International Comparisons of Industry-based Productivity Levels in the Financial and Business Service Sectors

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ABSTRACT

This article attempts to explain the relatively poor productivity growth in four major EU countries (Germany, France, United Kingdom, and Netherlands) relative to the United States. Our study is carried out from a sectoral perspective, focussing on the financial and business services sectors. Instead of examining only sectoral productivity growth rates, we also examine sectoral productivity level gaps. Our results imply that the productivity differential in the business services sector is a major factor behind the US lead in productivity.

THIS ARTICLE AIMS AT CONTRIBUTING to the explanations underlying the relatively poor productivity performance of European countries. Over the last decade, the United States has displayed productivity growth rates that are substantially above those observed in continental Europe. Van Ark et al. (2008) find for example that in the United States productivity growth increased from 1.2 per cent per year between 1973 and 1995 to 2.3 per cent per year in the 1995-2006 period. Over the same period, annual productivity growth in Europe declined from 2.4 per cent between 1973 and 1995 to 1.5 per cent during the second period.

Numerous authors have discussed the underlying reasons for this differential. In that regard, information and communication technologies (ICT) seem to have been of outstanding importance for the evolution of productivity over the last two decades (Oliner and Sichel, 2002). In particular, Jorgenson *et al.* (2007a) claim that in the late 1990s, the productivity differential in favour of the United States originated in ICT *producing* industries. This changed after the dot-com crash in 2000. Since then, the industries intensively *using* ICT capital have accounted for the differences in productivity growth and levels between the United States and the European economies.

A second factor put forward to explain the divergence in productivity dynamics between the two regions is total factor productivity. TFP growth seems to have been substantially higher in the United States. As most authors assert, this seems to hinge principally on more favourable institutional settings in the form of labour and product market regulations (Van Ark *et al.*, 2008).

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The two aforementioned factors are thought to have played an important role for the difference in productivity dynamics in the services sectors. Moreover, a number of authors believe that it is precisely the services sectors that are responsible for the bulk of the productivity gap between the European and Anglo-Saxon economies. Regarding manufacturing, one finds that in some European countries this sector is equally or even more productive than in the United States (Inklaar *et al.*, 2006). The Common European market is thought to have played a key role in that respect.[2] As the services sectors tend to gain economic weight in developed economies, it has become essential to understand the factors underlying these evolutions. The sectoral approach we adopt here is further justified by the heterogeneity of productivity performance atthe sectoral level, implying important limitations for the analysis of aggregate data (Jorgenson *et al.*, 2007b).

Following the above, this article focuses on the financial[3] and business services sector[4] of a set of five developed countries (France, Germany, the Netherlands, the United Kingdom, and the United States). The novelty of our analysis resides in the fact that we concentrate on both sectoral productivity level gaps and growth rates. Although there is an abundant body of literature that analyses sectoral productivity growth rates, only very few papers treat sectoral productivity level gaps (Inklaar *et al.*, 2006). Level gap evaluations allow a direct comparison of equivalent sectors in different countries. In addition, they provide valuable information on how to understand and interpret growth dynamics i.e. they permit detection of possible convergence or catching–up effects (Inklaar *et al.*, 2006). These effects may be all the more significant in branches such as the financial sector where technological spill-overs are very important and markets can be regarded as highly integrated. Our analysis is made possible by a new data set providing for internationally comparable industry level data and made available by the EU KLEMS project (Timmer *et al.*, 2007).

We concentrate particularly on the financial and business services sectors for a number of reasons. First, and most importantly, the two sectors are relatively important in size and account, on average in the five countries, for 6 per cent and 20 per cent respectively of total value added (see Chart 1a and b). Moreover, as can be seen from the charts, both sectors and especially business services display an increasing share in value added over the 1992-2006 period. The growing importance of market services can be explained by a number of interacting factors. Higher per capita income leads to an increasing demand for services. In addition, there is an increasing marketization of traditional household activities and many manufacturing firms

2 This underlines the importance of a number of measures aimed at creating a single market for services within the EU, notably the Services Directive and the Lisbon agenda. The Services Directive is an initiative of the European Commission aimed at creating a single market for services within the EU, similar to the single market for goods already existing. The Lisbon Strategy aims to make the EU 'the most dynamic and competitive knowledge-based economy in the world.' The agenda stresses the need to increase private and public spending on research (research and development expenditures should attain 3 per cent of GDP), while creating more jobs (raising the employment rate to 80 per cent), especially high-skilled ones. The agenda also underlines the need to open up protected sectors, to improve the climate for businesses, to reform labour markets, and to promote environmentally sustainable growth. So far it seems as if the Agenda is not living up to its ambitions as stated by the European Commission (2004) and Aghion *et al*. (2004) for example.

3 NACE Sub-sectors 65-67 including financial intermediation, central banking, Insurance and Pension funding and Activities auxiliary to financial intermediation.

4 NACE Sub-sectors 71-74 including renting of machinery and equipment, computer and related activities, research and development and other business activities (management, legal and accounting services etc.) We exclude real estate activities as the output of this industry reflects mostly imputed rents whose computation can vary substantially across countries.

