Does the European Union need to revive productivity growth

Ark, Bart van

University of Groningen

Groningen Growth and Development Centre

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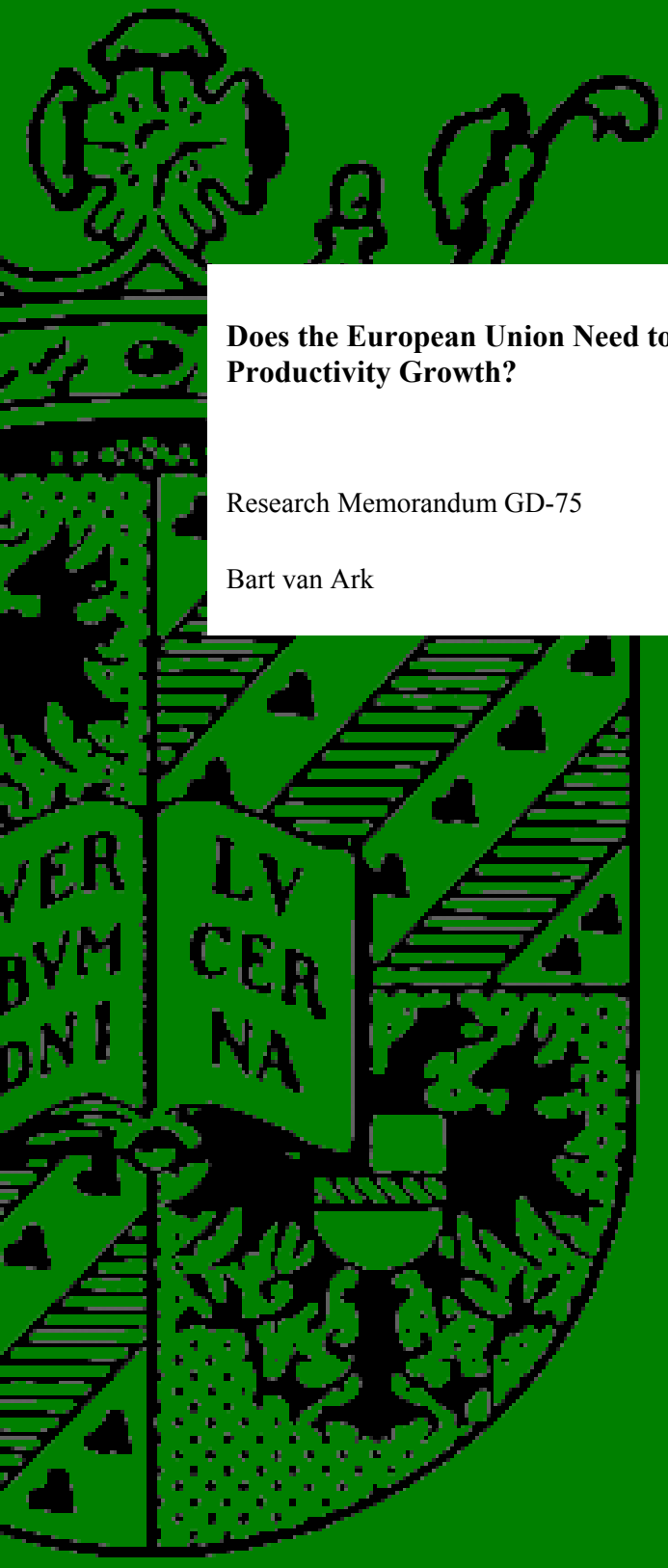

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Research Memorandum GD-75

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RESEARCH MEMORANDUM

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Bart van Ark[1]
Groningen Growth and Development Centre
University of Groningen

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[1] This paper is largely based on earlier work, including van Ark et al. (2003a, 2003b), O'Mahony and van Ark (2003), McGuckin and van Ark (2004) and Timmer and van Ark (2005).

