Sustainable Growth, Growth Potential

Tendencies of Potential Growth in the European Union

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Summary

In economic terms, growth theory is an essential dimension of sustainability. The structurally sustainable performance of an economy, that is the sustainable *(equilibrium)* level of output is expressed in terms of potential output, and its sustainable dynamics in terms of growth potential. In the EU Member States the main structural determinant of potential growth is the dynamics of total factor productivity (TFP). In this respect the level and dynamics of performance vary greatly across the EU. Narrowing the performance gaps compared to the leading economies through major structural reforms can be a crucial factor in strengthening the growth potential. This paper reviews the fundamental correlations for Europe's growth potential based on quantitative analyses carried out within the referred theoretical framework. Analysing the determinants of growth potential can help justify the inevitable structural reforms and macroeconomic adjustments, and can thereby contribute to the development of an economic theory of sustainability.

Keywords: sustainable growth, potential growth, growth potential, productivity, total factor productivity, convergence, divergence, structural reforms

JEL codes: E17, F15, F43, O11, O47, O52

DOI: https://doi.org/10.35551/PFQ_2023_1_3

The original manuscript was submitted in Hungarian.

In economic terms, sustainability can be interpreted as a system of dynamic real economic and financial balances.

An essential dimension of this complex and extremely complicated problem is growth theory. *Erdős's* (2003) work is pioneering in exploring the problems of sustainable growth. At the same time, approaching the subject with a focus on potential growth and growth potential can be an obvious method. This paper reviews the fundamental correlations for Europe's growth potential based on quantitative analyses carried out within the referred theoretical framework.

POTENTIAL OUTPUT, POTENTIAL GROWTH AND GROWTH ACCOUNTING

Potential output is an aggregate indicator of the capacity of an economy to generate sustainable, non-inflationary growth; it is also called 'natural' gross domestic product (see originally Okun, 1962, 1970). At the level of potential output, unemployment equals NAIRU[1], that is the natural rate of unemployment. The rate of potential output growth is an indicator of permanently sustainable economic dynamics (in other words: growth potential). Unlike the actual growth rate, potential growth does not contain cyclical factors.[2]

The difference between actual and potential output is the output gap, a basic indicator of the business cycle. The applied economic policy instruments vary depending on the evolution of the output gap (or the business cycle expressed by it).[3] Estimating the output gap is a complex task. It is not possible to directly observe potential growth, and the data published on actual output developments may be subject to revision.

The works discussing growth dominantly focus on actual growth tendencies. Developments in actual growth reflect the business (or other) cycles. These are all extremely important pieces of information. However, actual growth cannot be permanently removed from potential growth. The structurally sustainable performance of an economy, that is the balanced level of output is expressed in terms of potential output, and its sustainable dynamics in terms of growth potential. The growth performance of the European growth model and its sub-models (subtypes) can also be analysed on the basis of potential growth. In exploring the European growth trends, further analysis is therefore consistently focused on potential growth.

Potential growth can be interpreted in different time dimensions:

- In the short term the physical productive capacity of an economy can essentially be considered as given. Compared with the actual output (output gap analysis), it shows the potential for short term expansion of demand without endangering the equilibrium.
- In the medium term the expansion of domestic demand, if supported by a strong increase in the volume of productive investment, can endogenously generate an output capacity underpinning the dynamics (all of which can be facilitated by high profitability and wage growth in line with productivity.)
- In the long term the output that can be achieved by full employment is closely linked to future technological progress (total factor productivity) and the probable labour potential growth rate.

On the one hand, potential growth can be examined in terms of historical development paths. The advantage of ex post analysis is that the exact volume of the actual output is known. Also, potential growth can be examined in terms of present ('real') time and future projections. All this, however, is challenged by various methodological difficulties.

The calculation (or estimation) of potential growth allows for the separation of structural

and cyclical developments in the economy. To this end, various approaches can be used. Next, the results obtained through alternative methods for potential growth, and the possible advantages and disadvantages will be discussed.

Time-series filtering versus production function

The first approach to the potential growth of the economy is based on potential output estimation. Essentially there are two main types of approach used for calculation. On the one hand, potential output can be estimated by using the moving averages of GDP time series and 'trend output' obtained through filtering techniques.

For this purpose the Hodrick–Prescott (HP) filter is the most commonly used method. This method has the benefit of simplicity and transparency. The filter uses the information with the highest frequency from the GDP series. However, there are essential problems with this method. The HP filter method is not based on economic theory. Its properties depend on the specific value of the additional (smoothing) parameter. On the other hand, just like with other median filters, the so-called endpoint distortion problem arises, i.e. the real-time estimation of trend output needs to be based on GDP extrapolations, requiring significant posterior revision. Finally, similar to other techniques used for filtering GDP series, it does not utilise the information available to separate cyclical and structural changes.

The alternative to simple data filtering relies on a supply-side model of the economy. In this case, the potential output is based on production function calculation as the result of the combined contribution of production factors and technological level.[4] Compared to simple growth calculation, with a production function approach to potential output, the output level is consistent with the balanced use of available resources (i.e. excess supply or demand for production factors can be excluded). Therefore, in calculating the labour input it is assumed that the unemployment rate equals the non-accelerating inflation rate of unemployment (NAIRU) or the non-accelerating wage rate of unemployment (NAWRU)[5] and filtered labour data. In addition, the Solow residual obtained from standard growth accounting can be filtered further.[6] It allows the total factor productivity (TFP) to be cleansed of short-term fluctuations in the changing degree of production factor application. Despite its advantages over HP filtering, the production function method has some common drawbacks in terms of estimates based on potential output filtering (primarily due to the filtering of total factor productivity – TFP). Its reliability depends on the availability and quality of data relating to production factor contribution. This is a major challenge, especially for the new EU Member States.