Chart 1a
Share of Financial Services in Total Value Added

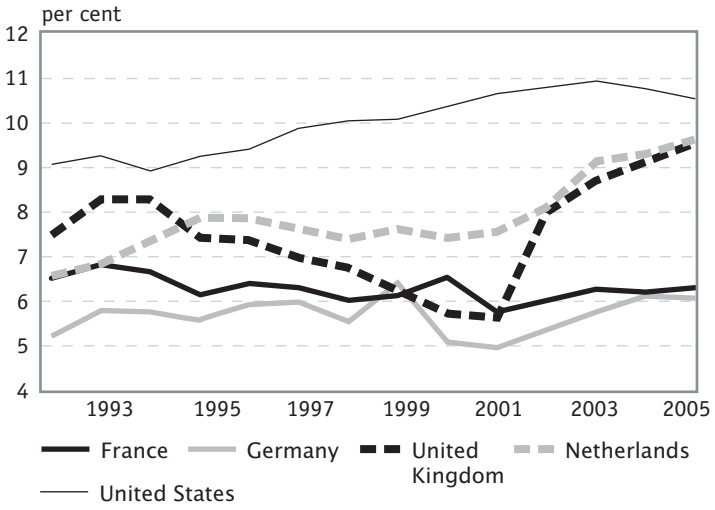
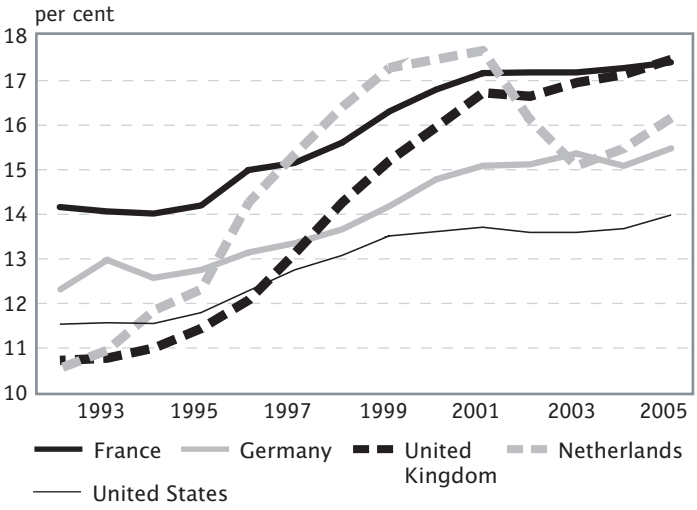


Chart 1b
Share of Business Services in Total Value Added



out-source more and more business services, trade and transport activities (Schettkat and Yocarini, 2005).

In addition to their importance in terms of value added, the two sectors also cater to other sectors in the economy by providing essential services. This means that productivity levels in those two sectors should have repercussions on the performance of other sectors in the economy. One need only think of the consequences that the functioning of the financial sector can have on investment decisions, or of the way legal or accounting services will influence the performance of companies in other industries. The impact of financial systems on growth has been well established empirically (see for example Levine, 2005 and de Serres *et al.*, 2006). Numerous studies based on macro or sectoral data find that financial development[5] has a significant impact on growth, either directly via productivity, or indirectly via its effect on the build-up of physical and knowledge capital (Pelgrin *et al.*, 2002).

In order to illustrate the importance of the two sectors, we now briefly present aggregate productivity growth and both sectors' contribution to it for the five countries. Our measure of productivity growth is here limited to the market economy, which means that health and education services, public administration and defence are excluded. We also exclude real estate activities (see footnote 3) and calculate our measure of productivity as value added over hours worked.

As presented in Chart 2, productivity growth has been the highest in the United States over the 1992-2005 period. Moreover, as mentioned above, productivity growth accelerated in the United States, while slowing down in most European countries. Between 1997 and 2005, it averaged 2.4 per cent per year in the United States (versus 1.5 per cent over the 1992-1997 period), but only 1.1 per cent in the United Kingdom (1.9 per cent over the preceding period) and 1.6 per cent in Germany (after 2.1 per cent over the preceding period). In France, productivity growth remained stable (1.5 per cent over the 1997-2005 period, after 1.4 per cent initially). The Netherlands was the only

5 Financial development is in most studies measured as the size of financial intermediation or of external finance relative to GDP.

one of the four European countries in which productivity growth increased substantially (2.0 per cent over the 1997-2005 period, after 1.0 per cent over the preceding period). In summary, productivity growth accelerated substantially in the United States and the Netherlands after 1997, remained stable in France, and decreased in the United Kingdom and Germany.

The contribution of the financial sector to overall productivity growth over the 1992-2005 period is highest in the United Kingdom (Chart 3a). When looking at sub-periods, this remains true as the financial sector's contribution in the United Kingdom over the second sub-period is 0.5 percentage points per year, after 0.4 percentage points in the first sub-period.

However, the increase of the sector's contribution is largest in the United States where the contribution doubles from the first to the second sub-period reaching 0.4 percentage points. The contribution of the financial sector also increased, albeit to a lesser extent, in France and the Netherlands, and became negative during the second sub-period in Germany. Consequently, the sector's contribution increased in all countries except Germany and doubled in the United States.

For the business services sector the contribution to overall productivity in the 1992-2007 period was the largest in the United Kingdom, followed by the United States (Chart 3b). This diagnosis changes, when looking at sub-periods. For the 1997-2005 period, the sector's contribution in the United States was of 0.7 percentage points per year compared to -0.1 points in the first sub-period. The sector contributed 0.6 percentage points to productivity growth in the United Kingdom in 1997-2005 (after 0.5 points initially). In France (0.0 points after -0.1 points) and the Netherlands (0.1 points after 0.0 points) the sector's contributions increased only slightly, whereas it was negative in both periods in Germany (-0.2 points). Again, it is the United States that experienced the largest increase in the sector's contribution between sub-periods, attaining also the highest contribution in the second sub-period.

