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Productivity, Sources of Growth and Potential Output in the Euro Area and the United States

The measurement and analysis of potential output depends crucially on the long-term growth trend of productivity. In combination with the development of the labour supply, potential output determines the highest possible level of output which could be achieved by the potential labour force (assuming some natural rate of unemployment) and the capital stock that can be employed, without inflationary pressures, and given the state of technology.

However, the actual measurement and analysis of the output gap is a tricky business. This is in part related to measurement issues with regard to actual output. In the light of the prelude to the current crisis, it is especially important to look at the reliability of measures of ICT production and services output, which have been among the key drivers of rapid growth during the late 1990s and early 2000s. The other problem with output gap analysis is that there are many moving parts (actual output, potential output and the drivers of both), which has important implications for the interpretation.

Currently there is strong evidence that a large output gap, i.e. a fall in the level of output relative to the potential output level has arisen as a result of the recession which started in late 2008. But the various estimates differ strongly. For example, according to the Congressional Budget Office the output gap in 2009 has been estimated to be as high as 6% in the USA.¹ The OECD put the US output gap at -4.9% and for the Euro Area at -4.5% in 2009.² The European Commission, in its Autumn Forecast, arrived at only 3.5% for the USA and 2.9% for the Euro Area.³ Similar differences arise for the output gap estimates for 2010 and beyond. These are partly the result of varying forecasts of actual output growth. Some forecasts suggest that the economies in the USA and Europe may recover rapidly in 2010 as the recession effects wane, so that the output gap may close within a year or two. Others argue that we will face several years of overcapacity of labour and capital, low inflationary (if not deflationary) risks and easy monetary policy. At least as important for the output gap estimates is the level of potential output

and its change over time. One argument is that the potential output growth rate itself may have come down under the influence of the crisis, thereby shrinking the size of the output gap. Long recessions, such as the current one, may bring economies to a lower growth mode than before the recession. In this light it is also important to revisit the potential output growth before the recession.

In this note we aim to shed some light on the causes of the past acceleration in potential output growth, the recent slowdown and the impact on output gap measures from the perspective of productivity, which is a key component in potential output measures. In the next section we focus on the actual measures of output and productivity growth, and the growth contributions during the past 15 years. Following that we discuss the implications of the recent productivity measures for the measurement and interpretation of potential output growth.

Recent Productivity Developments and the Long-run Trend

Productivity is pro-cyclical, and one should therefore not be surprised by the significant productivity decline that the world economy has experienced in 2009. According to the latest estimates by The Conference Board (January 2010), output per person employed declined at 1% on average for the global economy, and at 1.2% for the advanced economies (mostly OECD).⁴ Output falls more rapidly than employment when entering the recession. Hence productivity growth slows. In per-hour terms, the labour productivity slowdown is somewhat more moderate, as (in particular during the current recession) firms not only – or even not primarily – cut employment, but the working hours of employees who remain on the payroll. For example, the drop in output per person employed in the Euro Area was 2.2% in 2009, but in terms of output per hour it fell by only 1%, because labour input declined not only due to job cuts at 1.9%, but also because average hours per person fell by another 1.2% (Table 1).

One major exception to the stylised fact of pro-cyclicality was the productivity performance of the United States in 2009, which showed a growth rate of +2.5% in per-hour terms. American firms cut jobs much more aggressively

¹ Congressional Budget Office, 2009.

² OECD: OECD Economic Outlook, Paris, November 2009.

³ European Commission: European Economic Forecast, Brussels, autumn 2009.

⁴ See <http://www.conference-board.org/economics/database.cfm>.

Table 1
Growth of Labour Productivity, Real GDP and Labour Input, 1995-2010

	United States	Euro Area	United States	Euro Area
	GDP per hour		Real GDP	
1995-2004	2.5	1.5	3.3	2.2
2004-2007	1.5	1.1	2.6	2.5
2008	1.4	0.1	0.4	0.6
2009 (estimate)	2.5	-1.0	-2.5	-4.1
2010 (projection)	3.0	2.0	2.3	0.8
	Persons Employed		Total Hours Worked	
1995-2004	1.2	1.2	0.8	0.8
2004-2007	1.6	1.4	1.3	0.1
2008	-0.4	0.7	-0.9	0.4
2009 (estimate)	-3.6	-1.9	-5.1	-3.1
2010 (projection)	-0.7	-1.2	-0.7	-1.1

Note: Growth rates are based on the difference in the log of the levels of each variable.

