

## Growth and Productivity in Belgium

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*Bernadette Biatour, [bbi@plan.be](mailto:bbi@plan.be)  
Chantal Kegels, [ck@plan.be](mailto:ck@plan.be)*

**Abstract** - The objective of the report is to provide an overview of the main drivers of economic growth and the productivity evolution in Belgium, in comparison with the EU and the US, between 1970 and 2005, based on a consistent data set. The growth accounting methodology is applied to explain value added and labour productivity growth for the total economy, manufacturing and market services. This decomposition exercise diverges from what has been applied in Belgium up to now, as it uses capital services flows rather than the capital stock and labour services flows rather than the number of hours worked to measure the contribution of these factors of production to economic and productivity growth. Contributions of the main industries to value added, employment and productivity growth are also estimated.

**Jel Classification** – O11, O33, O40, O47

**Keywords** – growth accounting, growth contribution, productivity, MFP, ICT

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## Executive summary

Since 1970, the growth of GDP per capita in Belgium as well as in the EU has been on a declining trend, leading, in 2005, to a level of GDP per capita in Belgium that was 31% below the US level. Since the beginning of the nineties, the slowdown of economic growth was only due to a decline of labour productivity growth, hours worked making a modest but positive contribution to growth. By contrast, since 1990, the US has succeeded to increase its labour productivity growth and since 1995, it has recorded labour productivity growth rates much higher than the Belgian and European growth rates. These divergences in productivity growth rates have progressively eroded the Belgian leadership in this field and, in 2005, the US productivity level reached the Belgian level.

Using the growth accounting decomposition, the explanation for the Belgian and European slowdown of productivity growth can be found in the evolution of the three components namely labour composition effect, capital deepening, especially non-ICT capital deepening, and multi-factor productivity (MFP) which measures the evolution of the overall efficiency of how the factors of production, i.e. labour and capital, are used together in the economy. However, the decline of MFP contribution has been much more pronounced than the decline of other contributions. At the same time, the US recorded a strong increase in the MFP contribution, particularly since 2000. As a result, the US MFP level was only slightly below the Belgian level in 2005.

Structural evolutions in the economy between 1970 and 2005 have also influenced productivity performances. Over the whole period, the slowdown of labour productivity growth in Belgium is mainly due to a decreasing manufacturing contribution to aggregate labour productivity growth and, to a lesser extent, to a decrease of the contribution of non-market services and other industries. Since 1990, the only increasing contribution has come from the market services and since 2000, market services have become the most important contributor to aggregate labour productivity growth. At the opposite, all main industries, at the exception of "other industries", recorded an increase in their contribution to aggregate productivity in the US with the most important contributors being market services followed by manufacturing.

The origins of labour productivity gains by industry have also differed between Belgium, the EU and the US. MFP contribution accelerated strongly between 1995 and 2005 in US manufacturing while it decelerated in European and Belgian manufacturing. Over 1970-2005, the main contributor of productivity gains in Belgian manufacturing was capital deepening while it was MFP in the EU and in the US. The evolution of productivity in market services was mainly driven by the contribution of capital deepening in the EU, in the US and in Belgium with a particularly important contribution of ICT capital deepening in this last country. However, since 2000, the most important contributor of productivity gains in US market services has become MFP while

the MFP contribution has become negative in Belgium and close to zero in the EU. In other industries, in comparison with the US, labour productivity growth was especially high in Electricity, gas and water supply in Belgium and in the EU over the whole period, except in Belgium during 2000-2005. In the three areas, labour productivity growth in this sector was mainly driven by capital deepening, but in Belgium and in Europe, MFP growth was also an important contributor.

The divergences in the origins of productivity gains are also linked to the kind of activities developed in the main groups of industries. In manufacturing, the importance of ICT is clearly visible in the US where activities such as Computing equipment and Communication equipment have recorded skyrocketing growth rates of real value added but also in the EU where the growth rates reached by these activities have been the highest among manufacturing. By contrast, the growth rates of these industries appeared much more modest in Belgium where real value added growth was strongest in Chemicals, Plastics, Wood products and Transport equipment. Since 1990, the major contributors to labour productivity growth of the Belgian manufacturing have been Food, beverages and tobacco, Transport equipment and Rubber and plastic products. By contrast, the major contributors of the US manufacturing productivity growth have to be found in activities linked to ICT production such as Office, accounting and computing machinery or to ICT applications such as Printing and publishing. In market services, the highest growth rate of real value added is reached by Real estate, renting and business services in Belgium, by Transport, storage and communication in the EU and by Financial activities in the US.

## Introduction

The report on growth and productivity in Belgium has been developed from the database created by the Federal Planning Bureau for the EUKLEMS project. The aim of this international project, funded by the European Commission as a part of the 6th Framework Programme, is to study productivity in the European Union at the industry level. In order to be able to perform such analyses, a database with data from 1970 onwards on economic growth, productivity, employment creation, capital formation and technological change at the industry level has been created for European Union Member States. This dataset is fully compatible with the most recent National Accounts statistics. This dataset also represents methodological progress as it contains the index of capital and labour services allowing a better measure of the contribution of these factors to production (see Appendix 2 for sensitivity analysis). Despite the efforts of international harmonisation, the compatibility of EUKLEMS data with National Accounts still implies methodological differences. This is particularly important for deflator series. Indeed, the US, contrary to the majority of the EU Member states, uses in the National Accounts hedonic price indexes to deflate gross output and intermediate inputs for high-tech activities such as Office, accounting and computing equipment or Radio, television and communication equipment. These methodological differences partly explain stronger real value added growth rates in the US than in the EU.

The objective of this report is to provide an overview of the main drivers of economic growth and productivity evolution in Belgium between 1970 and 2006, and to compare the Belgian performances with the European and US evolutions over 1970-2005 based on this consistent data set. Given the lack of statistical information on hours worked by labour qualification category, the international comparison of decomposition of economic and labour productivity growth is only done for the period 1985-2005.

After commenting on evolutions for the total economy, the report successively examines manufacturing, market services, non-market services and other industries.

It has to be noted that real GDP is defined in this report as the Tornqvist sum of real values added at industry level where the weights are given by the two-period average share of each industry in nominal value added.