Chart 2
Aggregate Productivity Growth, 1992 - 2005

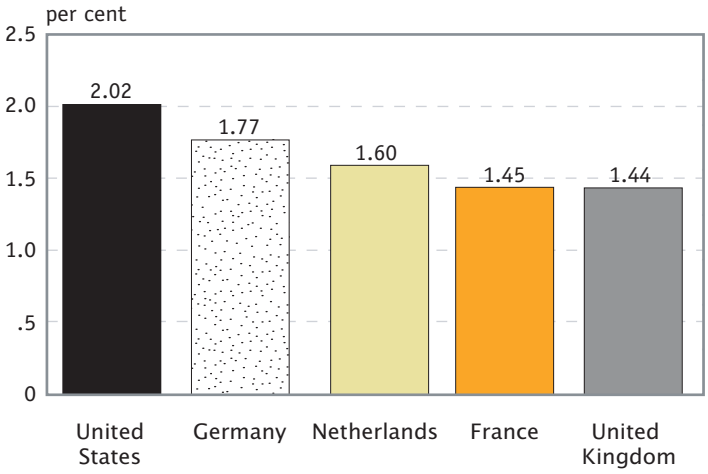
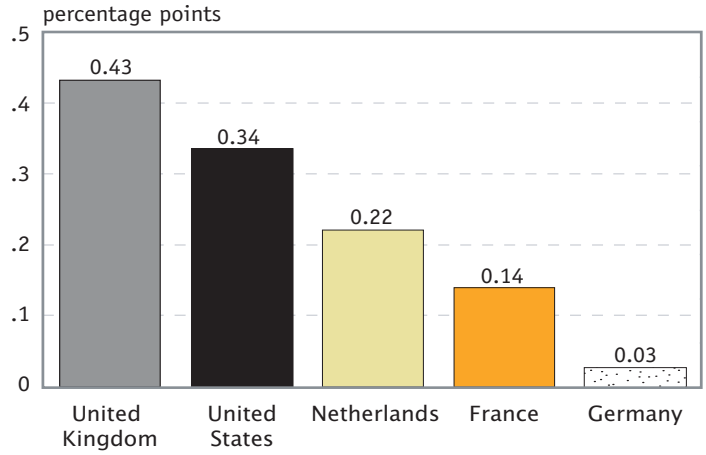
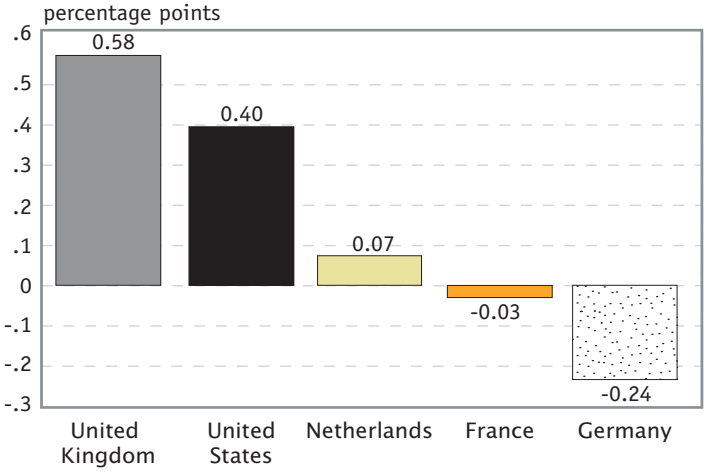


Chart 3a
Contribution of the Financial Sector to Overall Productivity Growth



An important caveat in the analysis of the contributions of the financial sector and business services to aggregate productivity growth is that the measurement of output in these sectors can be problematic. The measurement of output is in general much more difficult for services than in goods producing industries. (Grilliches, 1994,

Chart 3b
Contribution of the Business Services Sector to Overall Productivity Growth



for instance classified an important part of the services sector as 'unmeasurable'.) Most measurement problems hinge on the fact that services are intangible and often depend on the actions of consumers as well as producers. The measurement of nominal output in market services is generally straightforward, as it is mostly a matter of accurately registering total revenue. The main difficulty remains, however, the measurement of output volumes since the latter demands accurate price measurements that have to be adjusted for changes in the quality of services output (Van Ark *et al.*, 2008).

The measurement of banking output is even more challenging: only a part of banks' activities such as fees and commissions earnings can be measured directly. A large part of the sector's output, consisting essentially of the interest rate spread between loans and deposits, is indirectly accounted for (and referred to as financial intermediation services indirectly measured or FISIM).[6] In light of these measurement issues, the results presented further on should be interpreted cautiously.

The remainder of this article is organised as follows: the next section will briefly outline the methodology used to construct productivity growth rates and levels for the sectors of interest. A third section then presents our results for productivity levels, growth rates and input growth contributions. The fourth and last part will offer brief concluding remarks.

Methodology

Growth accounting

The analysis of productivity provided in this article is based on the standard growth accounting methodology as developed by Kuznets, Leontief and Jorgenson. We decompose productivity growth into the contributions of inputs. In order to obtain these contributions, we apply the methodology developed by Jorgenson *et al.* (2005), summarized in Inklaar and Timmer (2007). We define productivity as value added per hour worked. For each industry, value added growth is computed according to a neoclassical production function, using labour (L), ICT capital (K^{ICT}) and non-ICT capital (K^{N}). Total Factor productivity (A) is represented as a Hicks-neutral augmentation of aggregate inputs. We have for each industry a production function defined as:

$$VA_t = A\, f\left(L_t, K_t^N, K_t^{ICT}\right) \qquad (1)$$

Under the assumption of complete use of production factors, competitive factor markets and constant returns to scale (which implies $\bar{v}^L + \bar{v}^N + \bar{v}^{ICT} = 1$), gross value added can be defined as the weighted growth rate of inputs and total factor productivity (here calculated as a residual):