Source: The Conference Board Total Economy Database, January 2010.

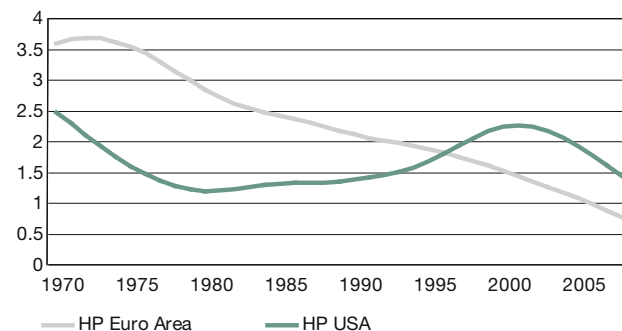
than in the Euro Area (3.6% versus 1.9%) and in addition reduced the working hours of those remaining on the payroll by 1.5% (versus 1.2% in the Euro Area). For 2010, US productivity is projected to grow even faster at 3% as output recovers but employment continues to drop, albeit at a diminished rate relative to 2009. In Europe, productivity is also likely to return to positive growth rates in 2010 with lesser but still negative labour hours growth relative to 2009.

Is the cyclical recovery in productivity growth also the beginning of a reversal in the long-term trend for both economies? This is an important question to answer because the productivity trend, together with the long-term development of the labour force, determines the change in potential output. Indeed the Euro Area has shown a long-term declining trend in productivity growth since the mid 1990s, but was joined by the United States in 2004 when that country's productivity growth rate also began to slow compared to previous years (Figure 1).

To answer the question as to whether the long-term declining productivity trend might reverse coming out of the recession, we first need to look at what constituted the productivity trends before the recession. Especially, we need to focus on the sources of output and productivity growth, from both an aggregate as well as an

Figure 1
Labour Productivity Growth Trend

(Output per Hour Worked)



The trend is based on a Hodrick-Prescott filter using a smoothing of $\lambda=100$, as is customary for annual data.

Note: Data for Euro Area start from 1990. We link the EU15 growth rate to the Euro Area growth rate for the years before 1990.

Source: The Conference Board Total Economy Database, January 2010.

industry perspective. The latter can be done by making use of the latest estimates of the EU KLEMS Growth and Productivity Accounts, released in November 2009, which provides estimates by industry group up to 2007.⁵ As aggregate estimates for the Euro Area are not yet available, we compare the sources of output growth for the market economy in France and Germany relative to the United States, and separately for major sectors (manufacturing, construction, distribution – including the retail and wholesale sectors and hotels and restaurants – and finance and business services) (Table 2). The table compares the contributions of these growth sources by sector for 1995-2004 (before the trend slowdown in the USA) and 2004-2007 (the slowdown period, before the recession).

Whereas European countries have experienced a declining trend in labour productivity for several decades now, the United States saw an upward trend beginning in 1995, due to a rise in ICT production and ICT investment in services, in particular in the distribution sector.⁶ While there has been general agreement on the growth contribution from ICT productivity and investment, the strong productivity growth in the US services sector has been challenged, as it could have been the result

⁵ See www.euklems.net.

⁶ B. van Ark, M. O'Mahony, M. P. Timmer: The Productivity Gap between Europe and the USA: Trends and Causes, in: *Journal of Economic Perspectives*, Vol. 22, No. 1, Winter 2008, pp. 25-44.