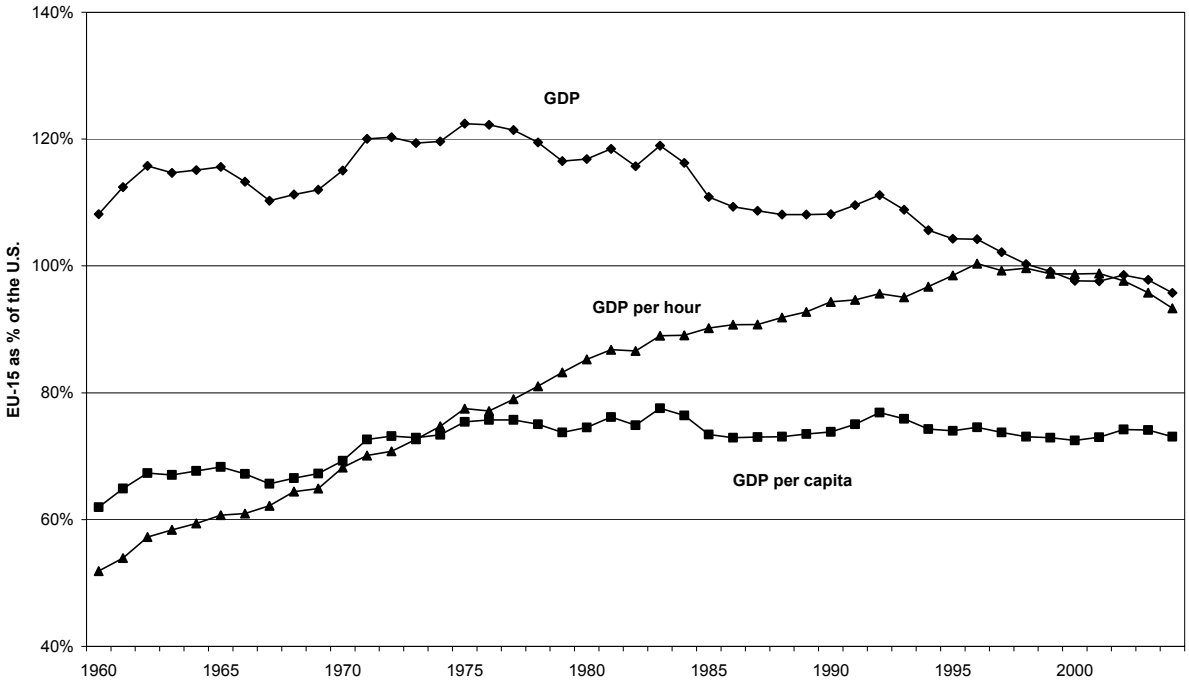
1. Introduction

During the second half of the 1990s the comparative growth performance of Europe vis-à-vis the United States has undergone a marked change. For the first time since World War II labour productivity growth in most countries that are now part of the European Union (EU) fell behind the U.S. for a considerable length of time. Until the beginning of the 1970s rapid labour productivity growth in the EU went together with a catching-up in terms of GDP *per capita* levels on the U.S.. A first break in this pattern occurred in the mid 1970s. While catching-up in terms of labour productivity continued, the gap in GDP *per capita* levels between the EU and the U.S. did not narrow any further after 1975 (see Figure 1). This differential performance reflects the slowdown in the growth of labour input in Europe, which was related to increased unemployment, a decline in the labour force participation rates and a fall in average working hours. The second break, which is the focus of this paper, occurred in the mid 1990s when the catching up in terms of labour productivity also came to a hold once the average EU level reached the U.S. level. In fact a new productivity gap opened up since 1995. Whereas average annual labour productivity growth in the US accelerated from 1.3% during the period 1980-1995 to 1.9% during 1995-2003, EU productivity growth declined from 2.3% to 1.3%.[2]

The striking acceleration in U.S. output and productivity growth in the mid 1990s has been much discussed in the literature. A consensus has emerged that faster growth can at least in part be traced to the effects of the information and communication technology (ICT) revolution (Oliner and Sichel 2000, 2002; Jorgenson and Stiroh 2000; Jorgenson, Ho and Stiroh, 2003), which in turn has depended on a surge in ICT investment, strong productivity effects from ICT-producing industries and a more productive use of ICT in the rest of the economy. In addition the U.S. economy has also benefited from a greater flexibility of markets in allocating resources to their most productive uses. This is partly realised through the labour market, as the substitution of low-skilled for high-skilled labour has proceeded more smoothly and the restructuring of the economy was not hindered. It has also been realised through product markets, in particular through the creation of new opportunities for productive applications of ICT mainly in service industries and service-related activities in manufacturing. Finally, the combination of reforms and adoption of new technologies has supported creativity of firms and entrepreneurs to develop new products and services and to reshape the organisational and production processes by which these are brought to the market.

[2] Business cycles in the U.S. and the EU are not completed synchronised. However, the divergent trend growth rates are clear.

Figure 1.
GDP, GDP *per capita* and GDP per hour, 1955-2003



Note: EU refers to 15 EU membership as before 1 May 2004.
Source: Groningen Growth and Development Centre and The Conference Board (2004)

Unfortunately there is much less consensus on the causes of the slowdown in Europe. Indeed the reasons for the limited impact of technology, innovation and structural reforms on economic growth in Europe are still poorly understood. The urgency to better grasp the causes of the problems is underlined in the recent review by the Kok Commission of the Lisbon agenda for reform in Europe, which aims to improve Europe's competitiveness (European Commission, 2004). Indeed, the Kok report strongly argues for a revival of productivity growth in Europe, in particular in the light of demographic trends towards a smaller labour force relative to the total population in Europe.

At the same time, however, there is also considerable diversity in terms of both productivity growth as well as comparative levels between European countries. Comparative growth rates of labour productivity between 1995 and 2003 differ between –0.2 per cent (for Spain) and 5.4 per cent (for Ireland). And there is a variation of plus 21 percentage points (for Belgium) and minus 47 per cent (for Portugal) in terms of each country's productivity level relative to the US in 2002. Hence although there are also some common traces to the European growth problem, one cannot simply treat the European area as homogeneous.

These developments – the application of ICT and the introduction of modern techniques and innovation more generally, and the structural reforms of the economy - cannot be fully understood without adopting an industry perspective to output, input and productivity performance. Thus there is a need to go beneath the aggregate numbers to ascertain to what extent variations across countries are

largely explained by industry structure. In addition it needs to be considered whether these features are common to all or just a subset of EU countries.

This paper argues that the European slowdown in growth is a reflection of an adjustment process towards a new industrial structure, which has developed more slowly in the EU than in the US. Rapid diffusion of new technology will facilitate the adjustment process in the future. However, an institutional environment that slows down change may hold up the structural adjustment process in Europe and inhibit the reallocation of resources to their most productive uses. The European economic environment creates too little room for good firms to excel and for failing firms to exit the market so as to free up resources for the much-needed transition.

This paper begins with a brief review of the aggregate estimates of productivity and per capita income in order to identify the extent to which labour market developments rather than productivity has impacted the comparative performance of the EU relative to the U.S. (**Section 2**). I then proceed to examine differential growth performance at industry level (**Section 3**). In particular I distinguish between industry groups that are typically characterized as producers of ICT, intensive users of ICT – measured by their investment intensity – or less intensive ICT users. I identify the specific role of *intensive ICT-using industries in services* as the key to understanding the productivity differential between the EU and the U.S.. I then focus more specifically on the role of services by identifying the possible reasons for differences in productivity growth rates, namely (1) problems with macro-economic measurement of service performance, (2) a genuine shortfall in innovative capacity of service industries in Europe, and (3) a lack of reforms to exploit the productivity potential of service innovation (**Section 4**). In the final section, I focus on the question whether the European Union needs to change or intensify its strategies to revive productivity growth (**Section 5**). My argument is that a specific productivity agenda is not needed. Instead policy mechanisms, such as macroeconomic management, existing innovation and reform policies and some horizontal policy measures (in particular education policies) should be reconsidered for their effects on the allocation of resources and their effects on productivity at industry and aggregate levels of the economy.