Using the production function to calculate potential growth

Growth accounting and the production function approach can be used to calculate potential growth. They focus mainly on the supply side of the economy, the quantity and quality of labour, capital accumulation, and total factor productivity as the main drivers of the output. The aim is to identify the effect of these drivers and to decompose the growth rate of output according to their impact. In the production function framework potential growth can be calculated based on the evolution of labour and capital inputs as well as total factor productivity. To use this method, the normal (equilibrium) rates of unemploy-

ment are also required. These can be supplied through the NAIRU or NAWRU approach already indicated.

The production function approach directly takes into account the determinants of the neoclassical growth model. More recent growth theories (just like development theories) also emphasise the importance of additional, typically qualitative factors (innovation, geographical location, openness, institutional system, macroeconomic policy, etc.). The latter factors are also important in ex post analyses, but there is a great deal of uncertainty particularly in ex ante examinations. In the production function framework these factors exert their influence primarily through the evolution of total factor productivity (implicitly including some important qualitative factors of the economic system). At the same time, quantifying the individual factors mentioned above poses difficulties. This requires particular attention and care in ex ante analyses.

Nevertheless, the production function approach can be used in growth and development studies. As for longer-term examinations, the significant and methodologically important research on ageing carried out in the European Union should be mentioned, among others (e.g. Carone et al., 2006; EC, 2020, 2021). One example of a shorter-term approach with medium-term extension is the growth accounting analysis updated three times a year by the EU EPC Output Gap Working Group (OGWG) (for details on methodology see Denis et al., 2006; D'Auria et al., 2010; Havik et al. 2014; Halmai, 2011, 2014; Elekes – Halmai, 2019.)

The production function approach therefore focuses on the supply potential of the economy. According to this approach, potential GDP is based on a combination of factor inputs and technological level in a broader sense (total factor productivity, TFP). In estimating potential output, cyclical factors are removed with respect to both labour and total factor productivity (for details see D'Auria et al., 2010).

The quantitative analysis forming the basis of this study looked at two main dimensions: on the one hand, the potential growth processes and models of the 'old' (pre-2004) EU15 Member States[7] based on longer data series, and on the other hand, the post-2004–2007 enlargement EU27 Member States, and within these some relevant groups of countries, too. (US data are also included in the analysis for comparison.) In addition to summarising the longer-term trends to date, the study may contribute to a comprehensive assessment of the impacts of the coronavirus crisis on growth potential.

The applied database[8] contains detailed information on the evolution of potential growth and its determinants (for the EU15 countries) starting from 1981.[9] The data have also been used for medium-term projections (for the period 2022–2025), the results of which are also included in the database. In the charts with time dimensions, broken vertical lines indicate the phase boundaries and the start of the 'Great Recession', for 2008 and 2019.

EROSION OF GROWTH POTENTIAL IN THE EU15

In the EU15 countries the potential growth rate began to gradually decline in the mid-1990s. Potential output dynamics dropped to below 2 percent from 2002, and continued to decline further during the post-2007 financial crisis. The EU15 average rate rose above 1 percent only from 2015. However, there are significant differences between the main groups of the EU15 (see Halmai,2021).

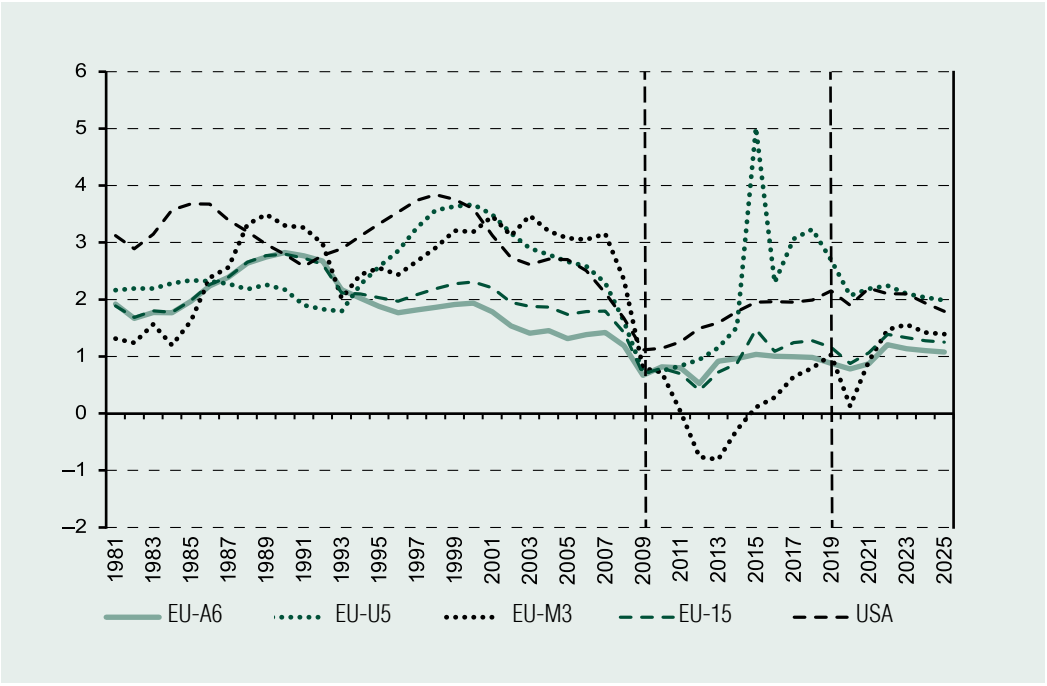
In the founding Member States (F6) the growth rate started to decline already in the first half of the 1990s. From 1994 the annual rate of potential growth slowed to below 2 percent, and then gradually declined to 0.7 percent in 2009, at the height of the Great Recession, and to 0.5 percent in 2012 *(see Figure 1),* then remained close to 1 percent between 2014 and 2019. That is approximately a third of the rate produced two decades previously.

