential output is the result of the decrease in productive capital stock (increasing capital depreciation), and the negative impact on labour supply and structural unemployment. The decisive question is the impact of the crisis on *long-term potential output growth*. If growth potential will be strengthened following the crisis, then the loss caused by the decrease in the output level might be compensated after a while. The economy might get on a higher, sustainable growth path due to the effects of the crisis forcing out structural transformation. (As for these processes, the development in Sweden and Finland following the crisis at the beginning of the 1990s might serve as a good example.)

In order to understand the impacts of the crisis on potential output and its growth, individual growth factors need to be analysed at large. Applying production function approach recession might have an impact on growth through three different channels: capital accumulation, labour input and total factor productivity. Labour supply can be divided into participation rate, average working hours, working age population and structural unemployment rate. (The latter is Non-Accelerating Inflation Rate of Unemployment – NAIRU.) TFP shows the effectiveness of the use of production factors. (As the latter is actually directly unobservable and is often calculated as residue besides labour and capital factors.)

Financial crises have deep impacts on the long-term output growth. According to Cerra and Saxena's analysis (2008) recession was not followed by rapid recovery in these cases. The loss of trend output has not been fully recovered later on. The loss in GDP level was generally not set off by higher growth after the crisis. In the countries analysed (in the case of 7 countries out of 14) the growth pace experienced during the decade following the trough of the crisis is somewhat lower than that prior to the crisis.

Bank crises and bigger recessions share several common peculiarities. Both are characterised by a decline in activity and industrial reallocation and a significant decrease in investment. All these have remarkable impact on potential growth.

Recessions following a financial market crisis are deeper than 'ordinary' recessions. These are generally associated with a significant decrease in housing prices and construction output (Reinhart – Rogoff 2008; Claessens et al. 2008). The decrease in consumption is high during recessions. It reflects also the loss of assets (e.g. decrease in housing prices).

During the past decades the impacts of economic recessions (not only financial crises) are mixed as regards long-term potential growth in the European countries.

Potential growth has increased in about half of the countries during the decade following the crisis.

The dynamics of capital accumulation has decelerated in most European economies in the short and medium term (Haugh et al. 2009; EC 2009b). In the long run the contribution of capital accumulation to potential growth has basically not changed in most EU Member States. Although the recession affected capital accumulation in the short run, *in the long run structural factors played a decisive role.* The *growth model* of these economies changed significantly in the 1990s. Due to the change in industrial structure capital accumulation declined and the contribution of TFP to potential growth increased.

After the severe recession the contribution of labour to potential growth increased in most countries analysed. During the decade following the recession the contribution of labour increased in 7 countries out of 10 countries analysed. *The level of NAIRU grew during recessions but it generally declined after it.*

After the big recessions the dynamics of total factor productivity was different, but it was considered the main driving force behind long-term output growth. In certain countries (EL, FI, SE and UK) the dynamics of TFP intensified and in other countries (BE, DE, ES, FR, IT, and PT) declined. *TFP and the increasing dynamics of potential growth coincided in the countries considered.* (The only exception was Spain, where participation rate grew significantly. Thus the contribution of labour to potential growth increased.) Output losses after banking crises are 2 to 3 times higher. It takes on average twice as long for output to recover back to its potential level (Haugh et al. 2009). In comparison with other financial and real-estate crisis driven recessions the current slump is considered to be severe as regards both output and investments.

In terms of *demand components* the main factor of downturn was the *collapse in fixed capital formation.* Household consumption, stock formation and net-exports contributed to the recession as well.

The likelihood of lasting effects on potential growth is much higher in case of the current crisis than of previous recessions. The length of the crisis, its global characteristics and the change in risk-related behaviour might explain that. According to the forecast of the European Commission published in Spring 2010, *the crisis is expected to be longer* than the previous crises (EC 2010). The crisis has an adverse effect on investments – on intangible investments in particular (namely R&D) – which has a severe impact on TFP growth and potential output. On the one hand NAIRU might increase due to the hysteresis effect (Blanchard et al. 1989) resulting in further drop in potential output level and slowing down potential growth in the short and medium term. Many discouraged workers leave the labour market decreasing this way the labour supply.

As the crisis is of global characteristics the possibilities of recovery through rechanneling of resources from sectors producing non-tradable goods into sectors producing for export is limited. In the middle of the 1990s – following the financial crisis – the essential factors of the Finnish and Swedish 'miracle' were structural transformation and reallocation of resources based on effectiveness and competitiveness into ICT sectors.

Risk-related output losses can be estimated only vaguely. The long recession has a severe and drawn-out effect on the main factors of production function. On potential growth path negative structural changes might occur, none the less the downturn will gradually stop.