2. A Trade-off between Labour Intensity and Productivity?

Table 1 shows the growth rates of per capita income (measured as GDP per capita) and labour productivity (measured as GDP per hour worked) for major regions in the world economy with a breakdown to individual European countries. The table shows a large variation in per capita income and productivity growth rates in European countries. Within the "old" EU-15, the variation of productivity growth is between -0.2% (for Spain) and 5.4% (for Ireland) between 1995 and 2003. Productivity growth in the new member states is higher but also varies much between -0.7% (Malta) and 13% (Lithuania) during 1995-2003.

On average EU labour productivity growth is not only slower than in the U.S., but also compared to Japan and the average of other OECD countries. In terms of GDP per capita growth, the differences are not as big. Between 1995 and 2003 EU-25 per capita income growth was about the same as in the U.S. and substantially higher than in Japan.

GDP per capita growth is driven by an increased input of labour and/or labour productivity growth. Indeed one can simply show that the *difference* in the growth rates of average per capita income and labour productivity can be accounted for by changes in a range of labour market and population indicators (see van Ark and McGuckin, 1999; McGuckin and van Ark, 2004). First, the growth in income per head of the population ($\Delta O/P$) is a function of the change in labour productivity ($\Delta O/H$) and labour intensity, expressed as the number of working hours per head on the population ($\Delta H/P$):

$$\Delta O/P = \Delta O/H * \Delta H/P \quad (1)$$

The change in working hours per person can be decomposed into the change in hours worked per person employed *(H/E)* and the change in the share of employment in the total population *(E/P)*:

$$\Delta H/P = \Delta H/E * \Delta E/P \quad (2)$$

Table 1: Growth Rates of Per Capita Income and Labor Productivity Growth, 1980-2003

	GDP per capita				*GDP per hour worked*			
	1980-1995	1990-1995	1995-2003	of which 2000-2003	1980-1995	1990-1995	1995-2003	of which 2000-2003
European Union (EU-15, present)(a)	1.7	1.0	1.9	1.0	2.3	2.3	1.5	1.0
Austria	1.8	1.2	1.8	0.8	1.7	1.8	2.5	1.4
Belgium	1.6	1.3	1.8	0.6	2.0	2.3	1.7	0.0
Denmark	1.8	1.6	1.7	0.7	2.5	2.4	1.7	1.2
Finland	1.3	-1.4	3.4	1.5	2.7	2.6	2.8	2.4
France	1.4	0.6	1.7	0.8	2.4	1.4	2.1	1.5
Germany	1.6	1.0	1.1	0.2	2.6	2.7	1.9	1.2
Greece	0.9	0.6	3.5	3.9	0.9	0.6	2.6	2.9
Ireland	3.6	4.1	6.9	4.0	3.7	3.6	5.4	4.6
Italy	1.8	1.1	1.3	0.6	2.1	2.3	0.6	-0.4
Luxembourg	3.5	2.5	3.8	1.0	2.9	2.3	1.2	-1.1
Netherlands	1.8	1.1	1.3	0.6	2.1	2.3	0.6	-0.4
Portugal	2.5	1.6	2.1	-0.2	2.5	3.6	1.6	0.3
Spain	2.3	1.3	3.2	2.3	3.0	2.3	-0.2	-0.1
Sweden	1.2	0.1	2.4	1.3	1.4	2.0	2.3	2.2
U.K.	2.1	1.3	2.3	1.7	2.4	2.9	2.0	1.9
European Union (EU-10, new)(b)	--	--	3.8	3.1	--	--	4.3	4.8
Cyprus	--	--	2.7	2.1	--	--	1.9	0.9
Czech Republic	--	--	1.8	2.7	--	--	2.9	4.5
Estonia	--	--	6.6	7.0	--	--	7.3	7.1
Hungary	--	--	4.1	3.7	--	--	2.7	3.2
Latvia	--	--	7.0	8.1	--	--	6.1	7.5
Lithuania	--	--	5.6	7.7	--	--	7.7	13.0
Malta	--	--	2.0	-1.0	--	--	1.9	-0.7
Poland	--	--	3.9	2.1	--	--	4.9	4.4
Slovakia	--	--	3.7	3.9	--	--	4.9	6.7
Slovenia	--	--	3.6	2.8	--	--	3.1	2.7
European Union (EU-25, enlarged)(c)	--	--	2.1	1.2	--	--	1.9	1.5
United States	1.9	1.2	2.2	0.9	1.3	1.1	2.4	2.9
Japan	2.7	1.2	1.0	0.8	2.6	1.9	2.2	2.0
Other OECD members	1.8	1.5	2.3	1.4	1.2	0.9	2.2	2.0
China[d]	6.3	7.4	6.6	7.7	*4.9*	*6.5*	*6.3*	*7.1*

a) referring to membership of the European Union until 30 April 2004; b) referring to new membership of the European Union as of 1 May 2004
c) referring to all members of the European Union as of 1 May 2004 (see Table 2): d) productivity in China is in terms of GDP per person employed
Source: TCB/GGDC Total Economy Database (www.ggdc.net/dseries), based on OECD National Accounts and Labour Force Statistics

The change in the employment/population ratio *(E/P)* can be further broken down into the number of persons employed relative to the total labour force (i.e., employed persons plus registered unemployed persons) *(E/L)*, the ratio of the labour force to all persons aged 15 to 64 (i.e., the working age population) (*L*/*P*1564) and the share of the working age population in the total population *(P*1564/*P)*:

$$\Delta E/P = \Delta E/L * \Delta L/P1564 * \Delta P1564/P \quad (3)$$

Table 2 looks at the breakdown of per capita income into labour market indicators and productivity from the perspective of *comparative levels* of European countries relative to the United States for 2003. The estimates are converted on the basis of purchasing power parities, which take account of differences in relative price levels across countries.