The group of advanced new Member States (N5) achieved higher dynamics (see Figure 1). The average annual potential growth rate between 2015 and 2019 was 3.3 percent, higher than in the pre-Great Recession period, and similar to the 1997–2002 rate. The F6 growth rate was significantly outperformed by the N5.

In the M3 countries the rate of potential growth increased significantly from the mid–1980s, after joining the EU (see Figure 1), rising from just 1.2 percent in 1984 to over 3 percent between 1988 and 1992, and again between 1998 and 2005. During the financial crisis it dropped to 0.6 percent in 2009. With the deepening of the sovereign debt crisis, the growth potential of the M3 countries turned negative in the period between 2012 and 2014. Then it increased moderately from 2015, but in 2018 it was still only marginally higher than the 2008 level. On average, potential growth in the Mediterranean Member States stopped for almost a decade following the onset of the financial and economic crisis in 2008. For this group of countries the lost decade formula may be particularly relevant.

Figur 1

POTENTIAL GROWTH IN THE AVERAGE OF THE EXAMINED GROUP OF COUNTRIES



Source: own construction

In the period under review, the potential growth rate of the United States consistently exceeded the EU15 average (see Figure 1). Consequently, the average of the examined European countries did not show any catch-up potential or catch-up growth; they got no closer to the US level of development. In fact, a steady divergence occurred, persisting ever since. Between 1981 and 2001 the US growth rates were mostly around or above 3 percent. The rate began to decline in 2002, falling below 2 percent from 2008 onwards. At the start of the financial and economic crisis (in 2009) the rate of potential growth dropped to 1.1 percent. After that, however, a recovery began, with potential growth rates close to 2 percent from 2014, and above 2 percent from 2017 onwards. In the period between 2012 and 2019 the US potential growth rate was 80 percent higher than the EU15 average. With the US economic recovery progressing well, the rate of potential growth returned to roughly the same as in the middle of the previous decade. Considering the EU15 Member States, over the discussed period the largest difference occurred in relation to the M3 countries, and the smallest in relation to the N6 (or N5) countries.

SLOWING POTENTIAL GROWTH IN THE EU27

Between 2009 and 2012 the potential growth rate of the 'old' EU Member States (EU15) fell to around a third of its 2005–2007 level. The new Member States (EU12) also experienced a slowdown from the beginning of the crisis. However, their potential growth rate, as converging countries, was higher than in the EU15 Member States (on average 1.8–2.3 percent between 2009 and 2013, compared to 4.2–4.8 percent in the years immediately preceding the crisis). In parallel, the contribution of the labour and capital factors in the EU15 decreased significantly, and the share of investment relative to potential GDP fell by approximately 4 percent in this group. On average, the contribution of total factor productivity (TFP) to potential output was very low (0.3 percent per year) in the EU15 from the start of the crisis. Its rate rose above 0.5 percent only in 2017.

In the EU12 the financial crisis also led to a sharp decline in potential growth rates: from 4.2–4.8 percent in 2004–2007 to 2.3 percent in 2009 and 1.8–2.3 percent in 2010–2013, i.e. by more than half. Recovery intensified from 2014. The average potential growth rate increased to 3.1–3.4 percent per year between 2017 and 2019. In the EU13 the contribution of labour to potential growth was negative between 2009 and 2012. The share of investments fell sharply: from 25.6 percent in 2008 to 19.5 percent in 2012. In this context, the contribution of the capital factor to potential growth also decreased significantly. In parallel, TFP dynamics at the beginning of the crisis slowed down from 2–3 percent in 1999–2007 to below 1 percent in 2010, then rose to 1.6–2 percent per year in 2016.

After a sharp downturn at the start of the Great Recession, the growth potential of the EU27 remained permanently low. Potential output dynamics between 2010 and 2013 were 0.4–0.8 percent per year in the EU15 and 1.8–2.3 percent per year in the EU12. A moderate increase started at the end of the period indicated.

The medium-term outlook for the EU15 was unfavourably influenced by the sovereign debt crisis, primarily affecting the southern Member States. In the 'advanced' EU15[10] countries the potential growth rate ranged between 1.3–1.9 percent over the period 2015–2019, close to the pre-Great Recession dynamics.

The average potential growth rate of the EU13 increased to 2.6–3.4 percent per year between 2015 and 2019. This is approximately 60 percent of the pre-crisis rate. The contribution of the capital factor declined most spectacularly, with TFP dynamics also falling well short of the pre-crisis level (1.6–2 percent per year from 2016). At the same time, growth potentials in the individual countries varied greatly, with divergence becoming prevalent in this respect.

In the EU27 the rate of potential growth decreased steadily until 2012, and ranged between 1.2–1.5 percent in 2015–2019. This is just over half of the rate achieved a decade and a half previously, with unfavourable productivity developments as a crucial factor. The contribution of capital and total factor productivity failed to recover from the depressed 2009–2010 levels, and remained persistently low (around half of their former rate). The labour market trends were also unfavourable (primarily due to a significant slowdown in the working-age population growth rate). These growth outlooks pose new challenges for real convergence as well.