Table 2
Sources of Growth, 1995-2007

	Percentage point contributions from					
	Value added	Hours	Labour quality	ICT capital	Non-ICT capital	TFP growth
France, 1995-2004						
Market economy	2.5	0.4	0.4	0.4	0.5	0.8
Manufacturing	2.1	0.3	0.4	0.3	0.6	0.6
Construction	2.6	-0.4	0.3	0.3	0.3	2.1
Distribution	2.4	0.8	0.4	0.3	0.6	0.4
Finance & business serv.	2.9	1.7	0.4	0.8	0.9	-0.9
France, 2005-2007						
Market economy	2.4	0.5	0.2	0.2	0.5	1.0
Manufacturing	3.0	3.1	-0.1	0.1	0.9	-0.9
Construction	3.0	3.1	-0.1	0.1	0.9	-0.9
Distribution	2.6	0.0	0.3	0.2	0.6	1.5
Finance & business serv.	3.8	1.4	0.1	0.3	1.0	1.0
Germany, 1995-2004						
Market economy	1.1	-0.5	0.1	0.5	0.5	0.4
Manufacturing	1.4	-0.2	0.1	0.4	0.7	0.4
Construction	3.1	0.2	0.3	0.3	0.5	1.8
Distribution	1.8	-0.4	0.1	0.3	0.3	1.5
Finance & business serv.	1.4	1.5	0.1	1.5	1.6	-3.4
Germany, 2005-2007						
Market economy	2.4	0.2	-0.2	0.4	0.4	1.6
Manufacturing	-1.7	0.2	0.1	0.0	-0.5	-1.5
Construction	-1.7	0.2	0.1	0.0	-0.5	-1.5
Distribution	2.4	0.0	-0.3	0.4	0.5	1.8
Finance & business serv.	3.9	1.4	-0.4	0.9	1.1	0.9
United States, 1995-2004						
Market economy	3.8	0.4	0.3	1.1	0.5	1.4
Manufacturing	3.2	0.6	0.2	0.8	0.8	0.7
Construction	1.9	-1.0	0.4	0.6	0.5	1.4
Distribution	5.2	0.4	0.3	0.8	0.4	3.2
Finance & business serv.	4.6	1.2	0.4	2.1	0.9	-0.0
United States, 2005-2007						
Market economy	2.7	1.1	0.2	0.6	0.4	0.4
Manufacturing	2.5	0.9	0.2	0.5	0.7	0.2
Construction	-5.6	2.5	-0.3	0.3	0.4	-8.5
Distribution	0.8	0.6	-0.0	0.6	0.5	-0.9
Finance & business serv.	7.4	3.1	0.4	1.0	0.4	2.6

Source: EU KLEMS Database, November 2009.

of extraordinarily high consumer expenditure fuelled by cheap household credit.⁷ Applying this argument to the distribution sector, it seems that scale effects

7 Michael Biggs, Thomas Mayer: The output gap conundrum, in: *Intereconomics*, Vol. 45, No. 1, 2010, pp. 11-16.

from increased demand may have played some role in productivity for the distribution sector. But it is difficult to relate this directly to increased household debt in the United States. The acceleration in retail output and productivity occurred mainly during the late 1990s and early 2000s, while most of the rise in household debt occurred later, from 2003-2007. At the same time there has been significant evidence of genuine technology and innovations effects on productivity in the retail and wholesale sectors, due to extensive ICT applications during the late 1990s and early 2000s. This has been an important contributing factor to the rise of highly productive “big box” retail outlets in the United States. Moreover, retail prices in distribution have also come down rapidly as a result of cheaper goods from emerging economies, providing consumers with an additional gain.⁸

Since 2004-2007 the United States saw a slowdown in productivity growth and joined the Euro Area, which has seen a long-term decline in the productivity trend since the 1970s. This growth slowdown in the USA was related to an output and productivity decline in manufacturing, construction and distribution services, with financial and business services being the main exception. In contrast to distribution, the finance and business services sector in the United States experienced a significant acceleration in its output and productivity performance since 2004. While part of this acceleration may be the result of output gains in finance, including securities, its impact on the aggregate result is limited. In fact the aggregate financial industry in the USA showed no acceleration in output growth after 2004, as the slow growth in insurance output offset the acceleration elsewhere in the financial sector. In contrast, business services accelerated growth from 4.8% from 1995-2004 to 9.8% from 2004-2007. Productivity growth in business services also accelerated more after 2004 (3.2%) compared to financial services (1.7%).

In Europe (exemplified by France and Germany), the productivity trend has continued to decline after 2004. However, in both countries, the major service sectors, distribution and finance and business services, showed an improvement in output and productivity performance since 2004. This partly reflected a peak in the business cycle and some delayed effects of ICT technology on those industries in Europe.