It is clear from the table that the comparative levels of labour productivity in the "old" EU-15 countries were substantially higher relative to the United States than the relative per capita income levels. This is mainly due to the substantially lower number of working hours per employed person and, in addition, to a lower ratio of employed persons relative to the total population.

The relative high levels of labour productivity in Europe have been pointed at by various scholars as an indication of a "European model" that deals differently with the trade-off between labour intensity and productivity than the U.S. model. According to, for example, Blanchard (2004) and Gordon (2004) the European preference for more leisure would be offset against a lower level of per capita income. Moreover, Gordon argues that a significant portion of higher American GDP per capita is required to create decent living conditions in a much harsher natural environment (requiring a greater use of energy for heating and air-conditioning), to fight crime and to travel longer distances across huge metropolitan areas.

Table 2: Labor Productivity and Income: Differences in Ranking, 2003

	Productivity		Effect of Working Hours	Effect of Employment/ Population Ratio	Per Capita Income	
	GDP/hour	%US			GDP/cap	%US
European Union (EU-15, present)(a)	40.2	93%	-13.6%	-6.6%	27546	72%
Luxembourg	52.2	121%	-17.2%	37.5%	53958	141%
France	50.2	117%	-26.9%	-13.2%	28788	75%
Belgium	47.8	111%	-15.4%	-17.6%	29582	77%
Ireland	46.5	108%	-12.2%	-4.5%	35035	91%
Netherlands	44.7	104%	-27.4%	3.3%	29691	77%
Austria	42.8	99%	-17.4%	-2.2%	29991	78%
Germany	42.6	99%	-20.2%	-6.8%	26937	70%
Denmark	41.1	95%	-17.7%	3.4%	30687	80%
Italy	39.7	92%	-11.5%	-9.3%	26721	70%
Finland	39.4	92%	-11.6%	-3.5%	29146	76%
U.K.	38.6	90%	-9.8%	-1.2%	29935	78%
Sweden	37.9	88%	-12.3%	1.3%	29387	77%
Spain	32.1	75%	-0.7%	-9.4%	24447	64%
Greece	27.3	64%	4.4%	-12.7%	21180	55%
Portugal	22.6	53%	-3.4%	1.8%	19017	50%
European Union (EU-10, new)(b)	17.5	41%	2.6%	-8.1%	13603	35%
Malta	26.8	62%	4.5%	-18.4%	18102	47%
Slovenia	24.9	58%	4.2%	-9.0%	20418	53%
Cyprus	22.2	52%	8.7%	-8.3%	19692	51%
Hungary	21.8	51%	-1.1%	-9.2%	15569	41%
Czech Republic	18.4	43%	2.1%	-1.4%	16733	44%
Slovakia	17.9	42%	-0.1%	-6.5%	13625	36%
Poland	16.7	39%	3.0%	-10.7%	12153	32%
Lithuania	12.7	29%	5.4%	-5.4%	11739	31%
Estonia	12.5	29%	3.5%	-3.3%	11490	30%
Latvia	10.3	24%	4.1%	-0.5%	11065	29%
European Union (EU-25, enlarged)(c)	36.1	84%	-9.7%	-7.4%	25261	66%
U.S.A	43.0	100%	0.0%	0.0%	38324	100%
Japan	32.2	75%	-2.3%	3.6%	29193	76%
Canada	34.6	80%	-2.7%	2.1%	30197	79%
Australia	35.1	82%	-2.7%	1.2%	30440	79%

a) referring to membership of the European Union until 30 April 2004 (see Table 1)
b) referring to new membership of the European Union as of 1 May 2004 (see Table 1)
c) referring to all members of the European Union as of 1 May 2004 (see Table 1)
Source: TCB/GGDC Total Economy Database (www.ggdc.net/dseries), based on OECD National Accounts and Labour Force Statistics, with GDP converted to US$ at 2002 EKS PPPs.

While there may be some truth in these arguments, it remains questionable whether the differences between Europe and the U.S. in terms of labour intensity do not also partly reflect differences in incentives for workers to supply their labour and business to demand it. Before jumping to the conclusion that Europeans value leisure more than Americans, it is important to ask the question how Europeans and Americans would allocate labour and leisure under the same set of circumstances. While a complete answer is beyond the scope of this report, it is perhaps useful to refer to **Table 2** which shows that not all countries in the world make the same trade-off between labour intensity and productivity as the "old EU-15" (for example, Australia, Canada or Japan). The European model is in fact rather an exception than the rule. Moreover, in the light of a downward trend in employment-population ratios due to the relatively rapid greying of the European population, the low labour intensity levels in Europe are unlikely to be viable for much longer. The trade-off between labour intensity and productivity is therefore a false choice and will threaten living standards in the long run.

3. An Industry Perspective on Productivity Growth

In this section we look at the productivity performance form an industry perspective.[3] Although many of the policy issues related to the slowdown of productivity growth in Europe are more of a generic nature rather than industry specific, the sector perspective is useful for several reasons. Firstly, it is important to pinpoint in which industries or industry groups the slowdown occurs and to examine whether it is confined to a few sectors or whether it is more widespread. Secondly, under the influence from both intra-EU economic integration and the on-going globalization of product markets and factor markets, the industry structure is under continuous pressure from competitive forces. It is important to establish how these changes have affected the overall performance of the economy. Finally, the opportunities for new technological applications may have very different implications for industries. Indeed the absorptive capacity for ICT differs highly across industries, and has very different impacts on output, employment and productivity performance.

For the analysis of productivity growth in Europe and the U.S., the Groningen Growth and Development Centre developed a database, which contains information on value added and employment for 56 industries between 1979 and 2002. On the basis of this data set measures of labour productivity growth and the contribution of individual industries to aggregate productivity growth can be calculated.[4] **Table 3** summarizes the contributions of the industries with the largest contributions to productivity growth. The table shows that the U.S. is characterized by a much greater contribution from the five largest contributors than the EU. Of the five largest contributors in the U.S., which account for 61% (1.4 %-point) of productivity growth (in gross terms), four are services industries. Together these five industries account for only 30% (0.5 %-point) of productivity growth in the EU. The five largest contributors in the EU add only 44% (0.7 %-points) to EU productivity growth. In the U.S. these same industries account for 31% (0.7 %-point) of productivity growth.