# 1. Total economy

**Table 1** Summary of main findings for Belgium  
*average annual growth rate in percent*

	1970-1980	1980-1990	1990-2000	2000-2006
<b>GDP per capita</b>	3.4	1.9	1.7	1.4
- GDP per hour worked	4.7	2.4	1.5	1.1
- Hours worked per capita	-1.3	-0.5	0.2	0.3
- Hours worked per worker	-1.3	-0.6	-0.1	-0.1
- Employment rate	-0.4	-0.1	0.5	0.3
- Working age population on population	0.4	0.3	-0.2	0.1
<b>GDP</b>	3.6	2.0	2.0	1.7
- Hours worked contribution	-0.7	-0.3	0.3	0.4
- Labour composition contribution	n.a.	0.3	0.4	0.2
- ICT capital contribution	0.6	0.8	0.7	0.6
- Non-ICT capital contribution	0.8	0.6	0.8	0.7
- MFP contribution	n.a.	0.7	-0.2	-0.1
<b>GDP per hour worked</b>	4.7	2.4	1.5	1.1
- ICT capital deepening	0.6	0.8	0.7	0.6
- Non-ICT capital deepening	1.1	0.7	0.6	0.5
<b>GDP</b>	3.6	2.0	2.0	1.7
- Manufacturing contribution	1.1	0.8	0.3	0.1
- Market services contribution	1.1	1.1	1.2	1.3
- Non-market services contribution	1.0	0.2	0.3	0.3
- Other industries contribution	0.3	0.0	0.2	0.1
<b>Hours worked</b>	-1.1	-0.3	0.5	0.6
- Manufacturing contribution	-0.9	-0.4	-0.4	-0.3
- Market services contribution	0.0	0.3	0.7	0.5
- Non-market services contribution	0.3	0.1	0.3	0.5
- Other industries contribution	-0.5	-0.3	-0.1	0.0
<b>GDP per hour worked</b>	4.7	2.4	1.5	1.1
- Manufacturing contribution	2.3	1.2	0.6	0.4
- Market services contribution	1.0	0.7	0.3	0.6
- Non-market services contribution	0.8	0.2	0.2	-0.1
- Other industries contribution	0.7	0.2	0.3	0.2

Remark: Labour composition is not available for the period 1970-1985 and for 2006. For the period 1980-1985, the structure of qualifications of 1986 was fixed. For 2006, the labour composition contribution of 2005 was used.

## 1.1. Evolution of GDP per capita in Belgium

Growth of GDP per capita is one of the most frequently used indicators of economic performance, providing an easily understandable picture of the evolution of the standard of living. However, this indicator is far from giving a complete view of changes in the welfare of an economy. Its main shortcomings are that this indicator does not take into account the degree of inequality of income distribution, the use of non-renewable resources, various aspects of the quality of life, etc. However, as this indicator is generally rapidly available for most industrialised countries, it is widely used in international comparisons. Per capita GDP growth can be decomposed into the growth of hours worked per person (which gives an indication of the evolution of the labour utilisation) and the growth of GDP per hour worked (which illustrates the evolution of the labour productivity).

The long term series allows light to be shed on the declining trend of GDP per capita growth. During the seventies, the average annual growth rate of GDP per capita reached 3.4%, decreasing to 1.9% during the eighties before reaching 1.7% in the nineties. Since 2000, GDP per capita has been growing even more slowly at an annual rate of 1.4%.

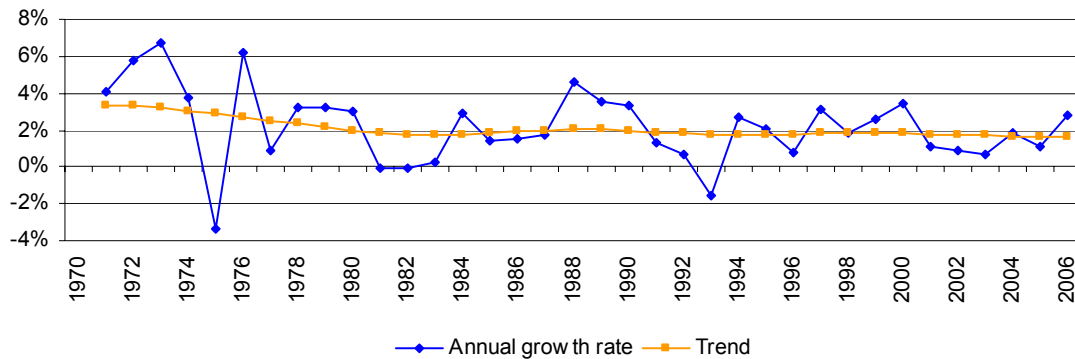
Growth in labour utilisation, strongly negative during the seventies and the first half of the eighties, has turned positive since the end of the eighties. Using the annual average rate, labour utilisation decreased by 1.3% during the seventies and by 0.5% during the eighties. Since then, growth was slightly positive, at an annual average rate of 0.2% during the nineties and at a rate of 0.3% during the most recent period 2000-2006. An acceleration of the growth has been observed particularly since 2005.

Over the whole period 1970-2006, labour productivity growth was positive but showed a decreasing trend. During the seventies, annual average growth of labour productivity reached 4.7% declining to 2.4% during the eighties, to 1.5% during the nineties and to 1.1% over 2000-2006. However a stabilisation of the trend was observed over the last four years.

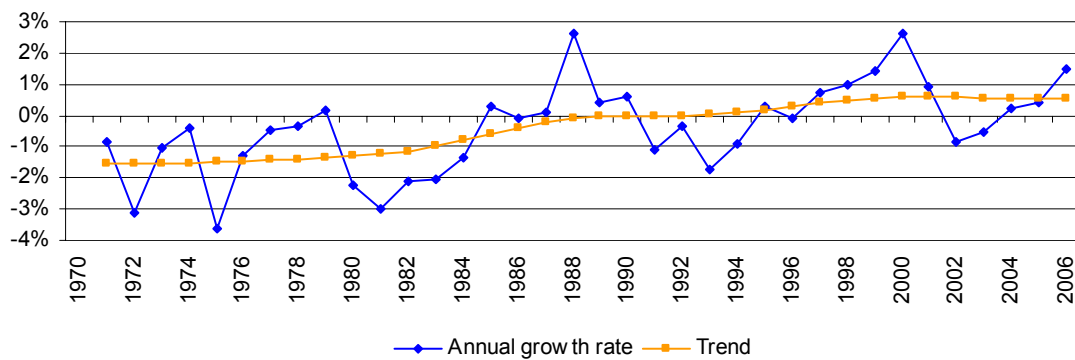
Identifying the factors explaining the evolution of these two components of the growth of standards of living is the objective of the following sections.