After the crisis hit the bottom *recovery started* both in the global economy and the economy of the EU. Economic policy measures (liquidity enhancement through monetary policy, additional fiscal demand stimulus etc.) have played a significant role in the moderation in the downturn and the initial recovery. The pace of this recovery is, however, lagging behind the dynamics experienced following previous recessions (IMF 2009; Reinhart 2010). Differences between countries are significant.

At the same time the *fiscal stimulus applied broadly while handling the crisis has led to an increase in fiscal deficit and public debt*. In 2010 government deficit might reach 6.5% expressed as percentage of GDP and public debt might excess 80% of GDP in 2011 (European Commission 2010). *Adjustment of public finances is unavoidable*. Fiscal consolidation might result in the fall of economic growth in the short run. In the long run its impact is positive, especially if it comes also to the introduction of growth enhancing structural reforms. High public debt ratio causes significantly lower growth both in developed and emerging economies (Reinhart – Rogoff 2010). Besides the crowding-out effect, also the financing of deficit through distorting taxation and the increase in government risk premium need to be underlined in its mechanism.

The current crisis leads to *potential output loss* in the European Union. While the effect on potential growth is much more uncertain, *the decline in the dynamics of potential output – by having basically the same policies – is unavoidable in the medium and long run, due to the decrease in TFP dynamics in particular*.

3. SLOWDOWN IN POTENTIAL GROWTH
(MEDIUM-TERM QUANTITATIVE ANALYSIS)

In medium-term estimations *uncertainty is considerably high as regards the forecasts on investments and total factor productivity*. On the one hand moderate investment dynamics of the recovery period that is caused by financial market prob-

lems, growing cost of capital, and shocked capital allocation system, on the other hand the problems of capital allocation system and because of all of these the slower dynamics of inevitable structural transformation intensify uncertainty and the possibility of adverse trends. So there are several factors having significant impact through the capital accumulation channel. Thus change in TFP or capacity utilisation can be measured only loosely. Considerable depreciation rate and at the same time the impacts of the crisis on innovation and structural transformation of sectors need to be taken into account.

In 2009–2010 the *potential growth rate of old Member States (EU15)* will *drop to nearly half of that measured in 2007–2008.*[5] (I.e. the annual growth rate of 1.3–1.6% is likely to decrease to 0.8–0.9%.) The new MSs (EU12) show the same situation, growth rate is, however, higher in their case as they are catch-up countries (in average 2.8–3.1% per year in 2009–2010). In the EU15 the decrease in potential output is to be explained mainly by the significant decrease in labour and capital factors. Structural unemployment is expected to rise by 1.0–1.5% and investment as a share of GDP might decrease by more than 3%. The dynamics of TFP is in average low in the EU15 (0.5% per year) and it is increasing only slightly – by approximately 0.1% per year – between 2011 and 2014. This TFP assessment is relatively conservative. It does not take into account that there is a one-off downward shift in TFP level related to the change in industrial structure.

In the EU12, the financial crisis is likely to result in a strong decrease in potential growth rate: from an annual 4.1% in 2008 to 3.1% in 2009 and 2.8% in 2010. The different factors of potential growth react basically similarly to the financial crisis both in the Euro zone and the EU15.

As regards the direction of the growth dynamics in 2009–2010 it is to be considered similar both in the old and the new MSs. *There is, however, a significant difference in the case of the medium term trends of 2011–2014.* The potential growth rate in EU15 is expected to be recovered by and large in this period. (The dynamics will be similar to that prior the crisis.) *The prospects of the EU12 are more unfavourable.* The contribution of investments and TFP will not be recovered fully from the 2009–2010 level. Labour market trends are also unfavourable. (Primarily, due to the significant deceleration of the growth rate of working age population.)

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[5]   The analysis is based on the 2010 Spring forecast database calculated according to the production function methodology of the EPC Output Gap Working Group (OGWG). The data were grouped and processed by the authors.

3.1 Potential growth in the main country groups

The financial crisis has affected different MSs to different extent. The symmetric shock has had asymmetric consequences.

The intensity of the impacts of financial crisis depends on the *initial circumstances* and the *vulnerability* originating from them. The over-estimation of housing markets, export dependency of economies, their current account position, the size of financial sector and the exposure to risky assets might play a significant role. In the individual MSs – in relation to the factors mentioned – potential growth rate, investment rate, structural unemployment (NAIRU) etc. differ to a great extent.

In our quantitative analysis the countries of the EU27 are categorised into five groups based on four main economic and economic policy features. These main peculiarities are as follows: potential growth rate, investment ratio, current account balance, the advancement in the field of the Lisbon Agenda.

'Continental' countries (BE, DE, FR, LU) are members of the Euro zone. Potential growth rate fell remarkably prior the crisis. These are countries with current account surplus (with the exception of FR). Little progress has been made in the Lisbon-type reforms.