[3] For comparisons of productivity in the European Union and the U.S. at the aggregate level, see for example, van Ark et al. (2002) and Timmer and van Ark (2005)

[4] See www.ggdc.net/dseries/60_Industry.shtml, van Ark et al. (2003a) and O'Mahony and van Ark (2003). The main source is the new OECD STAN Database of national accounts, but greater industry detail is provided through the use of industry surveys and censuses.

Table 3: Contribution to aggregate labour productivity of 5 industries that contribute most to productivity growth in the U.S. and the EU-15, 1995-2002

	US 1995-2002		EU-15 1995-2002	
	%-point contribution	%-contribution	%-point contribution	%-contribution
5 Largest contributors in US				
Wholesale trade and commission trade, except	**0.36**	15%	0.08	5%
Retail trade, except of motor vehicles and moto	**0.34**	14%	0.07	4%
Electronic valves and tubes	**0.32**	14%	0.11	7%
Activities auxiliary to financial intermediation	**0.23**	10%	0.02	1%
Communications	**0.18**	8%	0.22	13%
5 Largest contributors in EU				
Communications	0.18	8%	**0.22**	13%
Computer and related activities	0.09	4%	**0.14**	9%
Legal, technical and advertising	0.07	3%	**0.13**	8%
Health and social work	0.06	2%	**0.11**	7%
Electronic valves and tubes	0.32	14%	**0.11**	7%
Aggregate Labour productivity growth	2.37	100%	1.66	100%

Source: Groningen Growth and Development Centre, 60-Industry Database, February 2005, http://www.ggdc.net

The level of detail in the industry database is sufficient to adequately distinguish between ICT producing industries, ICT using industries and industries that make less intensive use of ICT (**Table 4**). The ICT producing industries include producers of IT hardware, communication equipment, telecommunications and computer services (including software). The distinction is based on an OECD classification (see, for example, OECD 2002). Apart from distinguishing ICT producing industries, we also distinguish between industries that make intensive use of ICT from those that are less intensive users. This is a less straightforward distinction since nearly every part of the economy uses some ICT. As a measure of ICT intensity, we rely on the share of ICT capital in total capital compensation in the United States (van Ark, Inklaar and McGuckin, 2003).[5]

[5] See van Ark et al. (2003) for an overview of all ICT producing, ICT using and non-ICT industries.

Table 4: Average annual growth of GDP per hour worked of ICT-producing, ICT-using and non-ICT industries in European Union, Japan and the U.S.,1979-1995 and 1995-2002

	1979-1995			1995-2002		
	EU-15	Germany	US	EU-15	Germany	US
Total Economy [a]	2.3	2.1	1.2	1.8	1.9	2.5
ICT Producing Industries	6.8	7.4	7.2	8.6	12.2	9.3
ICT Producing Manufacturing[b]	11.6	10.0	15.1	16.2	14.6	23.5
ICT Producing Services	4.4	5.5	2.4	5.9	10.9	2.7
ICT Using Industries [c]	2.3	2.4	1.6	1.8	1.9	4.9
ICT Using Manufacturing	2.7	1.9	0.8	2.0	1.9	2.6
ICT Using Services	2.0	2.5	1.9	1.7	1.8	5.3
of which:						
Whosale Trade	2.4	2.3	3.5	1.5	1.6	8.1
Retail Trade	1.7	2.0	2.4	1.5	1.3	7.1
Financial Services	1.9	2.7	1.5	2.3	3.4	5.0
ICT-intensive Business Services	0.8	1.6	-0.9	0.6	-0.6	0.7
Non-ICT Industries	1.9	1.5	0.4	1.1	1.0	0.2
Non-ICT Manufacturing	3.2	2.6	2.3	2.1	1.6	1.2
Non-ICT Services[a]	0.8	1.0	-0.3	0.5	0.4	0.2
Non-ICT Other	3.4	1.6	1.4	2.1	2.2	0.4

a) excluding real estate

b) based on U.S. hedonic price deflators for ICT production (adjusted for national inflation rates) instead of actual national accounts deflators.

c) excluding ICT producing

Notes: industry grouping into ICT-producing industries from OECD; distinction between ICT-using industries and less intensive ICT users is based on share of ICT capital services in total capital services from nonresidential capital; see Van Ark, Inklaar and McGuckin (2003) for exact industry grouping.

Source: Groningen Growth and Development Centre, 60-Industry Database, February 2005, http://www.ggdc.net

Table 4 shows that there is considerable variation in productivity growth across the industry groups. In ICT producing manufacturing, labour productivity growth rates in both the U.S. and the EU-15 are considerably higher than for all other sectors and show a similar time pattern with accelerated growth in the late 1990s, although at a higher rate in the U.S.. In contrast, ICT producing service sectors experienced high growth rates in the EU, outperforming the U.S., in particular during the later period. This is the only ICT industry group for which the EU shows an acceleration from the mid 1990s which is bigger than in the U.S.. The latter is mainly due to the negative productivity growth rates in U.S. computer services. But overall ICT producing services represent only a small share of total economy value added, about 5% in both the U.S. and EU.

The two ICT using sectors generally show considerably lower growth rates than the corresponding ICT producing sectors with the important exception of the ICT using services group in the U.S. which from 1995 onwards shows a sharp acceleration not matched in the EU-15. This was mainly due to a major increase in productivity and output growth in distribution (retail and wholesale trade) and financial services in the U.S. as shown in **Table 4**. Equally important in **Table 4** is the pronounced deceleration of productivity growth in non-ICT industries in the EU, which occurs in all three subcomponents. In non-ICT manufacturing, labour productivity growth decreases in the final period in both the U.S. and the EU-15. However the U.S. shows a marginal improvement in non-ICT services, and since this comprises over 60% of the non-ICT group, the overall reduction in U.S. productivity growth in non-ICT industries since 1995 is lower than in the EU. Nevertheless

productivity growth rates in the non-ICT sectors are much lower than in ICT using industries in both the U.S. than in the EU.