Data information: GDP at constant prices is defined as the sum of values added at constant prices (base year = 2000). The aggregation across industries is done using a Tornqvist index. Hours worked are estimated for the whole economy based on the assumption that self-employed persons work on average the same number of hours as employees.

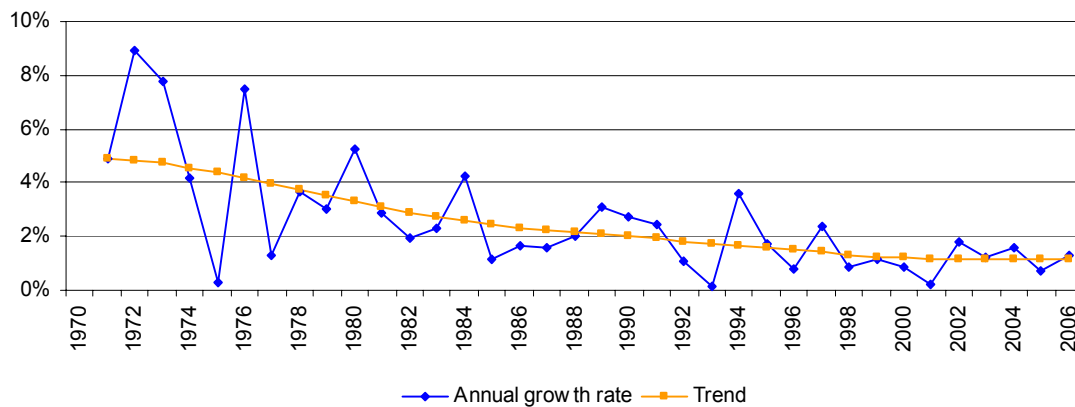
**Figure 1 Growth of GDP per capita**  
annual growth rate in percent



**Figure 2 Growth of labour utilisation (total hours worked per capita)**  
annual growth rate in percent



**Figure 3 Growth of labour productivity (GDP per hour worked)**  
annual growth rate in percent



## 1.2. Evolution of labour utilisation in Belgium

Labour utilisation, i.e. total hours worked divided by the population, is an important factor of growth as labour is one of the most important factors of production. To understand its evolution, it is helpful to decompose this indicator into more familiar elements. This has been done by considering the decomposition of labour utilisation into three components: firstly, annual hours worked per worker defined as total hours worked divided by the total number of workers; secondly, the employment rate defined as the total number of workers divided by the working age population and, finally, the share of working age population in total population.

$$\frac{\text{Hours}}{\text{Population}} = \frac{\text{Hours}}{\text{Employed workers}} \times \frac{\text{Employed workers}}{\text{Working age population}} \times \frac{\text{Working age population}}{\text{Population}}$$

The decrease in labour utilisation between 1970 and 1984 can be explained by a rapid decline of the employment rate from 61.2% in 1970 to 54.8% in 1984 and of the annual hours worked per worker (-15.6%). These negative evolutions were only partly compensated for by an increase in the share of the working age population in the total population, which reached its peak in 1985 at 67.4%.

Since the mid-eighties, labour utilisation has slowly increased under the effect of the rapid growth of the employment rate over this period. After having reached a peak in 2001 at 61.7%, labour utilisation decreased slightly during the two following years. Since 2004, an increase has been observed again. Although this evolution clearly goes in the right direction, the Belgian performance is still far from the Lisbon objective of an employment rate reaching 70% in 2010.

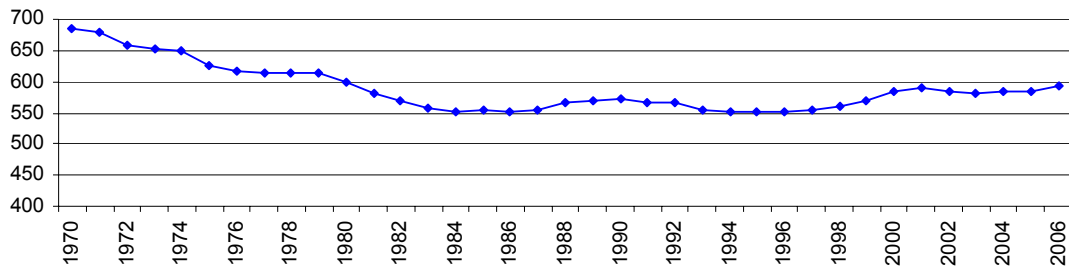
The evolution of annual hours worked per worker influenced slightly negatively labour utilisation from the seventies before becoming neutral since 1996.

Between 1986 and 2001, the share of the working age population in the total population declined due to the rapid increase in the share of persons older than 64 in the total population. From 2000 to 2005, the share of the working age population in the total population was stable at around 65.6%. In 2006, this share increased at 66.1% partly under the effect of immigrants.

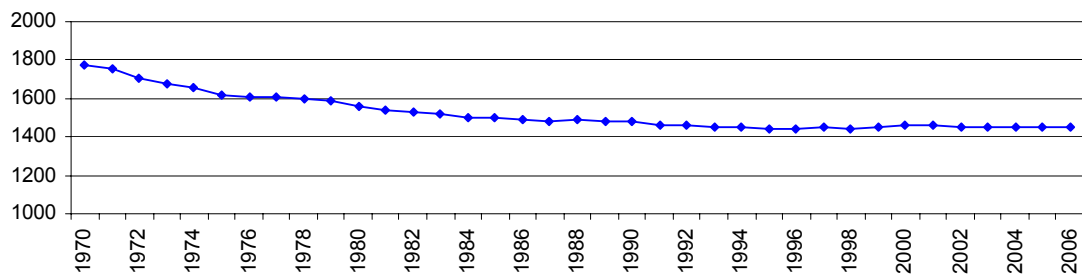
Data information: hours worked are estimated for the whole economy based on the assumption that self-employed persons work on average the same number of hours as employees. The working age population is defined as the population aged between 15 and 64 years. Population data are FPB-DG SEI data. More information is available in « Perspectives de population 2007-2060 », Planning Paper 105, FPB-DG SEI.