The cumulative effects of these factors are also significant. For the EU15, compared to the pre-crisis period in 2000–2007, the potential growth rate was much lower in 2008–2018. Due to lower dynamics, in the EU27 the rate of potential output was 17.3 percent lower in 2018 than in the previous growth period.[11] (The same level effect for the EU15 was 16,9 percent, and for the EU12 27,1 percent.)

POTENTIAL GROWTH IN THE MAIN GROUPS OF MEMBER STATES

The financial crisis affected the Member States to varying degrees. The symmetric shock had asymmetric consequences.[12]

The intensity of the impact of the financial crisis was determined by the initial circumstances and the related vulnerabilities of the individual Member States. The role of overvaluation in the housing markets, the export dependence and balance of payments position of the economies, as well as the size of the financial sector and exposure to risky assets could be significant. The potential growth rates, investment rates, structural unemployment (NAWRU), etc. varied significantly across Member States, also in connection with the above factors.

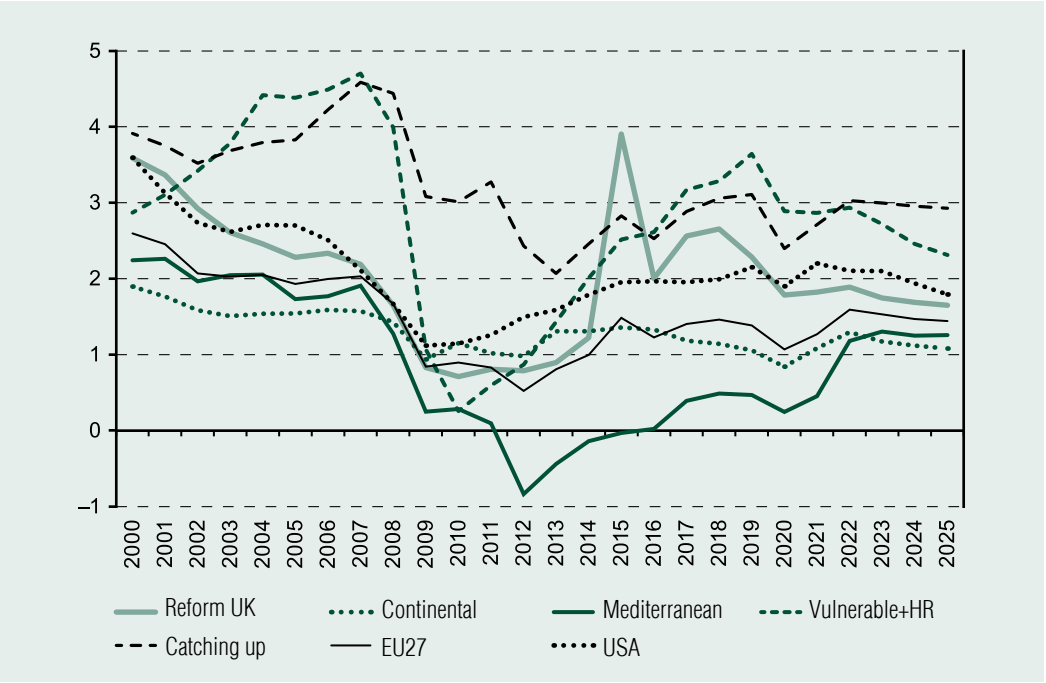
In the quantitative analysis presented below, the EU27 countries had been divided into five groups based on four main economic and economic policy characteristics. Three of the groups consist of countries progressing toward organic market economy: the 'continental', the 'reform' and the 'Mediterranean' Member States include the former EU15 and the two Mediterranean island nations that joined the EU in 2004.[13] [For the composition of the country groups indicated above as well as in the previous chapter (see Halmai, 2014, pp. 182–186). The 'new' Central and Eastern European Member States have fundamentally different institutional backgrounds, based on which their classification into a separate group is justified.]

The evolution of potential growth in each of the examined groups is shown in *Figure 2.* Based on the data, in relation to the individual groups of countries it is necessary to highlight the following:

The potential growth rates of the 'continental' countries declined steadily from the early 1990s. They slowed even further with the start of the financial crisis. During the recovery period this dynamic initially picked up slightly, reaching approximately 1.3–1.4 percent between 2013 and 2016, and then dropped back to 1.1–1.2 percent in 2017–

Figure 2

POTENTIAL GROWTH IN THE EXAMINED GROUPS OF COUNTRIES (EU27)



Source: own construction

2019, a rate even lower than in middle of the previous decade. (Note: the approximately 1.6 percent potential output dynamic achieved in 2004–2006 was also much lower than in the 1990s). The contribution of productivity remained permanently low (around 0.9 percent per year). The labour factor increased the potential output by 0.3–0.5 percent annually between 2013 and 2017. But in 2019, its contribution was less than 0.1 percent. Structural unemployment rates fell slightly in this group of countries. Meanwhile, in 2019 investment rates returned to the pre-Great Recession level.

In terms of growth performance, the 'reform' countries far outperformed the 'continental' group from the mid–1990s, and then again in the first half of the 2000s. During the crisis the decline in potential growth slightly exceeded that of the 'continental' countries. (Potential growth rates fell from 2.1 percent in 2007 to 0.8–0.9 percent annually in 2009–2012.) Some of the 'reform' countries experienced significant financial turmoil: high exposure to international capital flows, risky financial assets and toxic assets, and the bursting of the real estate bubble can have such an effect. As a result of these factors, investment rates fell by an average of 3.5 percent of potential GDP at the height of the crisis.

Until the middle of the 2000s, this group had been driven by the UK. After that, however, due to the factors described above, productivity trends in the UK began to diverge negatively from the reform countries. As these developments paradoxically coincided with Brexit, it was necessary to analyse data

for the 'reform' countries also without the United Kingdom (reform countries-UK).