4. What explains slow productivity growth in services?

The previous section has shown that the productivity slowdown in the EU economy can be largely traced to the service sector of the economy, and more in particular those services that are the most intensive users of ICT. Various explanations can be put forward for this phenomenon. Here I address three reasons which have been suggested most frequently, namely (1) problems with macro-economic measurement of service performance, (2) a genuine shortfall in innovative capacity of service industries in Europe, and (3) a lack of reforms to exploit the productivity potential of service innovation.

Ad 1) Measurement problems in services

In the past few years there have been increasing concerns about whether the macroeconomic statistics correctly trace the changes at industry level. In practice, the quality of measures of output and productivity differs highly across industries and between countries. Griliches (1994) showed a striking difference between the acceleration of labour productivity growth in 'measurable' sectors of the U.S. economy (agriculture, mining, manufacturing, transport and communication, and public utilities) and the slowdown in 'unmeasurable' sectors (like construction, trade, the financial sector, 'other' market services and government) over past decades. Apart from an increase in measurement error at the aggregate level due to shift towards the unmeasurable sectors of the economy, one may also observe an increase in measurement problems in the 'unmeasurable' sector itself. This component of the rise in measurement problems may – at least in part – be related to the increased use of ICT.

In practice the largest measurement problems relate to the measurement of output in the service sector. The current methodology of splitting the change in output value into a quantity component and a price component is difficult to apply to many service activities, as often no clear quantity component can be distinguished. Moreover, possible changes in the quality of services are also difficult to measure. These problems are not new, and improvement in measurement of service output has been a topic on the agenda of statisticians and academics for a long time.[6] In many service industries information on inputs (such as labour income) was and still is used as a proxy for output. However, the increased importance of ICT may have accelerated quality changes in services and raised the potential for productivity growth in services, which was previously not envisaged.[7] However, to include those quality aspects in the output measure, multiple dimensions of a service need to be taken into account, for example, the service concept, the type of client interface and the service delivery system (den Hertog and Bilderbeek, 1999). This implies that the real output of a particular service cannot be measured on the basis of one single quantity indicator. New measurement methods make use of various volume measures in, for example, financial services (e.g, in the Netherlands and in the United States) and health services and other government services (e.g., in the United Kingdom). Even though such changes in measurement methods have not exclusively led to upward adjustments of real output, on balance the bias is probably towards an understatement of the growth in real service output

[6] See, for example, Griliches (1992), Wölfl (2003) and Triplett and Bosworth (2004).

[7] See, for example, Baumol (2004) and Triplett and Bosworth (2002).

(Triplett and Bosworth, 2004). There is no evidence, however, that this bias is in any way bigger in Europe than in the U.S..

Ad 2) A lack of innovation in services?

It is sometimes claimed in the literature that slower productivity growth in services in Europe is related to a lack of innovation. However, there is little direct evidence to substantiate this claim. Although ICT investment – as was seen in the previous section –is an important enabler of innovation and productivity growth, and as the U.S. has been more successful in obtaining productivity effects from ICT investment than EU, the productive use of ICT investment is strongly dependent on various dimensions of non-technological innovations.

There are different ways to go about measuring non-technological innovation and its impact on productivity growth. The 56 industries, identified in Section 3, can be re-arranged o measure productivity growth on the basis of the type of innovation in the industry (van Ark et al., 2003b). A crucial consideration for such a service innovation typology is the way in which suppliers of inputs (machines, computers, and human capital), the service company and its customers (consumers of intermediary users) interact. In the service patterns described below, the customer has an increasing influence on the innovation process in the first four patterns.

'Supplier'-dominated innovation. This usually involves technological innovations in the manufacturing sector that are implemented in the service sector through investment in new computers. Although there may be limited scope within a company for influencing the service itself, it may utilize the innovation by making non-technological changes to aspects such as staff training and the way in which the service is delivered.

Innovation in services. Actual innovation and implementation takes place within the service organization itself. These innovations may be technological or non-technological in nature or, as is usually the case, a combination of the two. Typical examples are the development of a new service concept, the combination of different service functions, or a new method of service delivery developed by the organization itself. These innovations are often implemented in co-operation with partners from the private and/or public sectors.

Customer-led innovation. This type of innovation is implemented by service providers in response to the specific and clear wishes of customers. In some cases, providers respond to the demand in specific market segments. In many other cases, the innovation is initiated by a single customer. This often happens in the market for business services. The client of an educational institute may request a customized IT course to teach specific IT skills to staff.

Innovation through services. According to this pattern of innovation, the service organization contributes to the customer's innovation process. In many cases, the supplier of the intermediate service provides the knowledge that is required by the customer for an innovation process. This pattern prevails in knowledge-intensive business services, such as engineering consultancies.[8]

[8] A fifth category that may be considered is so-called paradigmatic innovation. Certain innovations are more radical than the incremental innovations that usually take place in service companies. They usually follow from breakthrough technologies, such as IT, and lead to far-reaching and complex changes. Paradigmatic innovations

Table 5 presents labour productivity growth rates in the EU and the US when industries are grouped according to their innovation patterns in services:

In sector characterized by supplier-dominated innovation, the U.S. acceleration in productivity growth is mainly due to the retail trade industry. The U.S. also shows an improvement in productivity growth in communication, but the productivity growth in the EU communications sector is higher than in the U.S. also after 1995.

However, in specialised supplier services ("innovation through services"), the EU outperforms the U.S., which is mainly due to the strongly negative labour productivity growth rates in U.S. computer services. Also knowledge intensive business services show a somewhat better performance in the EU. On the other hand, productivity growth rates in dedicated R&D firms in the U.S. are higher than in the EU.