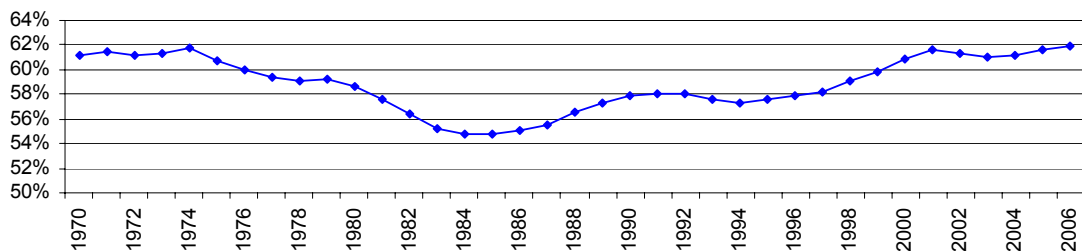
**Figure 4 Labour utilisation: total yearly hours worked per capita**



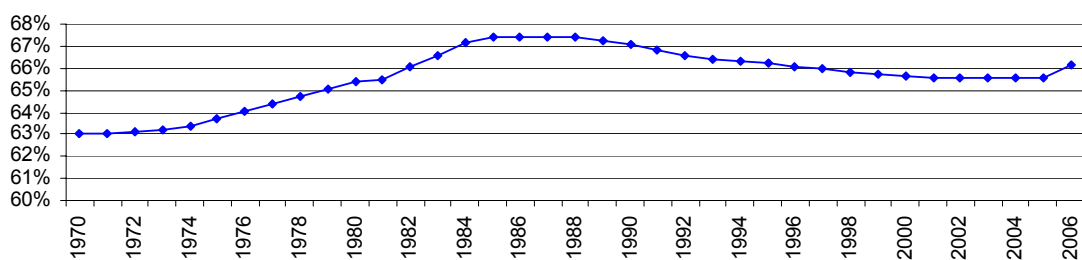
**Figure 5 Annual hours worked per worker**



**Figure 6 Employment rate: workers on working age population in percent**



**Figure 7 Working age population on total population in percent**



### 1.3. Level of GDP per capita

The comparison of the level of GDP per capita in Belgium with the levels observed in the European Union (EU) and in the United States (US) allows to assess the degree of convergence or divergence of Belgian economic performances with respect to the ones of these two areas. International comparisons of levels of GDP per capita or of their components require the utilisation of Purchasing Power Parities (PPPs), which enable to express data in a common unit taking into account the evolution of the relative prices of output. The differences in levels of GDP per capita can be decomposed in differences in labour utilisation (total hours on population) and in differences in labour productivity levels (level of GDP per hour worked).

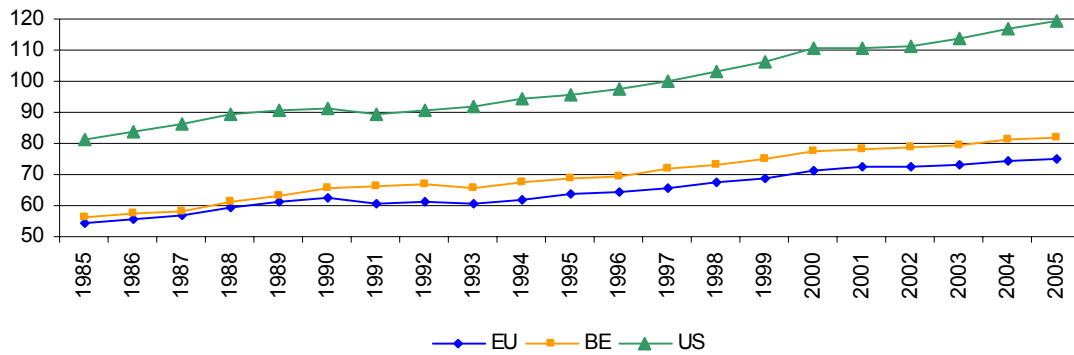
Over the whole period 1985-2005, the GDP per capita level in Belgium was lower than the level observed in the US. In 1985, Belgium recorded a GDP per capita level 30.7% below that of the US. This gap decreased and in 1991, the Belgian level was 25.8% below the American level of GDP per capita. Since then, the gap between the two countries has again increased and the Belgian GDP per capita level was 31% below the US level in 2005. During the eighties, the level of GDP per capita in Belgium was very close to the EU level. At the beginning of the nineties, Belgium knew a higher growth rate than the EU leading to a larger gap between the two areas. This gap remained more or less stable until the end of the considered period.

The Belgian level of the labour utilisation (hours worked per capita) was below the level recorded in the US and in the EU over the whole period 1985-2005. The level in Belgium was between 30% and 40% below the US level. The gap between Belgium and the EU decreased at the beginning of the nineties and remained stable during the rest of the period.

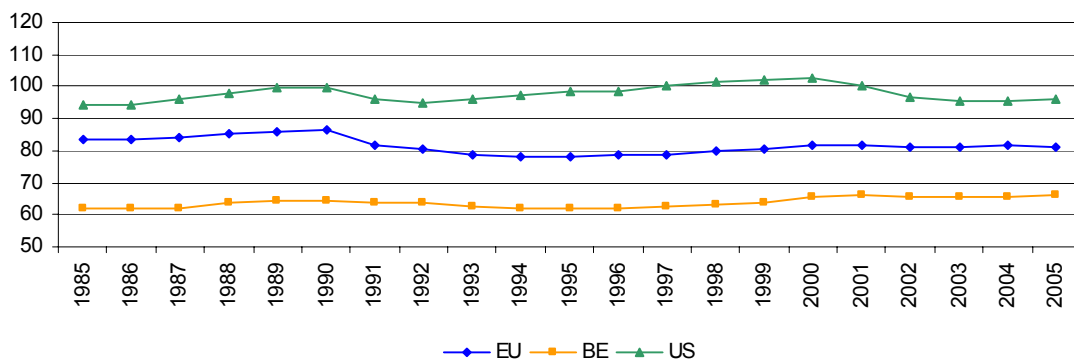
The Belgian level of labour productivity was above the US level and the EU level over the whole period 1985-2005. However, after an increasing gap between Belgium and the US in the mid-nineties, US caught up the Belgian level in 2005 due to a faster labour productivity growth since the end of the nineties. This strong growth in the US combined with a slowdown of the labour productivity growth in the EU over the same period, widened the gap between the two areas.