In the latter group of countries, the rate of potential growth gradually declined after 2001, to 1.7 percent in 2008. With the onset of the Great Recession, this dynamic slowed to 0.8–0.9 percent between 2009 and 2013. Recovery ultimately led to dynamic growth: between 2015 and 2019 the potential output dynamic in the examined group of countries rose to 2–2.6 percent per year, similar to the rates of the early 2000s. As the contribution of the labour factor declined during the Great Recession, its positive effect in the years of recovery was significant (0.5–0.9 percent per year). This dynamic growth, however, was mainly driven by a robust increase in productivity (although the impact of TFP was lower than in the early 2000s). The investment rate rose to an exceptionally high level (25.7 percent in 2019) in the period 2015–2019. The growth performance of this group of countries (reform countries-UK) came closest to its preceding level within the EU, and exceeded the comparable US performance. The key players were DK, IE and SE.

In the 'Mediterranean' group of countries the potential growth rate gradually declined from 2002, reaching only 0.3 percent in 2009, after the start of the Great Recession. In 2012–2015 the change in potential output was negative, ranging between 0.1–0.8 percent per year. The contribution of the labour factor to growth was particularly unfavourable (negative) over a long period (2009–2016). Similarly, the capital factor between 2013 and 2016 and total factor productivity between 2011 and 2015 were also negative. Growth potential in this group of countries was non-existent in the years indicated. Investment rates declined by 8.4 percent of potential GDP during the crisis (and were almost 6 percent lower in 2019 than before the Great Recession). The NAWRU increased significantly until 2014, and declined only moderately during the economic recovery. Productivity and, in particular, total factor productivity remained extremely low all along, below the levels of the other two groups discussed. In terms of potential growth dynamics, the Mediterranean countries failed to converge with the more advanced EU Member States of the other two groups from 2008, but rather diverged from them.

The 'catching-up' new Member States converged steadily, but their potential growth rates remained below the preceding level even after the recession ended (4.2–4.6 percent in the years before the crisis, 2.1 percent at the height of the crisis, and again 3.1 percent in 2019). The pace of convergence was slow. Structural unemployment declined steadily. In 2019 the NAWRU was half of its pre-crisis level. Investment rates fell by nearly 5 percent at the height of the crisis, and then rose to over 21 percent. The contribution of the capital factor to potential growth decreased steadily after 2008, and then stagnated. TFP dynamics declined until 2012, then reached 1.9–2.1 percent per year in 2017–2019. Potential growth in this group was primarily driven by increased productivity, particularly total factor productivity.

In the 'vulnerable new' Member States the potential growth rates were outstanding, 4.4–4.7 percent per year in 2004–2007. Dynamics fell to 1.1 percent in 2009 and to 0.3–0.9 percent in 2010–2012, then picked up again, reaching 3.2–3.6 percent between 2017 and 2019. The labour factor had a negative effect as a consequence of the Great Recession. After 2014 it turned positive again, ranging between 0.1–0.4 percent per year. Investments relative to potential output fell by almost 10 percent (!) from the start of the crisis until 2016. The contribution of

the capital factor declined significantly in line with the decreasing capital accumulation rate (from 2–3 percent per year before the crisis to less than 1 percent between 2010 and 2018). The contribution of total factor productivity dropped from well over 3 percent in 2001–2005 to 0.2–0.3 percent per year in 2011–2012, then rose again during the recovery period, reaching 2 percent in 2017–2019.

Analysing the medium-term potential growth trends of the individual groups, the following main conclusions can be drawn:

The financial crisis led to considerably declining potential output levels, with a significant negative impact on the contribution of labour (non-demographic drivers, such as NAWRU), capital and total factor productivity to potential growth.

In terms of potential growth, each of the examined groups demonstrated significantly different trends. While the more advanced Member States generally reached or exceeded the EU27 average growth rate, the 'Mediterranean' countries fell considerably behind as a result of structural difficulties, including the sovereign debt crisis. (Their potential output declined steadily between 2011 and 2015). The potential growth rates of the less developed (below the average) Member States decreased significantly. As a result, the growth dynamics of the individual groups slightly converged with each other, with the exception of the 'Mediterranean' countries, (but not in terms of potential output levels.) This means that, in respect of potential growth, a relative and surprising convergence among groups of countries with fundamentally different situations may occur (see Figure 2).

Increase in labour productivity is a decisive factor for growth potential. However, its dynamics fell to an unprecedented low level during the crisis.[14] Productivity trends during the recovery period varied greatly. Dynamics were the highest in the 'catching-up' and 'vulnerable' new Member States followed by the 'reform' countries, and were the lowest in the 'Mediterranean' Member States. The latter were outperformed even by the 'continental' countries *(see Figure 3)*.

In some Member States real convergence ceased, with the possibility of divergence from the more advanced Member States. This convergence crisis could lead to serious tensions in the relevant Member States and within the EU already in the medium term.