6 The interested reader can find more details on measurement issues in the financial sector in Williams *et al.* (2009) for the United Kingdom, Fixler and Zieschang (1999) for the United States and Inklaar *et al.* (2008) for European Union member countries.

$$\ln\frac{VA_t}{VA_{t-1}} = \bar{v}^L \ln\frac{L_t}{L_{t-1}} + \bar{v}^N \ln\frac{K_t^N}{K_{t-1}^N} + \bar{v}^{ICT} \ln\frac{K_t^{ICT}}{K_{t-1}^{ICT}} + \ln\frac{A_t}{A_{t-1}} \quad (2)$$

where $\bar{v}^j$ is the two-period average share of input type i in nominal value added. Capital services are defined as the aggregate of the individual capital stocks weighted by the asset's compensation share in total capital compensation:

$$\ln\frac{K_t}{K_{t-1}} = \sum_j \bar{v}_j^K \ln\frac{K_{j,t}}{K_{j,t-1}} \quad (3)$$

where $\bar{v}_j^K$ denotes the two-period average share of asset type j in total nominal capital compensation. For our analysis we distinguish between two types of capital: ICT capital (communication equipment, computing equipment, and software) and Non-ICT capital (transport, other machinery and equipment, and non-residential structures).

The change in labour composition is defined as the difference between the growth of labour inputs and the growth of total hours worked:

$$\ln\frac{q_t^L}{q_{t-1}^L} = \sum_h \bar{v}_h^L \ln\frac{L_{h,t}}{L_{h,t-1}} - \ln\left(\sum_h L_{h,t} \Big/ \sum_h L_{h,t-1}\right) = \ln\frac{L_t}{L_{t-1}} - \ln\frac{H_t}{H_{t-1}} \quad (4)$$

where L_t is the labour input index, aggregated over the h labour types using labour compensation shares and H_t is total hours worked summed over the different labour types.

In order to obtain labour productivity growth, we use value added per hour worked (va = VA/H). Capital input is also expressed in terms of hours worked (k = K/H) and TFP growth is simply deduced as a residual:

$$\ln\frac{va_t}{va_{t-1}} = \bar{v}^L \ln\frac{q_t^L}{q_{t-1}^L} + \bar{v}^N \ln\frac{k_t^N}{k_{t-1}^N} + \bar{v}^{ICT} \ln\frac{k_t^{ICT}}{k_{t-1}^{ICT}} + \ln\frac{A_t}{A_{t-1}} \quad (5)$$

Level gaps accounting

In order to compare productivity levels across countries, we use a methodology proposed by Inklaar and Timmer (2007). We assume that the production function is identical between countries.[7] Consequently, equation (5) can be used with time subscripts replaced with country subscripts (the United States is the reference country).

$$\ln\left(\frac{va_C}{va_{USA}}\right) = \bar{v}_L \ln\left(\frac{q_C}{q_{USA}}\right) + \bar{v}_{ICT} \ln\left(\frac{k_C^{ICT}}{k_{USA}^{ICT}}\right) + \bar{v}_N \ln\left(\frac{k_C^N}{k_{USA}^N}\right) + \ln\left(\frac{A_C}{A_{USA}}\right) \quad (6)$$

Until recently, comparisons of productivity levels by industry have been hampered by the lack of a comprehensive dataset for Purchasing Power Parities (PPPs) for industry outputs and inputs. Indeed, any reasonable comparison of industry performance in different countries needs a comprehensive set of industry-specific PPPs, as they are required to transform national output and input measures into internationally comparable quantity indexes. For the purposes of this study we use a new dataset made available by the EU-KLEMS project. This dataset provides industry PPPs for the year 1997 and covers 45 industries at the 2-digit level. The gross output PPPs have been made transitive by applying the EKS procedure and are available for

7 This assumption entails that the technological frontier is the same for all sample countries and that production sets differ across countries only because of differences in factor endowments. This hypothesis is in line with standard neoclassical trade theory and goes hand in hand with the hypothesis of constant returns to scale.

Table 1
PPPs/Exchange Rate for Financial Services, 1997

	France	Germany	Netherlands	United Kingdom	United States
PPP II	1.23	1.14	1.01	1.07	1
PPP GO	1.02	1.06	0.82	0.82	1
PPP VA	0.9	1.01	0.71	0.64	1

Table 2
PPPs/Exchange Rate for Business Services, 1997

	France	Germany	Netherlands	United Kingdom	United States
PPP II	1.17	1.19	1.14	1.18	1
PPP GO	1.85	1.40	1.40	1.30	1
PPP VA	1.85	1.39	1.41	1.30	1

all OECD countries.[8] The sample of countries we will here concentrate on consists of France, Germany, the Netherlands, the United Kingdom and the United States, the latter being the sample's reference country.

Based on the EU-KLEMS dataset for gross output PPPs we construct, in a first step, PPPs for value added. The latter are based on the relation between gross output and value added as defined in national input output tables (Gross Output – Intermediate Consumption = Value Added). Analytically this gives the following expression, used also in a number of other articles on the subject (e.g. Inklaar *et al.*, 2006; Rao *et al.*, 2004).

$$\ln\left(\frac{P_C^{GO}}{P_{USA}^{GO}}\right) = \overline{w}\ln\left(\frac{P_C^{VA}}{P_{USA}^{VA}}\right) + (1-\overline{w})\ln\left(\frac{P_C^{II}}{P_{USA}^{II}}\right) \quad (7)$$

Where P_C^{GO} and P_{USA}^{GO} are the relative price levels of gross output in country C and the USA respectively, P_C^{VA} and P_{USA}^{VA} the relative price levels of value added, P_C^{II} and P_{USA}^{II} the relative price levels for intermediate inputs and $\overline{w}$ the share of value added in gross output averaged between the country in question and the reference country, in our case the United States.