Data information: GDP per capita/per hour in level are first estimated for the year 1997 by dividing VA at constant prices by PPPs provided by the EUKLEMS consortium and then by population/hours worked. Using the growth rates of the data, series in level for the whole period can be estimated. Series for the EU are estimated with data published in the EUKLEMS database under the variable EU EX-15 and cover 10 Member States (Austria, Belgium, Denmark, Spain, Finland, France, Germany, Italy, Netherlands and United-kingdom).

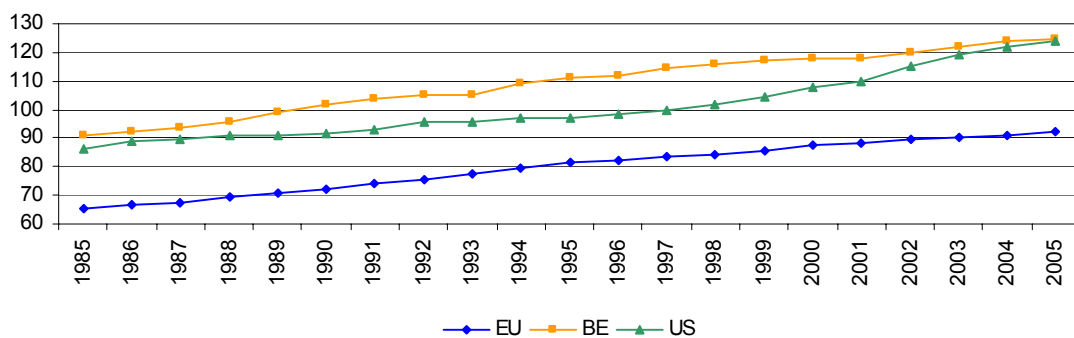
**Figure 8 Level of GDP per capita - EU, Belgium, us**  
*US 1997=100, PPPs*



**Figure 9 Labour utilisation: total hours worked per capita - EU, Belgium, us**  
*US 1997=100*



**Figure 10 Level of GDP per hour worked - EU, Belgium, us**  
*US 1997=100, PPPs*



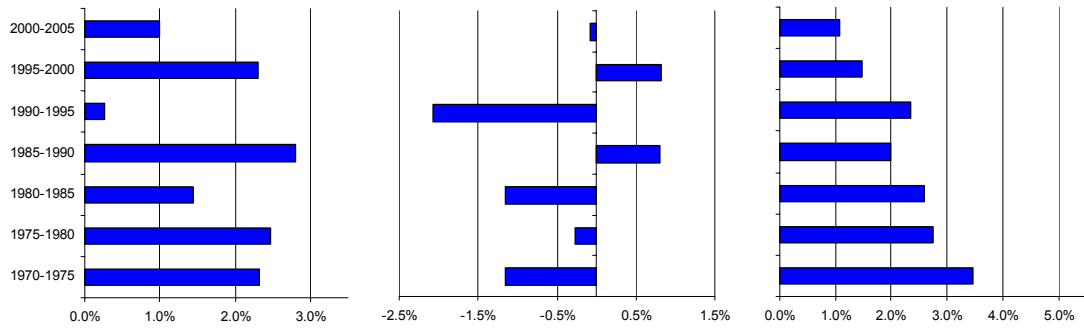
#### 1.4. Growth of GDP per capita

The slowdown of GDP per capita growth recorded in Belgium over the last decades has also been observed in many other European countries and consequently in the EU as a whole. This slowdown is the main justification for the adoption of the Lisbon Strategy. During the seventies and the eighties, the average annual GDP per capita growth of Belgium and of the EU was above the growth recorded in the US. Due to the deceleration experienced in Belgium and in the EU, the average annual growth of GDP per capita observed in US has become, since the nineties, higher than the growth observed in Belgium and in the EU. Despite the slowdown recorded by the three areas since the beginning of the new millennium, the gap between the US and Belgium and between the US and the EU remains. Since 2000, GDP per capita has been growing at an annual rate of 1.0% in the EU, 1.1% in Belgium and 1.5% in the US.

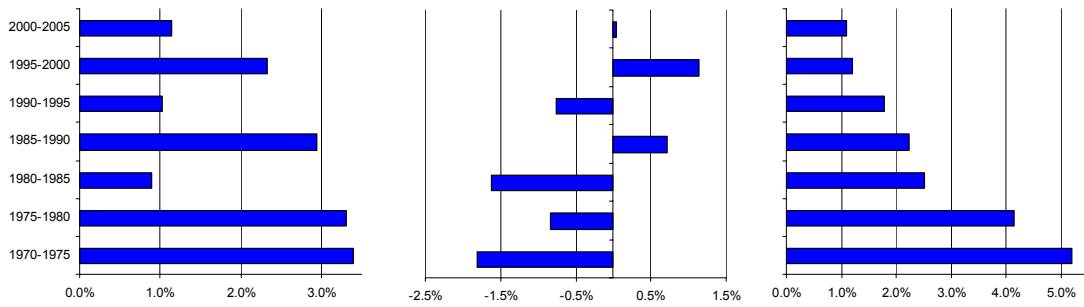
In Belgium and in the EU, the deceleration of the GDP per capita growth is explained by the strong decrease of the labour productivity growth. The average annual labour productivity growth decreased in Belgium from 5.2% in the beginning of the period (1970-1975) to 1.1% at the end of the period (2000-2005) and in Europe, from 3.5% to 1.1%.

In contrast, the US has recorded a significant acceleration of their labour productivity growth since 1995. Since then, the annual average growth of labour productivity observed in the US has been largely above the one of Belgium and of Europe. Labour productivity growth in the US reached 2.8% during the recent period 2000-2005. This strong growth was however thwarted by a sharp decline of the rate of labour utilisation.