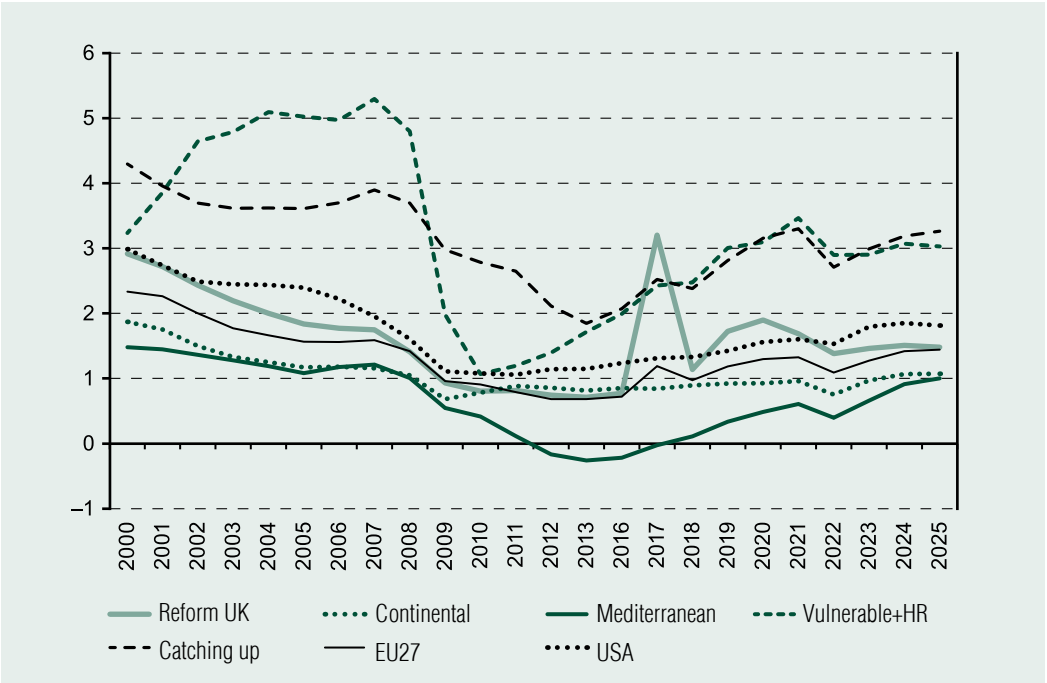
The US potential growth rate generally exceeded not only the EU15, but also the EU27. The growth performance of the EU27, however, is extremely varied. Catch-up growth towards the US potential output level could be achieved, with temporal differences, in the reform countries and, in average terms, in the discussed groups of the new Member States. Meanwhile, the Mediterranean Member States and, to a lesser extent, the continental countries drifted away from the US performance levels in the years after the Great Recession. The United States outperformed the EU average also in terms of labour factor and labour productivity impacts, and especially the Mediterranean and, to some extent, the continental countries. Catch-up growth therefore ceased in the enlarged EU as a whole following the financial crisis, signalling the collapse of the European growth model.

POTENTIAL GROWTH TRENDS IN THE POST COVID–19 PERIOD

Simulations based on the production function approach suggest for the EU14 annual potential growth rates just less than half of the US rates in 2020–2021. The difference is mostly due to varying productivity growth dynamics. At the same time, the potential growth rate of the EU

Figure 3

TRENDS OF LABOUR PRODUCTIVITY (EU27)



Source: own construction

N5 countries remained slightly above the US rate from 2014 and even during the Covid–19 crisis[15]. Productivity dynamics were similar to those in the US. (Within this, the impact of capital accumulation was slightly higher in the US, while total factor productivity was slightly higher in the EU N5.) Simulations suggest potential growth dynamics returning to the 2015–2019 level between 2022 and 2025 (see Halmai [2021]).

Starting from 2009, the annual potential growth rate of the 'advanced' EU Member States by far exceeded the comparable dynamics of the 'old' Mediterranean (M3) countries. This divergence indicated serious disturbances in the functioning of the euro area due to lack of desirable homogeneity, and it persisted throughout the Covid–19 crisis as well, with unfavourable productivity developments as a crucial factor. Between 2022 and 2025 the M3 will once again reach the average potential output dynamics of the 'advanced' EU Member States. Over this period, however, convergence capacity is still not seen for the Mediterranean countries.

Figures 4 and 5 provide an insightful picture of the growth models of the two groups mentioned (N5 and M3). The potential growth rate of the N5 countries came close to the performance of the preceding period after the post-Great Recession recovery (meaning the 2008–2009 financial and economic crisis), driven by productivity, and especially total factor productivity (see Figure 4). In contrast, the 'old' Mediterranean countries (M3) experienced a dramatic structural break after 2008, with productivity growth coming to a halt for many years. For the latter,

simulations suggest improving dynamics for 2022–2025 (Figure 5). However, this productivity growth will not be able to make up for the lost decade. In fact, the divergence between the 'old' Mediterranean Member States and the 'advanced' EU countries may not even decrease during this period.

In several respects, the trends are different for the 'new' Central and Eastern European Member States (see Halmai [2021]).

The presented simulations suggest no permanent decrease in potential growth dynamics as a result of the Covid–19 crisis. However, a break from 2022 onwards with significant additional risks to growth potential will result from the shock caused by the war. Regardless of these uncertainties, it can be concluded that the Covid–19 crisis may have a lasting level effect. Under the baseline assumptions of the simulation (including unchanged policies), this loss cannot be offset in the years following the crisis.