Organisational innovative services ("innovation in services") show a better performance in the U.S. than in the EU during the period since 1995. Banking services have shown a strong productivity improvement in both regions, whereas insurance services have experienced a slowdown in both regions. But there is large heterogeneity across EU countries. The strong productivity advantage in EU air transport services over the US has been reversed after 1995.

Considering client-led industries, a heterogeneous pattern can be seen in **Table 5**. The US experiences considerable growth in this sector, which includes industries such as wholesale, hotel and catering and business services, in the latter part of the 1990s. The EU lags behind the US, but when the country breakdown is taken into account, some countries are more similar to the US and experience less erratic labour productivity growth than other EU member countries.

It is difficult to draw any firm conclusions from the non-market services collection of industries since this is likely to consist of services where outputs and inputs are difficult to measure. On average the EU shows a better productivity performance in non-market services than in the U.S.. But when the EU is broken down into individual countries, there is much heterogeneity within and between countries over the two time periods. One also should take into account the substantial measurement problems in non-market services.

Table 5: Labour productivity growth according to pattern of service innovation

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in the service sector primarily affect the value chain. They often require participation and a change of behaviour by all players in the innovation, including co-operating companies, the public sector and consumers. An example of paradigmatic innovation is the introduction of the chip-card or the construction of an underground transport system. This fifth pattern of service innovation has a somewhat different character than the previous four as it deals with how "radical" an innovation is rather than where to place the source and sink of innovation in the value chain. This innovation pattern signals the possibility that some major service innovations may affect all players in a value chain and require major (interdependent) changes in behaviour by all players involved. However, our industry classification does not include any specific service industry where "paradigmatic" innovation occurred.

	1979-1995			1995-2002		
	EU	DEU	US	EU	DEU	US
Service industries						
Supplier dominated services	2.9	3.1	2.3	4.0	5.4	6.8
Specialised suppliers services	0.7	1.3	-0.4	0.8	0.3	-0.2
Organizational innovative services	2.6	3.2	1.4	2.1	3.0	3.3
Client led services	0.7	1.2	1.2	0.2	-0.2	4.2
Non-market services	0.8	0.9	-0.5	0.8	0.8	-0.5

Source: Groningen Growth and Development Centre, 60-Industry Database, February 2005, http://www.ggdc.net

In summary, the most important observation on productivity growth in services related to innovation patterns, is the strong acceleration of U.S. productivity growth in services that depend on innovation by their suppliers. This industry group is dominated by retail trade. The strong improvement in U.S. retail trade has also gone together with strong productivity growth in wholesale trade, which explains the US advantage in client led services. These industries benefited from the supply of ICT, but have also undergone significant organizational innovations. Indeed in industries that are primarily characterized by organizational innovations, U.S. performance has also strongly improved, in particular in banking. Within the EU, the experiences in service productivity growth are mixed across industries and countries. Although services will be an important engine for future productivity improvements, the exploitation of the potential for productivity growth will be strongly dependent on national circumstances, including the nature of the innovation system and the working of product and labour markets

Ad 3) A lack of reforms in services?

There has been much discussion in the literature about the link between, on the one hand, the performance of product and labour markets and, on the other hand, innovation and productivity. The basic argument has been that regulation restricts competition to a much greater extent in Europe than in the United States. Quantifying these differences is difficult, but a wide variety of evidence suggests that regulation does indeed matter.[9]

However, explaining sluggish productivity growth in Europe by broadly casting it as overregulated and uncompetitive is not very useful analytically. There is much variety and subtlety in the way by which regulation affects service productivity and innovation. It is essential to understand if and how regulation constrains productivity. Instead of giving an overall view of the interaction, it may be preferable to focus on one specific industry. Given the major role of the retail sector in explaining the productivity growth differential in services, a more detailed discussion of regulation in this sector may help to understand the issues better.[10]

[9] See, for example, Nicoletti and Scarpetta (2003).

[10] See McGuckin, Spiegelman and van Ark (2005).

One simple assessment of competition in retailing is to examine the absolute level of the margins retailers are able to make on sales. High margins are suggestive of a less competitive environment, because retailers are able to extract monopolistic rents. As competition increases, retailers will no longer be able to maintain very high margins—competitors will forcefully drive them down. Gross margins are generally lower in the United States than in any European country, with only Germany approaching U.S. levels.[11] Nonetheless, margins are far from a perfect measure of competition and may indicate differences in capital and labour costs, as well as other factors.

There are three other categories of regulation that can be logically associated with stunted productivity growth in Europe—store opening hours, land usage restrictions (especially on large stores), and labour laws.[12]

Most European countries have some type of regulation on large stores operating on Sundays (the United Kingdom being a major exception). Germany has some of the tightest regulations in all of Europe, defined by the *Ladenschlussgesetz* (Shop Closing Hours Act), which currently only allows stores to open 6 a.m. to 8 p.m. The United Kingdom and France, on the other hand, generally have no limits on opening hours during the week. The trend has definitely been towards liberalisation, and both local and national regulations are moving in the direction of greater flexibility. But remaining restrictions still reduce shopping time and limit customer convenience. In the longer run short opening hours limit the potential for accelerated productivity growth.

Local planning rules also impact on productivity in retailing, as restrictions on retail land usage cut back on both the creation of new stores and the elimination of old ones. The rules make it very costly to build new stores (fewer entrants) and artificially inflate the value of old stores based on the land they occupy. As land use regulations usually discriminate against large store sizes it affects the scale advantages that can contribute to productivity growth. The policies of European countries differ with those in the United States. The United States has taken a largely decentralised, disorganised, market-driven approach to retail development. While far from uniform, Europe is generally more restrictive of new retail establishments. By far, the strictest regulation occurs in the United Kingdom where development sites are highly restricted, with the result that retail property costs are significantly higher than in continental Europe or the United States. Germany also has a complex zoning law, but the regulatory threshold is 1,200 square meters (as opposed to, for example, 300 m2 in France). Combined with the operating hour restrictions, this encouraged the development of relatively small, highly productive discounters like Aldi and Lidl.