'Reform' countries (AT, DK, FI, IE, NL, UK, SE) have shown significant improvement as regards structural reforms. The 'Anglo-Saxon' and the 'Scandinavian' model have proved to be more competitive than the continental one during the globalisation period. The potential growth rate exceeded that of the continental countries. At the same time growth dynamics moderated preceding the crisis and it converged towards the dynamics of continental countries. Smaller countries belong mainly to the Euro zone. Three MSs (DK, SE, UK) are not members of the Euro zone. Characteristically there is a current account surplus (with the exception of UK and IE).

The potential growth dynamics has been very low in some *'Mediterranean' countries* for years (IT, PT), but it fell also in others (EL, ES, CY, MT) at the outset of the crisis. The current account deficit and significant structural deficiencies are typical in these MSs.

In the *'Catch-up'* group there are MSs joined the EU in 2004 which showed favourable growth and convergence prior the crisis (CZ, PL, SK, SL). Two smaller countries among them are members of the Euro zone, but the two bigger countries are not. All the countries classified as 'Catch-up' countries have a current account deficit. (These deficits, however, are relatively moderate in this group.)

The *'Vulnerable'* group contains the Baltic States (EE, LT, LV) and Hungary which joined the EU in 2004 as well as Bulgaria and Romania which joined the EU in 2007. With the exception of these two countries (BG, RO) potential growth

rate decreased before the crisis. There is relatively little advancement as regards structural reforms. None of the countries is a member of the Euro zone.[6] The current account deficit is high (two digit! in several countries), *the dependency on external financing and their vulnerability is very high.*

Through the abovementioned categorisation relatively homogeneous groups were to be outlined as regards the issues analysed. The characteristics of the groups and the countries in the groups are indicated in *Table 1* and potential growth is shown in *Figure 1*. The following consequences offer themselves based on the analysis of medium-term growth processes of country groups (the main factors of which are listed in *Table 2*).

Summarising: *the financial crisis might generate significant decrease in potential output and it might have a remarkably negative impact on labour (on non-demographic driving-forces, such as the NAIRU), capital and TFP.*

As regards potential growth individual country groups show substantially different trends. While more developed countries and those being a member of the Euro zone will get close to their previous growth performance,[7] potential growth
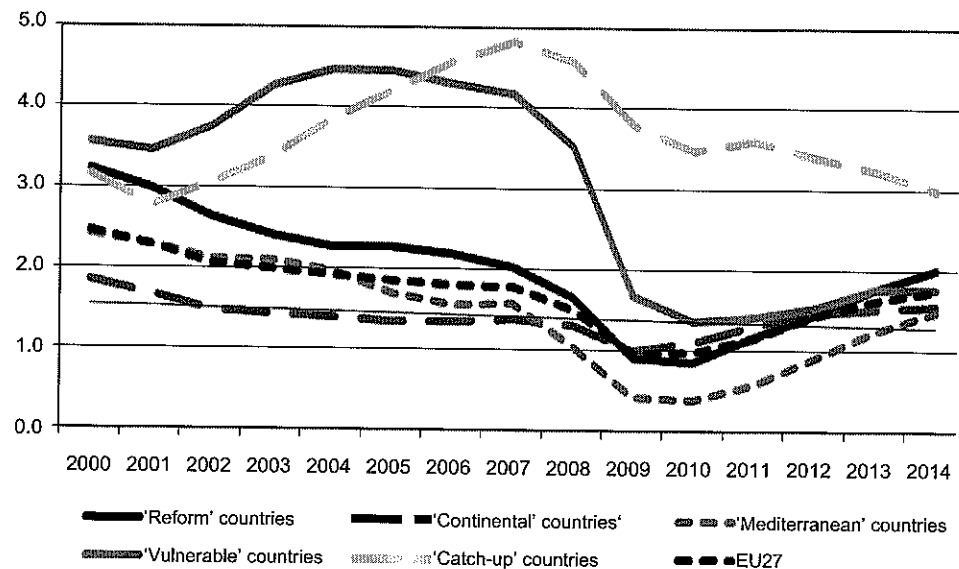

Figure 1. Potential growth in the country-groups of the EU

Source: own calculation.

[6] Estonia has become a member of the Euro zone from 1st of January 2011.
[7] At the same time there is a significant difference in the potential growth rate. The trend of 'Reform' countries is better (1.9% in 2014 according to the simulations) than that of 'Continental' countries (1.5% in 2014).