Based on this expression, it is necessary to calculate PPPs for intermediate inputs. The methodology we follow is outlined in great detail in Inklaar and Timmer (2007). For the computation of intermediate input PPPs, we assume that the price of a good is independent of its use. Thus, we calculate intermediate input PPPs for the two industries in question, by aggregating gross output PPPs of the delivering industries weighted by their importance in the industry's total intermediate inputs. In addition, PPPs for intermediate inputs should reflect the costs of purchasing intermediate deliveries, and should hence be based on purchasers' prices. As the PPPs for gross output in our data set are based on basic prices, we have to adjust the gross output PPPs for transport and trade margins and net taxes. Data on margins and net taxes are only available for commodities and not by industry. In order to obtain information on pricing behaviour in a particular industry, we aggregate margins for commodities by their weight in the industry's output. Note that our analysis is based on pair wise comparisons of countries vis-à-vis the United States so all ratios are bilateral. Table 1 shows the intermediate input and the resulting value added PPPs relative to the market exchange rate. For instance, when comparing Germany's intermediate input PPP in finance with the one for the United States (normalized to 1), one can see that inputs in Germany are more expensive than in the United States.

As it can be seen from the Tables 1 and 2, intermediate consumption is more expensive in the four European countries than in the United States. But whether value added will be more or less 'expensive' than in the reference country depends not only on relative prices for intermediate inputs and outputs,

8 For a thorough description of the dataset, see (Timmer et al., 2007).

but also on the weight intermediate inputs and value added have in gross output. The latter differs not only by country, but also by industry. Indeed, the share of value added in gross output is on average 5 percentage points higher in finance than in business services.

Compared to the United States, value added is less 'expensive' in finance in all sample countries except Germany. Hence, when applying the PPP for value added to the measure of value added as given in national input output tables, the resulting quantity will be bigger than the initial value for France, the UK and the Netherlands, but will be smaller for Germany.

In contrast, the usual measures of value added in the business sector given in national input output tables will be divided by the PPPs derived above. Hence, quantity indices of value added in the business sector will be smaller than the initial unadjusted values found in national input output tables.

The computation of PPPs for capital inputs are based on the method proposed by Jorgenson and Nishimizu (1978). The PPPs for capital services are based on PPPs for investment provided by Eurostat and the OECD. These PPPs for investment are adjusted by the ratio of user costs of capital between countries (which depends on capital's rate of return, depreciation rates and investment price changes). For our analysis we use capital input PPPs as calculated by Inklaar and Timmer (2007).

The PPPs for labour input are based on the methodology proposed by Jorgenson and Grilliches (1967), which involves aggregating relative wages across different labour types using labour compensation shares for each labour type as weights. For this purpose we distinguish between three labour categories: high-skilled (university graduates), medium-skilled (roughly higher education below degree), and low-skilled (no formal qualifications). The resulting quantity indices for inputs and outputs and the subsequent productivity levels are presented in the next section of the article.

Table 3
Sources of the Gap in Labour Productivity in the Financial Services Sector
(value added per hour worked, gap measured as percentage productivity differential relative to the US)

	France	Germany	Netherlands	United Kingdom
1997				
Productivity differential	12.4	-8.8	23.0	7.8
Contributions from				
Labour Composition	3.0	-3.1	-0.7	-4.0
ICT Capital	-1.3	-0.8	0.4	-1.6
Non-ICT Capital	-8.2	6.2	13.0	-11.7
TFP	18.8	-11.1	10.4	25.1
2005				
Productivity differential	15.2	-32.9	23.0	16.6
Contributions from				
Labour Composition	6.4	-2.4	3.2	-2.4
ICT Capital	4.9	-7.5	0.7	0.2
Non-ICT Capital	-1.4	4.7	3.3	-11.6
TFP	5.2	-27.7	15.7	30.3

Results for level and growth accounting

Finance

Productivity levels – differentials and input contributions

Table 3 shows the productivity differential and the input contributions to it for the financial sector in the sample countries vis-à-vis the United States in 1997 and 2005.

In 1997, we find that the productivity level in the financial sector in the Netherlands is 23.0 per cent higher than in the United States. This difference is due to the positive contributions of non-ICT capital (13.0 points), TFP (10.4 points) and ICT capital (0.4 points) and to the negative contribution of labour composition (-0.7 points).

More generally, productivity levels in the financial sector in 1997 in the four European

countries except for Germany are higher than in the United States. This is the case although the contribution of labour composition is negative in three of the countries (the exception is France). The contribution of labour composition is negative because the share of hours worked by the highly skilled in total hours worked is at least two times higher in the United States (40 per cent) than in the other countries.[9] Also, it should be underlined, that ICT capital's contribution to labour productivity is higher in the United States than in the European countries, except in the Netherlands, a fact confirmed by numerous other studies (Inklaar *et al.*, 2005).

Germany is the only country among the four European countries with a lower level of labour productivity in the financial sector than the United States. This is due to a negative contribution of TFP in 1997, while TFP's contribution is highly positive in the other three countries. Although the underlying explanations behind Germany's negative TFP performance are beyond the scope of this analysis, an important reason might be the financial sector's high degree of fragmentation. Indeed, Germany's banking landscape is shaped by many small and often state-run banks (*Sparkassen*, *Landesbanken*) hampering the diffusion of positive externalities and the realization of returns to scale due to agglomeration or size effects. For a sample of German and Italian banks, Fiorentino *et al.* (2009) find that the privatized banks indeed experienced a significant increase in productivity.