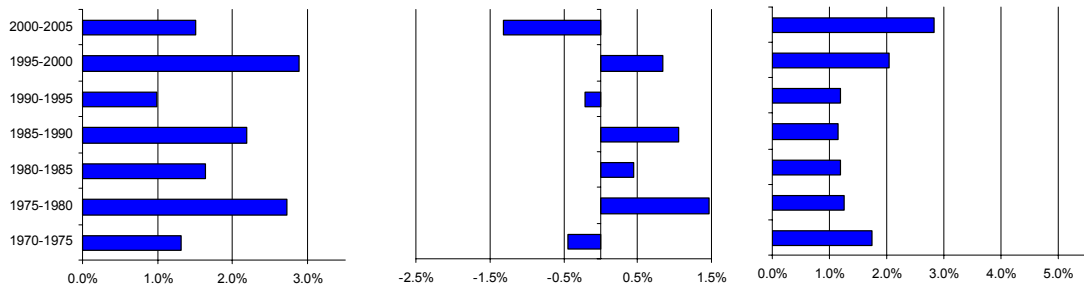
**Figure 11 Growth of GDP per capita, labour utilisation and GDP per hour - EU**  
*average annual growth rate in percent*



**Figure 12 Growth of GDP per capita, labour utilisation and GDP per hour - Belgium**  
*average annual growth rate in percent*



**Figure 13 Growth of GDP per capita, labour utilisation and GDP per hour - US**  
*average annual growth rate in percent*



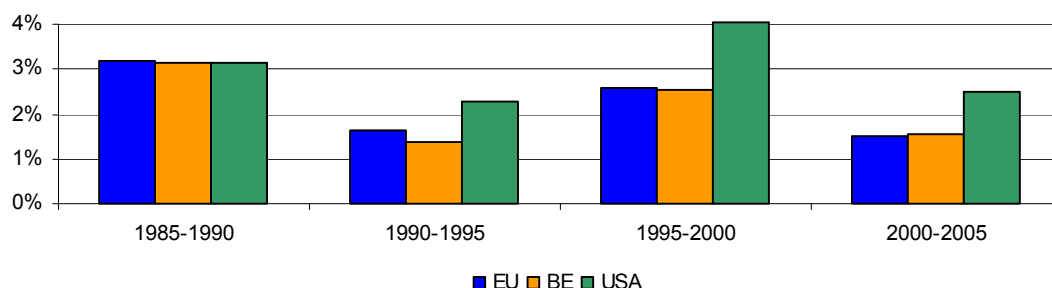
## 1.5. Decomposition of GDP growth

The growth accounting model allows GDP growth to be broken down into the contributions of labour, capital and multi-factor productivity (MFP). This last component measures the evolution of the overall efficiency of how the factors of production, i.e. labour and capital, are used together in the economy. The labour contribution to GDP growth is decomposed between the effects of changes over time in the amount of labour input (number of hours worked) and changes in the composition of labour concerning qualifications (labour composition). The labour composition effect is measured by distinguishing various types of labour (allowed by the estimation of labour services). The capital contribution to GDP growth is measured by capital services rather than capital stocks, the quality improvements of capital, i.e. the efficiency gains, are consequently included in capital contribution rather than in MFP.

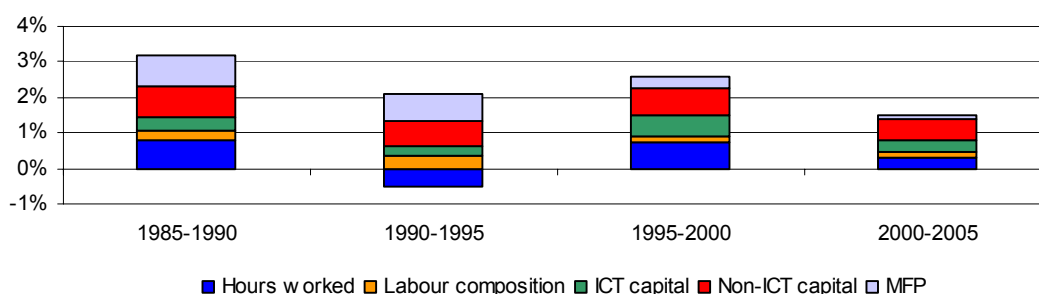
In Belgium, over all periods, the main contribution to GDP growth has come from capital. The contribution of capital reached more than 1% in each period. The role of capital is divided into the role of ICT and non-ICT capital. The contribution of ICT capital was particularly high over the period 1995-2000 and to a lesser extent over 2000-2005, indicating the growing penetration of these new technologies inside the economy. The contribution of non-ICT capital has decreased over the whole period. The contribution of hours worked was positive over the first and third period, negative over the second period and positive but smaller over the last period. The labour composition effect decreased over the whole period, meaning that the shifts in labour composition towards more skilled workers were less important during the end of the period. After a strong contribution to growth in the first period, 1985-1990, the average MFP contribution has been negative since the second period, 1990-1995.

Contrary to Belgium, the US recorded an increasing MFP contribution over the whole period and reached a growth of 1.6% over the period 2000-2005. In this country, labour growth was also an important source of growth thanks to the increase in hours worked, the labour composition effect being very small. This effect has however increased and contributed to GDP growth more largely in the US than in Belgium during the most recent period. The ICT and non-ICT capital contributions were, on average, lower in the US than in Belgium.

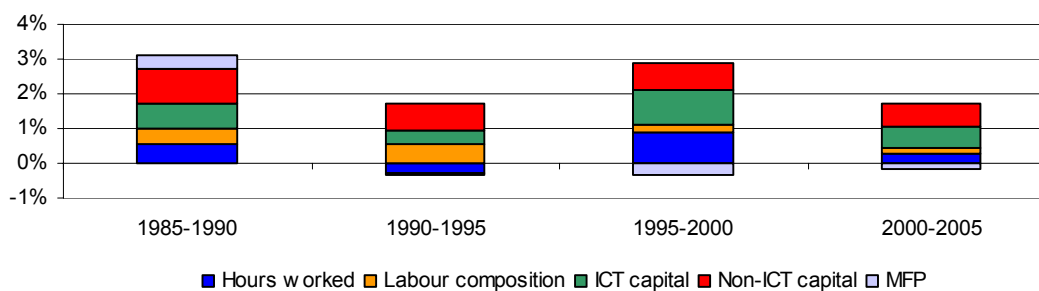
**Figure 14** GDP growth - EU, Belgium, us  
average annual growth rate in percent