Table 1

Potential growth, current account, investment ratio and Lisbon performance in the country groups

Country group	Potential growth rate		Current account balance (as percentage of GDP)		Investment ratio (as percentage of potential output)		Lisbon performance[b] (2005 data in brackets)
	2005	2008	2005	2008	2005	2008	2008
'Continental' [a] (BE, DE, FR, LU)	0.8–1.9[a]	1.0–1.8[a]	2.2–5.2[a] (except FR)	1.1–6.7[a]	18.7–22.0[a]	21.2–23.5[a]	10.8 (10.0)
'Reform' (AT, DK, FI, IE, NL, UK, SE)	1.3–5.3	1.4–2.1	3.9–7.5 (except IE, UK)	2.7–8.9	17.7–22.3	18.6–22.0	4.0 (4.0)
'Mediterranean' (CY, EL, ES, IT, MT, PT)	0.6–3.9	0.4–2.6	from –1.2 to –11.0 (except CY)	from –3.1 to –16.4	20.3–28.3	15.7–28.2	20.4 (19.4)
'Catch-up' (CZ, PL, SK, SL)	3.3–5.7	3.2–5.1	from –1.2 to –8.6	from –0.8 to –6.9	18.7–28.0	22.8–31.2	16.3 (17.8)
'Vulnerable' (BG, EE, HU, LT, LV, RO)	3.2–6.6	0.9–5.3	from –7.1 to –12.5	from –6.9 to –20.6	24.8–37.0	24.6–40.0	19.7 (19.8)
EU27	1.8	1.5	–0.3	–1.0	20.5	21.8	
USA	2.5	1.8	–5.9	–4.7	19.9	18.0	

Notes:
[a] Without LU.
[b] Based on the ranking by Tilford – Whyte (2010), the average value of the ranks of each MSs are calculated. The increasing number indicates that the "Lisbon performance" is getting increasingly unfavourable.
Source: own calculation.

rate will decrease in the Member States which are less developed than the average. *Due to that the growth dynamics of country groups will converge compared to the period preceding the crisis.* (But it cannot occur as regards the level of potential growth.) That is: *a surprising convergence might develop in the potential growth rate of basically different country groups (Figure 1).*

The contribution of individual factors to potential growth is very different. Structural unemployment (NAIRU) *(Figure 2)* will slightly decrease in 'Catch-up' countries, it won't change in the 'Continental' group, it will increase by about 2% in 'Reform' countries and it will increase by about 2.2–2.5% in the 'Mediterranean' and the 'Vulnerable' country groups. The investment ratio[8] in 'Continental' and 'Reform' countries will be recovered by and large at the level preceding the crisis *(Figure 3).* It decreases by 2% in 'Catch-up' countries, by about 4% in the 'Mediterranean' group and by more than 6% in 'Vulnerable' countries. The contribution of labour input is modest on the whole, while its contribution is negative in the case of 'Catch-up' and 'Vulnerable' countries. The

Table 2

Potential growth and its factors in country groups

Country groups	Potential growth rate		Contribution to potential growth					
			Labour		Capital		TFP	
	2010	2014	2010	2014	2010	2014	2010	2014
'Continental'	1.1	1.5	0.1	0.2	0.5	0.5	0.5	0.8
'Reform'	0.9	1.9	−0.2	0.2	0.4	0.7	0.7	1.0
'Mediterranean'	0.4	1.5	−0.2	0.3	0.4	0.6	0.2	0.6
'Catch-up'	3.5	3.0	0.3	−0.1	1.5	1.5	1.6	1.6
'Vulnerable'	1.4	1.8	−0.6	−0.3	1.4	1.3	0.5	0.7
EU27	1.0	1.7	−0.1	0.1	0.6	0.7	0.5	0.9
USA	1.4	2.1	0.0	0.2	0.5	0.9	0.9	1.0

Source: own calculation.

contribution of capital factor is the most modest in 'Continental' and 'Mediterranean' countries. After hitting bottom TFP as the decisive factor of potential growth in structural terms will grow but it will remain at a low level on the whole. The most unfavourable dynamics of this structural component is to be expected in the 'Mediterranean' and 'Vulnerable' country groups.

As regards potential growth and the contribution of individual factors *the most unfavourable trends can be experienced in the case of 'Mediterranean' and 'Vul-*

[8]   Investment ratio is expressed as percentage of the potential output.

nerable' countries (Figures 1–5). In the period analysed the catch up with the average of the EU27 will practically stop in the country groups indicated.
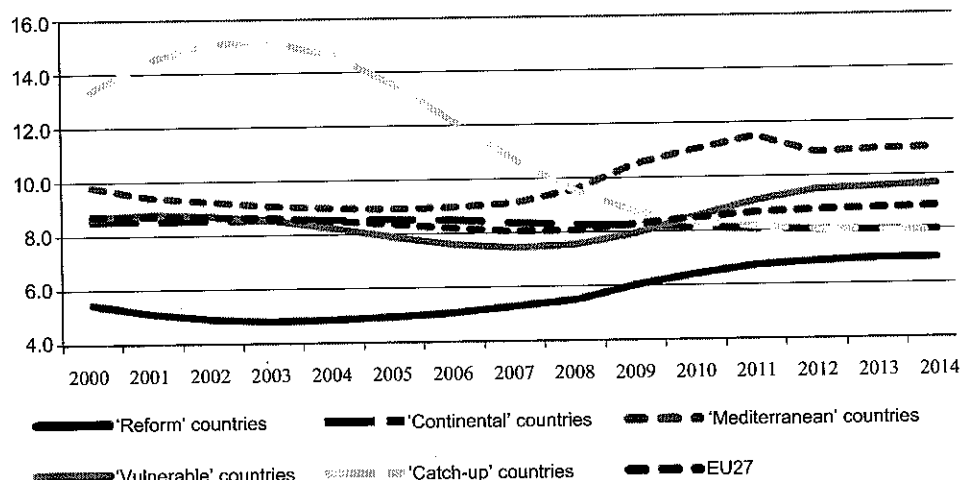