The second part of Table 3 shows the productivity differential and the input contributions to it for the financial sector in the sample countries vis-à-vis the United States in 2005. Between 1997 and 2005, France and the United Kingdom increased their lead on the United States and the Netherlands-US gap remained unchanged. In the Netherlands, all components contributed positively to the productivity differential, but TFP's contribution was by far the most significant. TFP growth and to a lesser extent ICT capital were the principal drivers behind the increase in the UK's productivity differential vis-à-vis the United States (here the differential in favour of the United Kingdom actually doubled).

In 2005, Germany continued to be the only one of the four countries with a lower level of labour productivity in the financial sector than the United States. Between 1997 and 2005 the negative differential vis-à-vis the United States more than tripled from 8.8 percentage points to 32.9 points, with lower TFP the single most important driver of this development. In Germany, negative contributions come from all inputs except non-ICT capital accumulation. A classical explanation for the negative contribution of ICT capital would be an institutional framework that does not allow firms the organisational flexibility needed to benefit fully from ICT capital (Gust and Marquez, 2003). The negative effects induced by the composition of Germany's labour force could also hamper productivity growth in the German financial sector, as a certain level of qualification is needed to reap the full benefits of ICT diffusion. The highly negative TFP contribution could also reflect the structure of the German banking sector (see preceding paragraph). The latter has changed very little, whereas the liberalization of financial markets advanced considerably in the other sample countries. Given this first set of results, the financial sector does not seem to account for the EU's negative productivity differential vis-à-vis the United States, but might contribute to it in the case of Germany.

9 Cette and Bourles (2007) find that observed productivity measures can be biased. Using a model that takes into account diminishing returns to hours worked, they show that 'structural' estimates of hourly productivity growth for several European countries are 10-15 percentage point below observed measures. These estimates assign some role to labor market institutions in explaining Europe's productivity performance.

Productivity growth and input contributions

Over the first sub-period (1992-1997), Table 4 shows that ICT capital contributed heavily to labour productivity growth in the financial sector for all five countries. In contrast, the non-ICT capital contribution was less significant and even negative in the Netherlands. The most significant factor behind productivity growth in Germany and the United Kingdom was TFP growth, probably going hand in hand with financial market liberalization. Surprisingly, TFP growth was negative in the United States.

Over the second sub-period (1997-2005), labour productivity growth in the financial sector was very strong in all countries except Germany, where it was negative. Labour productivity growth accelerated relative to 1992-97 in all countries except the United Kingdom, where the rate of productivity growth remains still high (3.9 per cent per year) and Germany, where it fell 4.3 percentage points. In all countries, the principal driver of labour productivity growth was ICT capital accumulation, as was largely the case during the preceding period. Note that labour composition's contribution was smallest in the United States. In fact, absolute labour input growth (measured by total hours worked) increased the most in the United States. But, at the same time, the share of hours worked by the low-skilled increased only in the United States, while decreasing in the four European countries.

In summary, we observe that in 1992-1997 the labour productivity growth differential in the financial sector vis-à-vis the United States was positive for three of the four European countries (France was the exception) and that in 1997-2005 it was positive for two countries (the exceptions were Germany, where growth was negative, and the Netherlands, where growth was the same as in the United States). In both periods, the main drivers of labour productivity growth generally were ICT capital and TFP growth to some extent, the latter reflecting most probably structural features of the respective economies. In addition, TFP contributions exhibited in the majority of countries a downward trend between periods. Irrespective of the underlying growth drivers, it is, however, not the financial sector that accounts for the aggregate labour productivity growth differential in favour of the United States. Moreover, observed growth patterns and drivers of the financial sector are similar across countries. This could be due to the fact that financial markets are quite homogeneous and integrated. One way to corroborate this intuition is to look at intermediate consumption (Inklaar and Timmer, 2007). Intermediate service consumptions are usually higher in the United States than in other countries. Yet, looking at the different types of intermediate consumption (material, energy, and services), we find that the structures in the financial sectors are quasi-identical across countries. This implies that the degree to which services are

Table 4
Sources of Labour Productivity Growth in Financial Services
(value added per hour worked, percentage growth and contributions)

	France	Germany	Nether-lands	United Kingdom	United States
1992-1997					
Productivity	0.0	3.0	2.2	4.9	2.0
Contributions from					
Labour Composition	0.5	0.5	0.4	0.3	0.2
ICT Capital	0.5	0.9	1.5	1.2	1.6
Non-ICT Capital	0.0	0.5	-0.1	0.5	0.7
TFP	-1.0	1.2	0.4	2.9	-0.4
1997-2005					
Productivity	3.0	-1.3	2.7	3.9	2.7
Contributions from					
Labour Composition	1.2	0.6	1.5	0.8	0.4
ICT Capital	1.2	0.8	1.9	1.8	1.8
Non-ICT Capital	0.4	0.1	-0.7	0.1	0.3
TFP	0.2	-2.8	0.0	1.2	0.1

Table 5
Labour Productivity Growth and TFP Contributions in Financial Services, 1992-1997 and 1997-2005
(value added per hour worked, in per cent and percentage points)

	France	Germany	Nether-lands	United Kingdom	United States
1992-1997					
Labour productivity	0.0	3.0	2.2	4.9	2.0
TFP	-1.0	1.2	0.4	2.9	-0.4
1997-2005					
Labour productivity	3.0	-1.3	2.7	3.9	2.7
TFP	0.2	-2.8	0.0	1.2	0.1