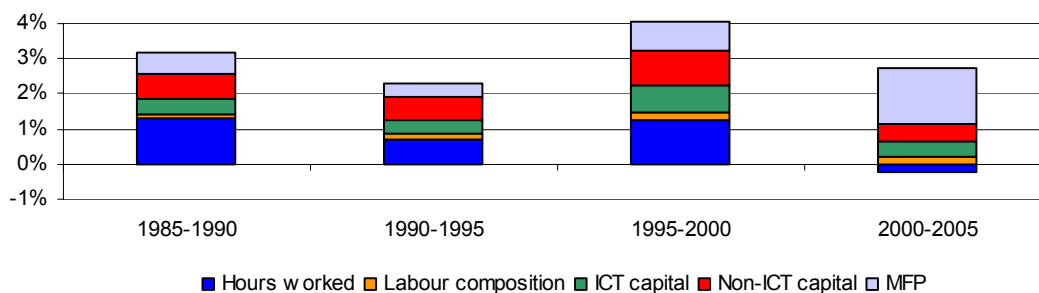
**Figure 15** Contribution to GDP growth - EU  
average annual growth rate in percent



**Figure 16** Contribution to GDP growth - Belgium  
average annual growth rate in percent



**Figure 17** Contribution to GDP growth - us  
average annual growth rate in percent



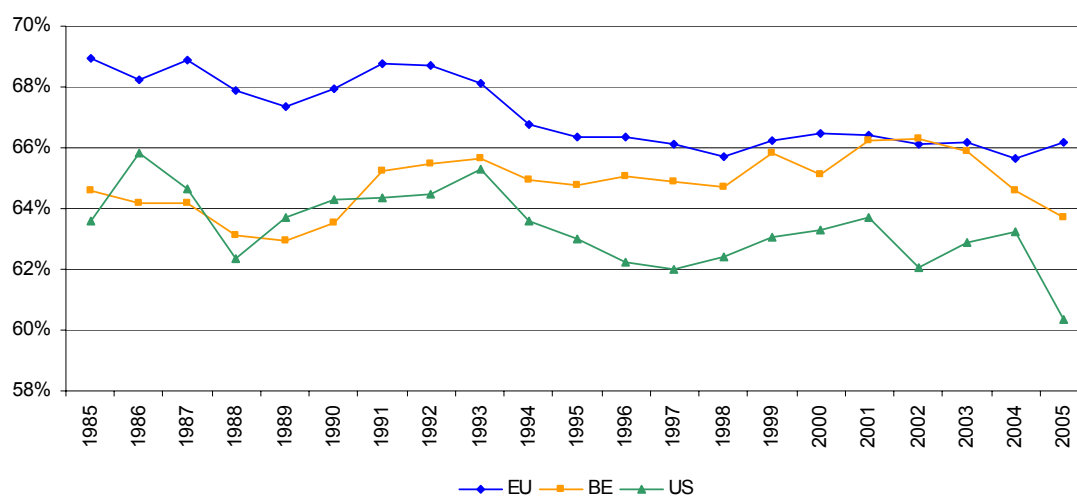
The evolution of the respective contributions of capital, labour and MFP depends crucially on the share of the two factors of production in value added as this share is used as a weight in the contribution estimates. According to the growth accounting model, perfect competition guarantees the absence of economic profit. Therefore, value added is totally allocated to labour and capital. As consequence, the sum of the shares of capital and labour compensations in value added equals 100%. In Belgium, the share of labour compensation in value added fluctuated between about 63% and 66% over the whole period. After having reached a peak of 66.3% in 2002, the share of labour compensation in value added decreased until 2005 and reached 63.7%. In Europe and in the US, a decreasing trend was observed over the whole period. In Europe, the share of labour decreased from 68.9% to 66.2% over the period 1985-2005. Over the same period, the share in the US decreased from 63.6% to 60.3% due to a sharp fall in 2005.

The comparison of the levels of MFP has to be made with caution because the estimation of MFP levels is more complicated than the estimation of labour productivity levels. PPPs for each variable intervening in the calculation of MFP are required. The Belgian level of MFP has been higher than the US and EU levels since 1985. At the beginning of the period, the Belgian level was very high in comparison with the EU and US levels. However, given the low or even negative MFP growth rate observed in Belgium and the faster rate in the EU and the US over this period, the gap between Belgium and the EU and especially between Belgium and the US decreased. After being caught up by Europe in the mid-nineties, the US experienced a fast MFP growth and reached in 2005 a level very close to that of Belgium. Europe knew during the same period a slowdown of its MFP growth and the European MFP level has been remaining below the US level since the end of the nineties.

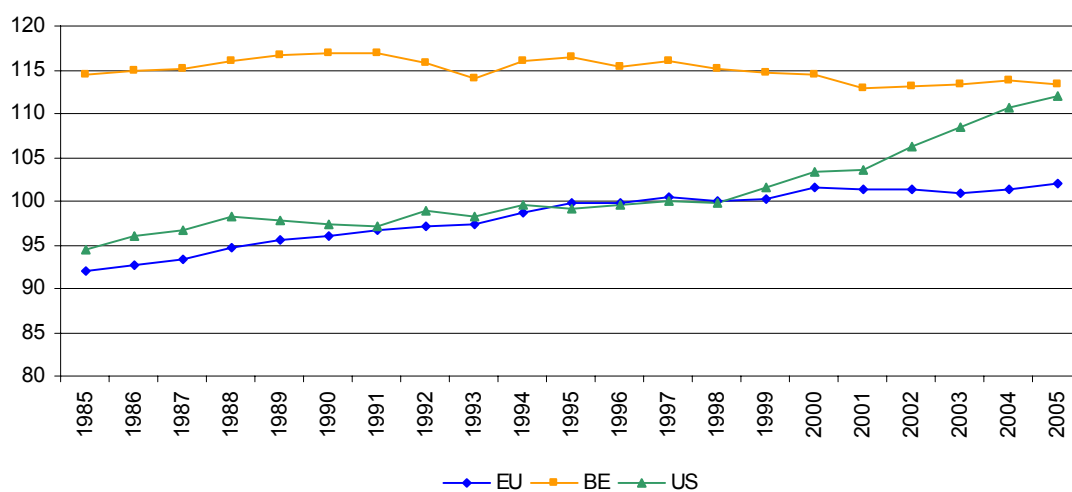
Data information: the contribution of hours worked is the increase in hours worked weighted by the labour share measured as total labour compensation in nominal value added; the contribution of labour composition is the difference between the increase in the volume index of labour services and the increase in the numbers of hours worked, weighted by the labour share in nominal value added; the contribution of capital is the increase in the volume index of capital services weighted by the capital share measured as capital compensation, including compensation for the capital of self-employed persons, in nominal value added. The growth of the volume index of labour/capital services is obtained by weighting the growth of hours worked/real productive capital stock of each type of labour/asset by the share of the labour type/asset in the value of labour/capital compensation (see appendix 1). The productive capital stock of each asset is obtained by the perpetual inventory method with a geometric rate of depreciation. Hedonic price indexes are used for ICT capital in all countries. MFP is the residual component of GDP growth after removing both the labour and the capital contributions. MFP levels for 1997 are calculated by the EUKLEMS consortium (Inklaar, R. and M.P. Timmer, 2007, "International comparisons of industry output, inputs and productivity levels: Methodology and new results", *Economic Systems Research*, 19(3), pp. 343-363 (2007) for methodology). Using the growth rates of the data, series in level covering the whole period can be estimated. Series for the EU are estimated with real VA in PPPs for 1997 for 10 Member States as weights.