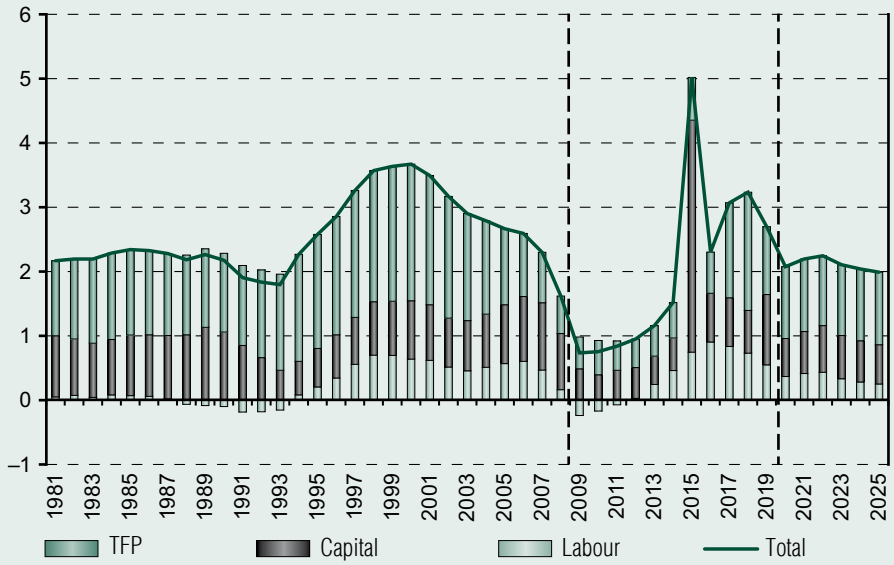
Other risks also need to be highlighted. A series of prolonged shocks would permanently reduce growth potential. In other words, permanent shocks combined with Europe's already existing growth potential problems would lead to serious consequences. Avoiding this risk is the fundamental interest of all EU Member States.

SOME CONCLUSIONS

Analysing the trends of potential growth and growth potential can reveal fundamental

Figure 4

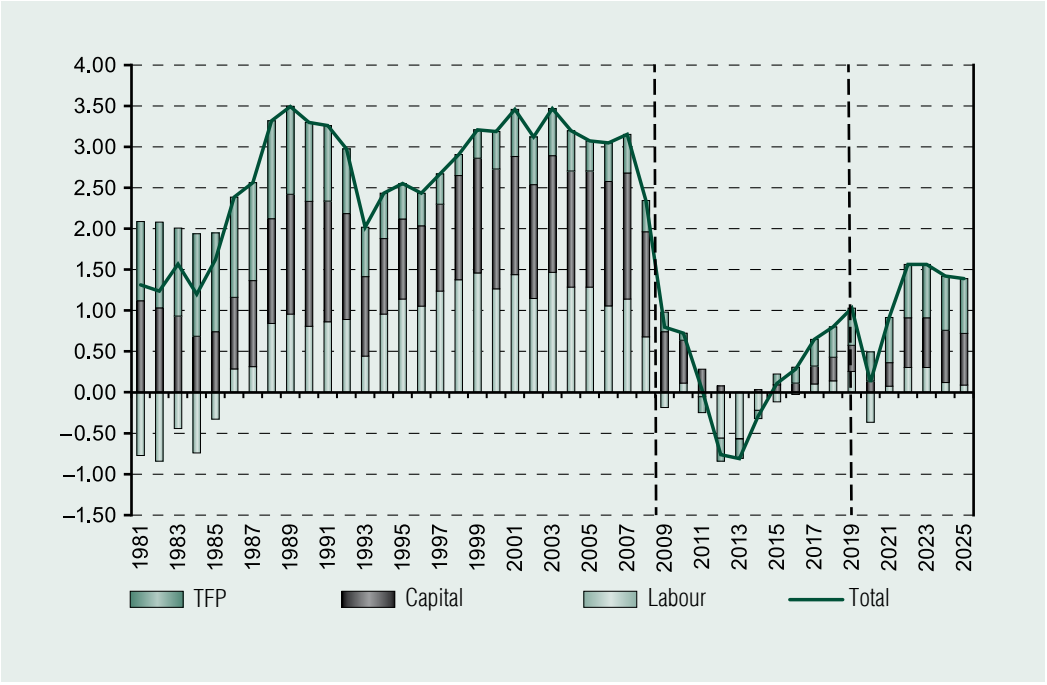
GROWTH MODEL OF THE EU N5 COUNTRIES (POTENTIAL GROWTH AND ITS MAIN FACTORS)



Source: own construction

Figure 5

GROWTH MODEL OF THE EU M3 COUNTRIES (POTENTIAL GROWTH AND ITS MAIN FACTORS)



Source: own construction

sustainability correlations primarily concerning the economic aspects of sustainability.

The *equilibrium* growth path is potential growth, which, in the long term, depends on supply-side factors. Demographic correlations and the evolution of total factor productivity (TFP) are determining structural factors. In the advanced countries of the world economy, the latter may increasingly become the main driver of growth. Total factor productivity is a broad category in which, in addition to technological level, the role of the institutional, policy and cultural factors is critical. At the same time, demographic developments, including ageing as a key issue for economic and social sustainability, require particular attention.

Europe's growth potential started to erode several decades ago, at first in a latent and then in a more open way, primarily due to a productivity gap compared to the world's leading economy that has persisted since the mid–1990s. In the past two decades the potential growth rate of the EU has halved, with the possibility of further slowdown. This, on the whole, signals the collapse of the European growth model (Halmai, 2014, 2018). It is a serious challenge for the convergence mechanism as well, which is key to the economic and social sustainability of European integration.

The probability of lasting effects on potential growth is much higher after the 'big crises' than in previous recessions. In addition to the initial level effect, these factors may also lead to declining potential growth rates in the EU Member States in the medium to long term. The key question is: will the

shocks have a lasting impact on Europe's growth potential? Potential growth rates could be permanently affected by declining investments and labour market hysteresis. The former could have a negative impact on productivity. Persistent shocks could lead to increasing inequalities, with negative effects on social cohesion. Future developments in divergence among the EU Member States are critical. Its possible increase could disrupt the functioning of the euro area and the internal market. At the same time, further wave(s) of the pandemic would create additional external shocks. Avoiding the former can be an important policy priority. In the event of a new wave of Covid–19, however, the experience gained so far could result in adequate policies to successfully mitigate the possibility of output decline.