Table 6
Sources of the Gap in Labour Productivity in Business Services
(value added per hour worked, gap measured as percentage productivity differential relative to the US)

	France	Germany	Netherlands	United Kingdom
1997				
Productivity differential	-14.1	2.7	-16.4	-30.3
Contributions from				
Labour Composition	-2.8	-9.1	7.6	-8.2
ICT Capital	0.8	1.7	-1.4	-1.6
Non-ICT Capital	8.1	26.6	2.2	-3.6
TFP	-20.1	-16.6	-24.8	-16.9
2005				
Productivity differential	-28.4	-21.4	-24.3	-32.6
Contributions from				
Labour Composition	-3.9	-9.5	9.7	-10.8
ICT Capital	1.7	-7.3	-7.6	-7.1
Non-ICT Capital	8.0	20.6	0.4	-3.2
TFP	-34.2	-25.2	-26.8	-11.4

outsourced is similar across the financial sectors of the five countries.

The financial sector's productivity performance in the light of the current turmoil

As seen above, TFP growth, along with ICT capital, is an important driver of labour productivity growth in the financial sector. TFP growth is calculated as a residual. Hence, it captures intangible assets such as organizational efficiency and technological progress. It can also reflect more or less favourable institutional settings in the form of product and labour market regulations. Last but not least, TFP growth may simply be 'a measure of our ignorance' as Abramovitz put it. In that spirit and in light of the current financial turmoil, TFP growth, or at least parts of it, could as well be related to evolutions in the financial sector that have little to do with the sectors' fundamentals. In particular, TFP growth may be influenced by over-evaluations of assets prices, which inflated value added artificially and which will prove transitory, or indeed may have already proven transitory with the economic crisis.

In Table 5 we compare annual average productivity growth and TFP's contribution to it over the two sub-periods (1992-1997 and 1997-2005). In comparison to the first sub-period, the second one was relatively turbulent as a major crises, the dot-com bubble, took place. In addition, measures applied to the financial sector might have been biased by the build-up to what would become the financial crisis of 2007. When interpreting TFP growth as a factor capturing evolutions that are not reflected by the variations of explicit production factors, one would therefore assume that TFP growth would have been more important during the second sub-period. This is, however, not the case. TFP growth's contribution to productivity growth decreased between the two sub-periods in all countries except the United States and France. These results suggest that there is little reason to believe that our measures of productivity growth were more fragile to excessive developments in the financial sector in the second sub-period. That said, the general fragility related to TFP measures for financial sectors applies to our computations, implying that our results have to be interpreted cautiously.

Business Services

Productivity levels – differentials and input contributions

Regarding labour productivity levels in business services, our results are found in Table 6. In 1997, the productivity level for all countries except Germany were well below that in United States (per cent gaps ranged from -14.1 per cent in France to -30.3 pent cent in the United Kingdom). In Germany, the labour productivity level in business services was 2.7 per cent higher than in the United States. The contribution of labour composition to the gap differed significantly across countries: it was negative in all countries except in Netherlands. The contribution of ICT capital to the gap was small in all four countries, being slightly positive in Germany and France and slightly negative in the United Kingdom and the Netherlands. In addition, TFP's contribution is highly negative in all countries. Non-ICT capital is particularly significant in Germany, being the single factor explaining the positive productivity differential vis-à-vis the United States.

In 2005, labour productivity differentials in business services for all four European countries were highly negative in comparison to the United States, with the gap increasing in all four countries. A greater negative contribution to the gap from TFP was the most important reason behind this evolution in France and Germany, reflecting probably less pro-growth institutional settings and differences in organisational efficiency. However, when interpreting these results, one should bear in mind that the business services sector is very heterogeneous, covering various domains of economic activity (legal, accounting, design and translation activities, management and advertising, scientific and market research). ICT capital's contribution to the labour productivity gap in 2005 was negative in all countries except France. Non-ICT capital's contribution was negative only in the United Kingdom. Labour composition effects remain negative in all countries except the Netherlands.

Productivity growth and input contributions

In 1992-1997, labour productivity growth in business services was negative in all countries except the United Kingdom. Over this period, labour composition's contribution to labour productivity growth was small, but positive in all countries except the Netherlands where it was zero. This was related to the increase in the share of hours worked by the highly skilled. Both ICT and non-ICT capital contribute positively to labour productivity growth (except in the Netherlands where non-ICT capital made a negative contribution). Last but not least, TFP was an important growth driver of labour productivity in business services, but in the negative sense in all countries except the United Kingdom. Coupled with the fact that the sector is quite labour intensive, this underlines the importance of structural features such as the regulations on product and labour markets. In addition, TFP growth can be negatively affected by financing conditions, as found by Estevao and Severo (2010), since financial shocks can distort the allocation of factors across firms within an industry.