8 R.H. McGuckin, M. Spiegelman, B. van Ark: The Retail Revolution. Can Europe Match USA Productivity Performance?, in: Research Report R-1358-05-RR, The Conference Board, New York 2005.

Table 3
Potential Output and GDP Growth Rates, USA and Euro Area

	United States	Euro Area
Potential output growth, 2000-2004	3.3	2.0
Potential output growth, 2004-2008	2.6	1.9
Potential output growth, 2011-2016	2.3	1.6
GDP growth projected, 2011-2016	2.0	1.0
Required growth to close output gap	3.7	3.2
1995-2005 GDP growth	3.2	2.1

Source: The Conference Board, November 2009.

In sum, one cannot assign the productivity gains in services primarily to an increase in household debt, because of the differences in timing and sector effects. Instead technology and innovation and lower prices seem to have been the major sources of productivity growth. There is strong evidence that the labour productivity growth acceleration in the late 1990s and early 2000s was related to the ICT boom and rapid installment of ICT capital across the economy. This technology gain was strongest in the USA as a result of the strength of the IT industry as well as the rapid increase in use of IT in services industries, especially in distribution and finance and business services. While the dot-com bubble and the rise in household consumption may have played a temporary role in speeding up the productivity gains due to scale advantages, the ICT technology effects must be regarded as genuine and permanent as they don't disappear during a crisis. The long-term productivity growth rate for the Euro Area seems to have been lower than in the United States as technology did not transfer as easily into output and productivity growth. However, since 2004 the United States also saw the opportunities for ICT applications decline, leading to an erosion of productivity gains in service industries. As a result potential output growth seems to have gradually slowed since the mid-2000s.

The Impact of Productivity on Potential Output

Productivity, together with the long-term development of the labour force, is the main determinant of potential output. During the late 1990s, potential output growth in the United States was above 3%, but it gradually slowed to around 2.6% on average since 2004, mainly as a result of the slowdown in productivity growth. In the Euro Area potential output growth was much lower, at around 2%

for most of the decade before the recession (Table 3).⁹ The strong increase in household debt since 2003 may have increased consumption to unsustainable levels, but there is little evidence that this translated into higher productivity growth during that period.

However, in going forward there may be a significant effect of the current recession on the potential output level, because its growth rate is not a constant in the medium term. In particular, if the recovery from the recession is slow, idle machinery may get scrapped prematurely, and discouraged job-seekers may drop out of the labour force definitively. More important, incentives for innovation may drop and slower productivity growth occur. Because of the large systemic effects of the current global financial and economic crisis, the growth of potential output is likely to slow to 2.3% in the United States, and to 1.6% in Europe from 2011 to 2016.¹⁰ As a result, the output gap may narrow faster than expected. However, even after lowering the potential output growth, the projected growth rates for GDP are still lower than for potential output. For example, The Conference Board's medium-term projection of actual output growth in the United States is 2% for the period 2011-2016, and only 1% in the case of the EU. In order to close the output gaps by 2016, the actual growth in the USA would have to be 3.7% from 2011-2016, and in Europe 3.2%. For comparison, these are much higher growth rates than those achieved during the "rapid growth phase" from 1995-2005. As the underlying trend in labour force growth is likely to be slow, most of these effects would have to come from productivity growth, which seems a big challenge.

To conclude, there is good reason to adjust the long-term US productivity growth rate downwards. The structural problems which the US economy is facing may hold recovery back and therefore lead to a gradual erosion of productivity. The European Union will also need to address remaining structural problems before the productivity trend is likely to strengthen. A continuation of growth initiatives as implemented through the Lisbon agenda, such as the strengthening of technology and innovation and continued reforms in product markets, especially in services, will be crucial elements of the upcoming Europe 2020 agenda.

⁹ B. van Ark, K. Bostjancic: Economic growth in the EU in the age of globalisation: issues and policies, The Conference Board, 5 March 2009, available at http://ec.europa.eu/dgs/policy_advisers/docs/van_ark1.pdf.

¹⁰ B. van Ark: Global Economic Outlook 2010 and Beyond, StraightTalk, The Conference Board, November 2009.