Figure 2. Development of NAIRU
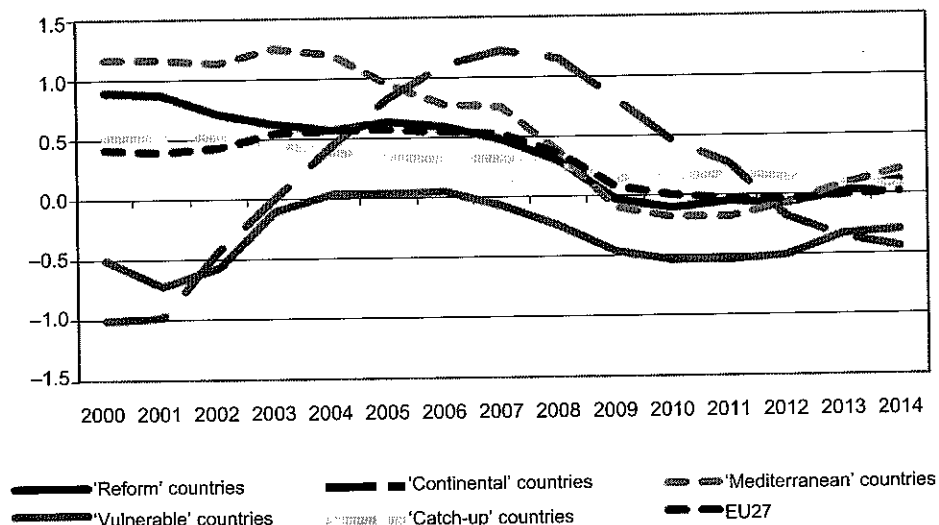
Source: own calculation.

Figure 3. Development of investment ratio

Source: own calculation.

The decrease in the dynamics of potential output to be predicted for the coming years shows a dramatic size (Figure 5). In the Baltic States the annual increase in

potential output is expected to fall from 5–6% to 1.6–2.0%. In the case of Hungary the potential growth rate of 3–4% might fall under an annual 1%! That is: *in certain new member states real convergence might stop in the short and medium run. (In certain cases even divergence might occur compared to more developed countries.)* This *convergence crisis* might cause severe tensions in the broader medium-term period both in the countries affected and the EU.
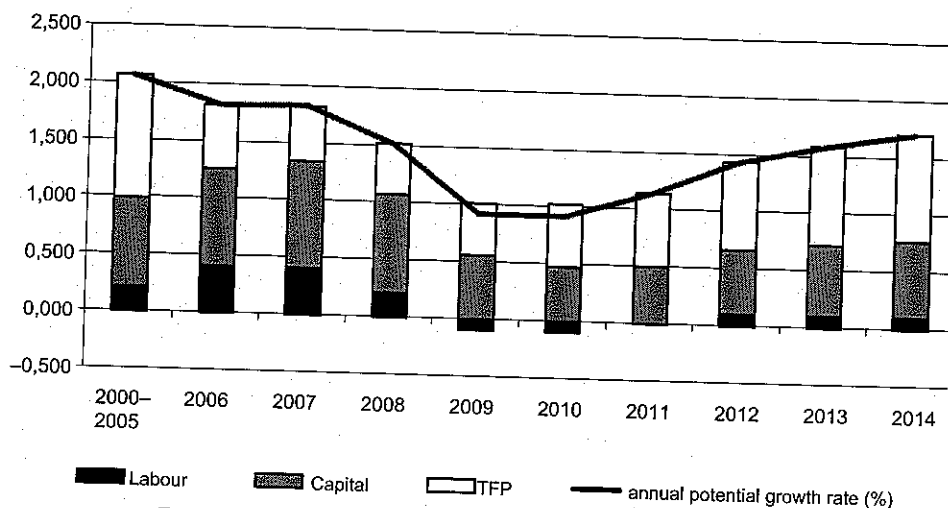