In 1997-2005, labour productivity growth in the business services sector varied significantly across countries, ranging from 3.1 per cent per year in the United States and 3.0 per cent in the United Kingdom to -1.8 per cent in Germany. This is in line with changes in the productivity differentials between 1997 and 2005 as found in Table 6, which showed an increase in the US advantage. In Germany and France, labour productivity growth was identical, and negative, in both sub-periods, underlying the need of structural reforms in the market services, in line with the Lisbon Strategy. More generally, the contribution of labour composition to labour productivity growth was positive in all countries in 1997-2005, since the share of hours worked by the highly skilled increased substantially in all countries. The contribution of ICT

Table 7
Business Services, Productivity Growth and Input Contributions
(value added per hour worked, percentage growth and contributions)

	France	Germany	Nether-lands	United Kingdom	United States
1992-1997					
Productivity	-0.1	-1.8	-0.3	3.3	-0.8
Contributions from					
Labour Composition	0.5	0.5	0.0	0.3	0.2
ICT Capital	0.5	1.0	0.3	1.1	1.2
Non-ICT Capital	0.9	1.1	-0.5	0.2	0.4
TFP	-2.0	-4.4	-0.1	1.7	-2.6
1997-2005					
Productivity	-0.1	-1.8	0.8	3.0	3.1
Contributions from					
Labour Composition	0.7	0.3	0.6	0.1	0.4
ICT Capital	0.5	1.4	0.7	1.5	1.9
Non-ICT Capital	0.3	0.5	0.4	0.7	0.5
TFP	-1.6	-4.0	-0.9	0.7	0.3

capital was somewhat greater in most countries than in 1992-1997. It is important to note that the contribution of ICT capital was particularly important in the United States (around three times the contribution of ICT Capital in France). In addition, in all countries except the United States and the United Kingdom TFP growth was negative. This may suggest an absence of hampering institutional settings in these two countries.

The key development in business services between the 1992-1997 and 1997-2005 periods was the massive 3.9 percentage-point acceleration of labour productivity in the United States (from -0.8 per cent per year to 3.1 per cent per year). There was no change in labour productivity growth in France and Germany between periods, while labour productivity growth picked up in the Netherlands and fell in the United Kingdom, albeit from a high growth rate. The importance of ICT capital and TFP growth for the business services sector should be underlined. The interpretation of the latter should however, be undertaken with caution.

Over the period under consideration productivity levels and growth rates in the European countries of our sample lag very much behind those in the United States. There can be no doubt that, given the sector's importance and size, it accounts for a large part of the productivity differential between the United States and the European countries (see also the introduction for the computations of the sectors' contribution to the productivity growth rate of the overall market economy). Moreover, given the productivity level gaps, we can exclude possible catching-up effects as an underlying reason for the diverging growth dynamics across the sample countries. Subsequently, possible explanations for the increasing US productivity lead in business services include greater ICT capital accumulation and positive effects of a higher percentage of skilled workers on average, both related to more favourable institutional settings. Given these results, the swift implementation for the Services Directive could prove to be an important step towards narrowing the productivity differential in business services vis-à-vis the United States.

Conclusion

This article employs a sectoral approach to productivity level gaps and growth rates. The first part of our exercise consisted of computing productivity levels for the years 1997 and 2005 for the financial and business services sectors of five advanced economies (France, Germany, the Netherlands, the United Kingdom and the United States). We found that productivity levels in the sample countries' financial sectors are very similar and that the European countries do not seem to lag behind the United States.

Indeed, our measures imply that productivity levels (value added per hour worked) in the European financial sectors are actually higher than in the United States. This situation may be explained by lower regulatory barriers to competition in the banking sector: all the European

countries of our sample were less regulated than the United States in 2003, and a regulatory environment that is conductive to competition has a significant positive impact on sectoral output and potential growth (de Serres *et al.*, 2006). This is true for all countries but Germany where productivity levels are substantially lower. We believe that one important factor behind Germany's poor performance is the high degree of fragmentation of its financial system, the small size of its institutions impeding on their returns to scale.

Nevertheless, our results should be interpreted with caution. We have calculated TFP as a residual and the classical explanation for TFP is that it reflects primarily more or less favourable institutional settings. The distinction between prices and volumes being an uneasy undertaking for the financial sector (see the introduction for a discussion of measurement issues of output in finance), a different reading would be that TFP simply reflects errors in our computations or the omission of one or several explanatory variables (intangible assets being one possibility). Bearing in mind these constraints, our results still support the view that it is not the financial sector(s) that is responsible for Europe's negative productivity differential vis-à-vis the United States.

In terms of labour growth rates in the financial sector, the principal drivers are ICT capital and TFP growth. This is the case for all five countries and in both sub-periods. In addition, when examining the two sub-periods, we observe that productivity growth accelerated somewhat in the second period (1997-2005) in line with increasing contributions of ICT capital.

Regarding business services, productivity level gaps vary significantly. But one should bear in mind that this sector is very heterogeneous in its composition and covers various domains of economic activity (legal, accounting, design and translation activities, management and advertising, scientific and market research). Market structure varies across countries, and this heterogeneity between European economies is for instance underlined by the OECD's PMR indicator (Conway and Nicoletti, 2006). Labour productivity levels in the business services sectors of European countries are generally substantially below the US level. This is not the case in Germany where productivity was well above the other countries in 1992-1997; however, this proved to be transitory as in 2005, the productivity level in the German business services sector converged to the level of other European countries and was below that of the United States. Given this sector's importance in total value added, we believe that the business services sector accounts for a large part of the EU's negative productivity differential vis-à-vis the USA. This conclusion seems to be broadly in line with the findings of numerous other authors such as Van Ark *et al.* (2008).

Labour productivity growth rates for the business services sector vary significantly across countries, implying different trends in TFP growth. The contribution of ICT capital is important in all countries. However, it must be borne in mind that the positive effects of ICT capital accumulation will also depend on intangible factors such as organizational efficiency or educational levels and life-long learning (Brynjolfsson and Hitt, 2003). Also, in contrast with to the financial sector, labour productivity growth in business services did not accelerate during the second sub-period (1997-2005) except in the Netherlands and the United States. This implies that the observed labour productivity growth patterns cannot be explained by catch-up effects. Nonetheless, given the sector's importance for the national economies, our results imply that the sectors' poor performance contributed to the EU's negative productivity differential vis-à-vis the United States.

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