The crises of the past one and a half decades affected the EU Member States to varying degrees. The symmetric shock had asymmetric consequences. The pace of recovery was varied. Growth patterns across the EU proved to be divergent. The differences in equilibrium status and in the need to reduce debt alone led to significantly different growth opportunities for the individual Member State. As a result, investment rates declined significantly in some Member States, while structural unemployment increased permanently. In other countries conditions were more favourable. The mostly vulnerable Member States with external imbalances were forced to improve their current account balances, increase exports, and restrict internal demand. This was generally accompanied with decreasing unit labour costs in order to regain external competitiveness.

In terms of potential growth and the contribution of the individual factors, the quantitative analysis suggests that the least favourable trends in the post–2008 period occurred in the 'Mediterranean' (M3 and M6) Member States. In the 'Mediterranean' countries the catch-up process stopped in the period under review (over the medium term), with divergence from the advanced Member States possibly persisting for several years. The catching-up of some new Member States stalled during the crisis period, or even turned into temporary divergence. For the continental countries, declining growth potential is a major problem. At the same time, some of the most developed Member States (e.g. DK, IE, SE) that belong to the 'reform' countries have outstanding growth potential, in some respects even higher than the world's most advanced countries, and most importantly, high TFP levels and dynamics.

Increasing productivity can be a permanent source of potential growth in EU Member States. Its main structural determinant is the dynamics of total factor productivity. In this respect the level and dynamics of performance vary greatly across the EU. Narrowing the performance gaps compared to the leading economies through major structural reforms can be a crucial factor in strengthening the growth potential.

At the same time, the cleansing effects of crises encouraging structural change and reallocation of resources can also provide new opportunities for total factor productivity growth. The loss of growth potential can be reduced by rapid resource reallocation. Integration into the global and continental value chains can foster fast structural transformation. Disruptions in reallocation can lead to poorer utilisation of resources and higher unemployment levels.

Exploring potential growth and growth potential is key to determining and applying the right policies (policy mix). The presented projections of potential growth assume no changes in policies. Unfavourable trends,

in principle, can be counterbalanced or at least mitigated by material changes to macroeconomic policies and the implementation of profound structural reforms. Analysing the determinants of growth potential can help justify the inevitable structural reforms and macroeconomic adjustments, and can thereby contribute to the development of an economic theory of sustainability. ■

Notes

[1] NAIRU: Non-accelerating inflation rate of unemployment, i.e. the level of unemployment below which inflation would be expected to rise. NAIRU is a theory associated with Edmund Phelps.

[2] On the subject see for example D'Auria et al (2010), Denis et al. (2006), Havik et al. (2014), Halmai (2014).

[3] For example, the Taylor rule also includes the output gap, in addition to the inflation difference when describing monetary policy behaviour. An output gap with a positive sign may indicate future inflation and with a negative sign may indicate possible deflation.

[4] See Halmai (2014), chapter 1, in particular paragraphs 1.3 to 1.8.

[5] For the concept see Elmeskov–MacFarland (1993), Elmeskov (1994).

[6] See Halmai (2014), paragraph 1.4.

[7] The EU15 (from 2020 EU14) countries have been divided into three groups:
- The founding six (F6) are the six countries (DE, FR, IT, B, NL, L) that founded the European Economic Community (EEC) in 1958. (Continental European model.)
- The 'new' member states (N6) are the more developed countries that joined the European Communities and the European Union in 1973 and 1995 respectively: the UK and IE, which belong to the 'Anglo-Saxon' model; DK, FI and SE, which belong to the 'Scandinavian' model; and finally AT. (We also examined an 'N5' group removing data for the UK.)
- Mediterranean member states (M3): Greece (EL), which joined the EU in 1981, and the Iberian countries (ES and PT), which joined in 1986. (Mediterranean model.)

[8] Calculations were based on data from the EPC OGWG panel. The raw data were grouped, processed and analysed by the author.

[9] For the countries that joined the EU between 2004 and 2007 (EU12, and from Central and Eastern Europe: EU10), data of similar quality are available only from 1995. The EU15 and EU12 countries plus Croatia, which joined the EU in 2013 (EU13), together form the EU27 according to the status as of 1 February 2020. These groups of countries will also be analysed at a later stage. For HR, however, growth accounting data of adequate quality are only available from 2003 onwards.

[10] EU15 without the M3 countries and IT.

[11] Own calculation. The former value is the average potential growth rate between 2000 and 2007. It should be noted that in the years immediately preceding the crisis, the potential growth rate

had already declined compared to the above indicated period, due to latent erosion. Thus, based on the period immediately preceding the crisis, the level effect was lower than indicated above.

[12] Actually, the external shock also affected the Member States differently (e.g. according to the degree of financial intermediation, or the varying proportions of non-bank financing). At the same time, the crisis brought about serious country-specific problems, for example in terms of overheated real estate markets or public finances. These may explain the diverging trends of the individual countries or groups of countries to a significant extent.

[13] For want of a better term, this group can be called EU17. However, due to the small weight of the two island countries, their aggregates are not presented in this study.

[14] The time series starting from 1981 never had such low values as in 2009–2018.

[15] On the growth effects of the Covid-19 crisis see e.g. Autor–Reynold (2020), Baker at al. (2020), Bodnár et al. (2020), Boissay–Rungcharoenkitkul, P. (2020), Donadelli et al. (2021), Fornaro–Wolf (2020), Furceri et al. (2021), Halmai (2021, 2022), Heimberger (2020), Ilzetzki (2021), Licchetta–Mattozzi (2022), Pollit (2020), Pujol (2020), Pfeiffer et al. (2020).

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