Figure 4. Development of potential growth and its factors (EU27)
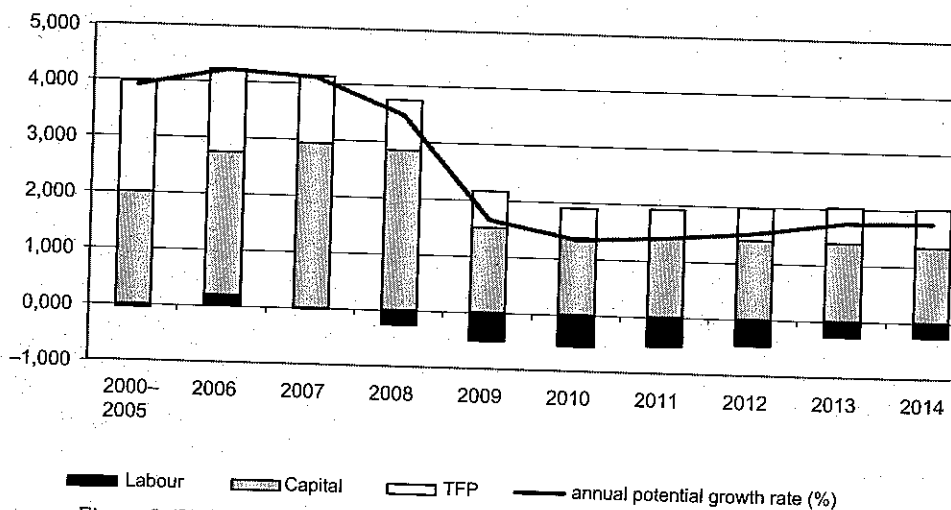
Source: own calculation.

Figure 5. 'Vulnerable' countries – Development of potential growth and its factors

Source: own calculation.

3.2 Potential growth in the EU and the USA

In a broader context it is to state that potential growth rate shows in general a downward trend both in the USA and the Euro zone countries. (There is an exception in the USA from the mid 1990s onwards.) Potential growth rate represented a downward trend both in the Euro zone and the USA prior the financial crisis.

The current crisis is linked with repeated mitigation that occurred on the supply side earlier both in the USA and the Euro zone. Potential growth rate was much lower in 2008 than in 2000 (It is lower by 1.5% in the USA and by 0.8% in the Euro zone.) The current financial crisis decreases these rates by 0.25–0.50% in 2009–2010 *(Table 3)*. According to *Table 3* the deterioration induced by the financial crisis might be relatively short-lived. The main scenario of the *medium-term simulation based on production function indicates the recovery of potential growth rate (annual 2%) until 2013 in the USA. In the Euro zone potential growth rate might reach the level of 1.7%.*

Table 3

Potential growth in the Euro area and the USA

	Potential growth (as percentage of annual change)	Contribution to potential growth			NAIRU (as percentage) of labour force	Investment rate (as percentage of potential output)
		Labour	Capital	TFP		
Euro area (EA-16)						
2001–2005	1.8	0.5	0.7	0.6	8.5	20.9
2007–2008	1.4	0.2	0.8	0.4	8.5	22.5
2009–2010	0.7	–0.2	0.5	0.4	9.3	19.5
2011–2012	1.3	0.2	0.5	0.6	9.9	19.7
2013–2014	1.7	0.4	0.6	0.8	10.0	20.5
USA						
2001–2005	2.5	0.2	1.1	1.2	4.9	19.2
2007–2008	1.9	0.1	0.9	0.9	6.1	18.6
2009–2010	1.3	0.0	0.4	0.9	7.2	15.5
2011–2012	1.8	0.2	0.6	1.0	7.7	16.7
2013–2014	2.1	0.2	0.9	1.0	7.9	18.2

Source: own compilation based on the OGWG database.

According to the analyses carried out using the production function method, the financial crisis might strengthen the models that differ between the Euro zone and the USA as regards the contribution of growth factors to be experienced. The contribution of labour exceeds that of the USA further on, while in the latter the

increase in investment is expected to be significantly stronger from 2011 onwards.

The annual contribution of TFP to potential growth decreased from 1.5% prevailing at the end of the 1990s to approximately 0.8% in 2007–2008. But this dynamics was still more than twice as high as the rate in the Euro zone. In both regions TFP contribution will be moderated due to the financial crisis in 2009–2010. These contribution rates return to the level prior the crisis. According to the forecast the contribution of TFP to potential growth in the USA will be significantly higher during the period from 2009 to 2013 than in the Euro zone. In order to explain why the performance of the USA is continuously higher there is a need to analyse the key driving forces of tangible and intangible investments.