The efficient and flexible use of labour is as critical for success as strategic management of space and land. European labour is generally more expensive than in the United States. France and Germany generally have much higher minimum wages than the United Kingdom or the United States, reducing the number of services provided in the retail environment of the former two countries. Leaving out from the labour force the low paid group may paradoxically increase measured productivity. French

[11] Gross margin data are taken from Boylaud (2000).

[12] Other regulations such as price controls and restrictions on promotional activities play some role, but they are not likely to be as significant.

retail labour productivity has historically been very high, and up until 1995 was greater than in the United States. But this is not a real efficiency gain as work is simply transferred to the customer.

In summary, while the overall picture points in the directions of regulations hampering productivity growth in services in Europe, there are many subtleties in how it exactly impacts on productivity growth. There are large differences between EU countries. In fact the lack of a harmonised regulation system in itself is often cited as a major difficulty in building cross-border operations within Europe. It should also be stressed that complete deregulation is not always the best way to raise productivity growth. Moreover, there is a substantial time lag in reforms impacting on productivity. In this respect, it remains an important question whether the European slowdown is just a reflection of a lagged reform process, or that rigid institutions and regulations hamper the adjustment process.

5. Does the European Union need a Productivity Agenda?

On balance, this paper suggests that the European slowdown in productivity growth is a reflection of an adjustment process towards a new industrial structure, which has developed more slowly in the EU than in the U.S.. But with some delay, rapid diffusion of new technology may ultimately facilitate the adjustment process towards a faster growth track in Europe. After all, the United States has also gone through a phase of slow productivity growth during the 1980s.[13] However, an institutional environment that slows down change may hold up the structural adjustment process in Europe and inhibit the reallocation of resources to their most productive uses.

In a market economy the main way for public policy makers to promote and support faster productivity growth is to try and encourage private enterprises to move in a productivity-enhancing direction. For this government can use a mix of four main policy mechanisms, which are only partly directly targeted towards productivity-enhancing measures.

The first mechanism concerns macro-economic management, which influences the relative prices of capital and labour inputs and hence determines the choice of technology. It may be argued that wage moderation policies and active labour market policies (which have been applied in a different mix and intensity in European countries) have lowered the price of labour relative to capital in Europe. Although conclusive evidence on the precise relationship is still lacking, the relative decline in the price of labour may have impacted the slowdown in the growth of the capital-labour ratio during the 1990s. For many European countries this slowdown can be clearly observed and is an important source for the slower growth in labour productivity.

However, the main explanation for the slowdown in Europe comes from slower growth in total factor productivity, i.e. productivity growth corrected for the change in capital-labour ratios (Timmer and van Ark, 2005). Total factor productivity growth is often related to technological change. The second policy mechanism, which includes measures directed to support technological change and innovation, is therefore very popular with governments. However, direct support of particular industries or technology areas easily raises questions on whether governments are able to make the right choices. Nevertheless it is clear that governments have a responsibility for creating the "rules of the game" concerning technology creation and diffusion. Technology creating measures are of particular importance for moving the productivity frontier and improving best practices, and include measures such as R&D subsidization and the creation of effective patent systems. Technology diffusing measures play a major role in reducing the productivity gap between average and best practice firms, including best practices abroad. They involve the facilitating of training programmes, support of innovation platforms and other ways of co-operation between government and business.

The investment decisions concerning tangible and intangible capital, and the (re)allocations of these inputs to industries and firms, are taken in an environment, governed by markets in which supply and demand for factor inputs (labour and capital markets) and product and services (product markets) are matched. Governments play an important role in setting the "rules of the game" (or institutions) of

[13] See, for example, Dertouzos et al. (1989).

these markets, which is the third main policy mechanism. In the past many existing institutional settings or regulatory arrangements have originally been set up with the motivation to smooth the functioning of the markets, by streamlining rules on competition, business conduct, labour markets, consumer protection, public safety, health and so on. However, regulations may have become a drag to the extent that they limit the efficiency of market functioning, reduce entry of new firms and delay exits. There has been an increasing awareness of the need for an innovation-specific focus on (de)regulation and its impact on growth and productivity performance in the knowledge economy. The opportunities to exploit new technologies are to a large extent determined by the regulatory environment. There is much evidence that higher entry and exit rates of firm within industries are supportive of faster productivity growth (OECD, 2003).

Finally, "horizontal policies", which represent the fourth main policy mechanism, concern policies that are not directly related to innovation, are at least as important to improve service innovation activity. As human capital is a key input in the innovation process, there is a clear role for the government to provide an adequate formal education system. More specifically governments should support a higher education system that has the flexibility to train excellent researchers, to support their mobility, and to allow business to tap into the knowledge of universities and other higher education institutions for commercial purposes.

The optimal mix of these four main policy mechanisms is difficult to determine. It depends on such factors as the distance relative to the world technology and/or productivity frontier, which may differ between industries. It may also depend on the state of institutional reform in particular markets. Finally, the nature of the political reality implies that all public policy interventions are likely to involve costs as well as benefits.

The key to productivity improvements is with business itself. For business there is a choice between a strategy focused on cost reductions through scrapping and postponement of investments in new capital goods and intangibles, or by restructuring through upgrading the resources and overcoming the bottlenecks which account for the difference between average and best practice in a given (local) market. Of course, rapid restructuring through cuts has also often been propagated as the recipe for the recovery of U.S. and global firms in general. The fundamental difference is that when such a strategy is pursued in a market environment that is more flexible, it may help to reposition the firm, activate the resources and realize the potential. Another difference between the EU and the U.S. is that when entry and exit of firms is speeded up, the reallocation of resources to its most productive uses is strengthened. Hence in a more flexible market environment the strategy towards restructuring can be more easily aligned with exploiting the potential for growth and reducing the gap between average and best practice through maximizing the returns on investments in high performing capital goods and intangibles.

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