4. EROSION OF THE EUROPEAN GROWTH POTENTIAL – ALTERNATIVE LONG-TERM SCENARIOS

Long-term potential trends need to be overviewed as well. The potential growth rate of the EU15 has been increasingly lagging behind the dynamics of global competitors among them that of the USA since 1990's. Due to severe structural productivity problems of the EU15 and the insufficient adjustment to globalisation a permanent and significant decline in potential growth rate is to be expected (Carone et al. 2006). The unfavourable investment environment promotes a higher level of capital outflow and a notable increase in the share of imported products and services.

Applying the *production function* approach longer-term simulations indicate that potential growth rate falls both in the EU15 and the EU27[9] (EC 2008b, 2009b). According to the base scenario this reduction will be continuous, moving from an annual 2.4% in 2007–2020 to an average 1.7% in 2021–2030 and then down to 1.4% in 2031–2060.

The forecast decline in the potential rate of growth is far greater in the EU10 and EU12 countries than in the EU15 states. According to this longer-term simulations output in the EU12 will expand far more rapidly until 2030 than in the EU15 countries, i.e. the convergence process will continue. But as time passes the pace of convergence will slow down, and then stop after 2030. Based on simulations, annual GDP in the EU12 will grow by only 0.6% in 2041–2060, compared to a figure of 1.5% for the EU15 countries. That is there is a switch from convergence to divergence, see *Figure 6*.

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[9] In this section we used the quantitative analysis – based on the production functions – that was carried out for the European Commission (2008b, 2009b).
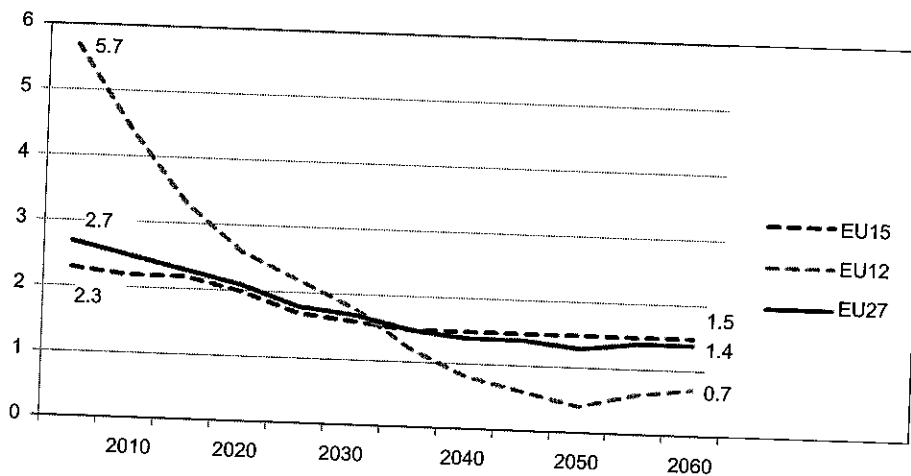
Figure 6. Potential GDP growth rate (annual average as percentage)

Source: EC (2009 b).

In the new MSs potential growth rate will decline at a greater pace, thus real convergence will stop from *2030 onwards and even a moderate divergence from the EU15 might occur.* It can be explained by the following factors: on the one hand productivity growth rate might be rebalanced by 2050, on the other hand demographic simulations are significantly more unfavourable in the NMSs than in the old ones.

The long-term paths indicating the erosion of the European growth potential could be considered rather optimistic based on the analysis of the impacts of the current crisis on potential growth.

In order to calculate the impacts of the current crisis alternative scenarios need to be set up (see Section 1). In view of the large uncertainty regarding the length of slump in economic activity the case of temporary shock and the case of permanent shock needs to be defined.[10]

Two temporary shock scenarios can be described: a *'lost decade'* and a *'rebound' scenario.*[11] Those figures are much lower than the baseline projection for the period until 2014.

Potential growth components will then converge to reach the growth rate projected in the baseline:

[10] In the case of the permanent shock risk aversion changes significantly. There is a long lasting increase in the risk *premia* and at the same time in capital cost, investment rate and TFP dynamics are shrinking and at the same time there is a permanent increase in the NAIRU.

[11] The analysis is based on the database applying the production function method of the EPC Output Gap Working Group and the database of the Ageing Report (EC 2009b).

- in the *'lost decade'* scenario, labour productivity is assumed to reach the baseline growth rate in 2020. Labour input is assumed to reach the baseline growth rate in 2020, too;
- in the *'total rebound'* scenario, labour productivity and labour input are expected to reach the baseline level in 2020.

Given the current economic crisis and a very considerable degree of uncertainty, the impact of a permanently worse situation of growth potential can also be analysed. This is the 'lasting and increasing loss' (or *'permanent shock'*) scenario. These numbers are much lower than the values calculated until 2014 in the comprehensive long-term baseline scenario. According to this analysis the annual potential GDP growth in the EU27 countries is lower in both scenarios by about 0.9% than in the baseline scenario.

Potential growth rate converges to the growth rate of the baseline scenario following these corrections: According to the 'lasting and increasing loss' scenario from 2014 to 2020 labour productivity growth and labour input growth will reach baseline figures, but unemployment rate will be permanently 1% higher than in the baseline from 2020 onwards; and labour productivity growth rate will be 0.25% lower than that from 2020 onwards.

The *'lost decade scenario'* causes a lower per-capita GDP level at the end of the period examined compared with the baseline. It implies *a lower expected potential growth* up to 2020. This period is 'lost' in terms of accumulated wealth creation. The loss in GDP per capita in the EU27 is around 11% in 2020. This scenario carries over the loss in the rest of projection period. Growth projection remains broadly unchanged between 2020 and 2060. In the *'total rebound'* scenario, GDP per capita by 2060 is the same as in the baseline (The deterioration relative to the baseline up to 2014 is offset by the improvement between 2015 and 2020 (EC 2009e).

A more marked reduction in GDP per capita level occurs in the 'lasting and increasing loss' *scenario*. In that case GDP per capita is 12% lower than in the baseline in 2020, 16% lower in 2040 and 20% lower in 2060. It means that this scenario reflects significant lower growth throughout the projection period than it was assumed before. The growth path of the different variables is summarised in *Figure 7*.

Permanent shocks would result in the complete collapse of growth and catch-up models in Europe. In the long term one fifth of GDP would fall out and the chances of real convergence would deteriorate dramatically, though differently country by country.
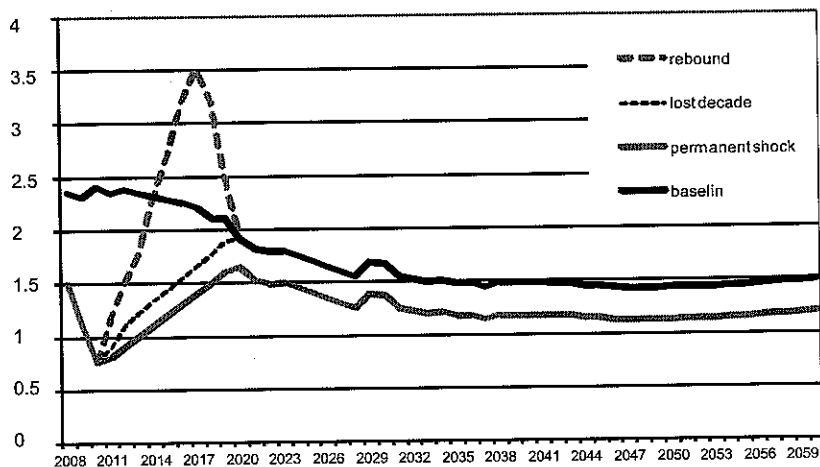
Figure 7. Potential GDP growth under different shocks (annual growth rate)

Source: EC (2009b).

CONCLUSIONS

1. Applying the supply side approach *recession has an impact on growth through three different channels:* capital accumulation, labour input and total factor productivity. The probability of lasting impacts on potential growth is much higher as regards the recent crisis than it was in the case of previous recessions. It has to be particularly highlighted, that the *risk-related* behaviour might change permanently.

2. The present global crisis resulted in the deepest recession we have seen since WWII. New risks appeared. In the EU the new MSs have been experiencing a continuous fall in potential growth since 2008. The potential decrease in the dynamics of potential growth in the medium term is of dramatic size in certain new MSs. In these countries *real convergence might stop in the short run and it might even come to a divergence.* We call it *'convergence crisis'.*

The financial crisis hit different countries to a different extent. *A symmetric shock resulted in asymmetric consequences.* As regards potential growth and the contribution of individual factors *the most unfavourable trends were to be experienced in the case of 'Mediterranean' and 'Vulnerable' countries.* In the period analysed the catch-up will practically stop in the country groups indicated.

3. It is important to compare the European and the US growth model. In the long run potential growth rate shows a declining trend both in the USA and the Euro zone countries. TFP growth rate is much higher in the USA from the middle of the 1990s onwards than in the Euro zone. This higher dynamics is expected to last also in the medium term.

4. In relation with challenges of globalisation and competitiveness problems of the European Union's economy – current average annual rate of *potential growth in the European Union of 2.4% could fall to half this level on average in the coming decades.* Potential growth rate will be cut in half, despite the prognosis containing relatively benign development in labour productivity. This may also indicate adverse demographic changes. But its decisive structural element is the decreasing dynamics of total factor productivity.

5. The risk of shock repetition is high. These changes project a *further erosion of growth potential in Europe.* That is: due to the crisis and its potential long-term impacts there might be scenarios which are more unfavourable than those indicating decreasing potential growth in the previous point. If the scenario of permanent shocks becomes a reality, then it would threaten with the complete collapse of the European growth and catch-up model.

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