**Figure 18** Share of labour compensation in value added - EU, Belgium, us  
in percent



**Figure 19** Level of MFP - EU, Belgium, us  
US 1997=100, PPPs



## 1.6. Decomposition of labour productivity growth

Using the same growth accounting model and rearranging the terms allows labour productivity growth to be broken down into three components: capital deepening, which covers the effect of an increase in labour productivity driven by increases in the quantity, and/or the quality of capital for a constant amount of labour, the labour composition effect and MFP, as already explained. Capital deepening is mainly caused by rationalisation investment by which enterprises replace labour by capital in function of the evolution of the relative costs of production factors.

Since the mid-eighties, the slowdown of labour productivity growth has been due to the three components: a deceleration of capital deepening, of labour composition effect and of MFP. However, the slowdown of MFP has been much more pronounced than that of the two others components.

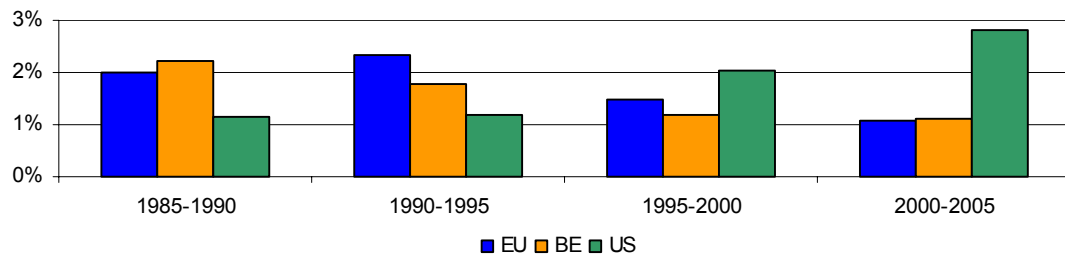
The contribution of capital deepening in Belgium has gone down from 1.4% in 1985-1990, to 1.1% at the end of the period, 2000-2005. This slowdown is mainly due to non-ICT capital deepening. ICT capital deepening has been higher than non-ICT capital deepening over the two last periods indicating the positive effect of these technologies on labour productivity. However, the difference between the contributions of these two types of capital has been decreasing over the recent period.

Despite the slowdown of the contribution of capital deepening in Belgium, this contribution has remained higher than the contribution of capital deepening in Europe and in the US. Contrary to Belgium and Europe, the US recorded a strong acceleration of the contribution of their capital deepening, which was very low at the beginning of the period. The comparison with the EU and the US shows that the contribution of ICT capital deepening has been particularly high in Belgium over the whole period.

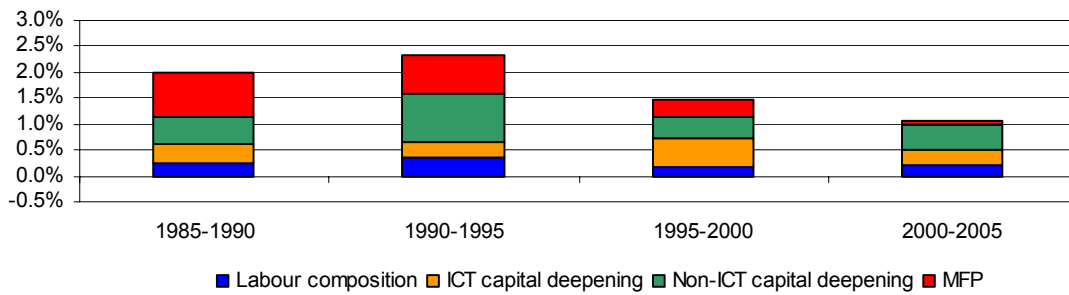
Finally, as observed in the decomposition of GDP growth, MFP was a particularly important source of growth over the last years in the US, contrary to what has been observed in Belgium and in Europe.

Data information: labour productivity is defined as value added at constant prices divided by the total number of hours worked. The contribution of capital deepening is the increase in the ratio of capital to hours worked weighted by the capital share measured as total capital compensation, including compensation for the capital of self-employed persons, in nominal value added. The contribution of labour composition is the difference between the increase in the volume index of labour services and the increase in the numbers of hours worked, weighted by the labour share in nominal value added. MFP is the residual component from the growth decomposition.

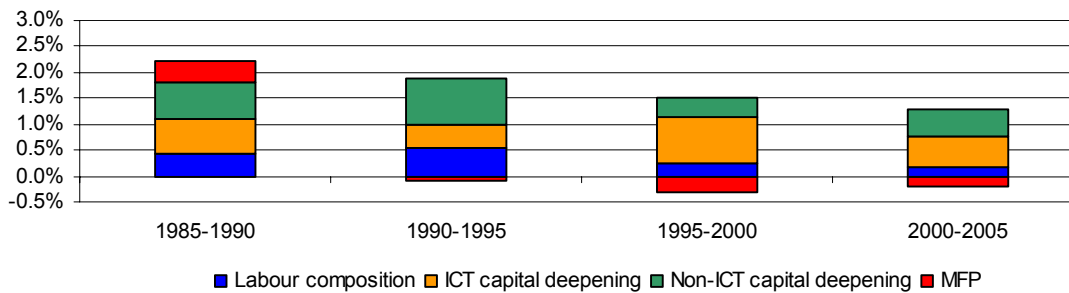
**Figure 20 Labour productivity growth**  
average annual growth rate in percent



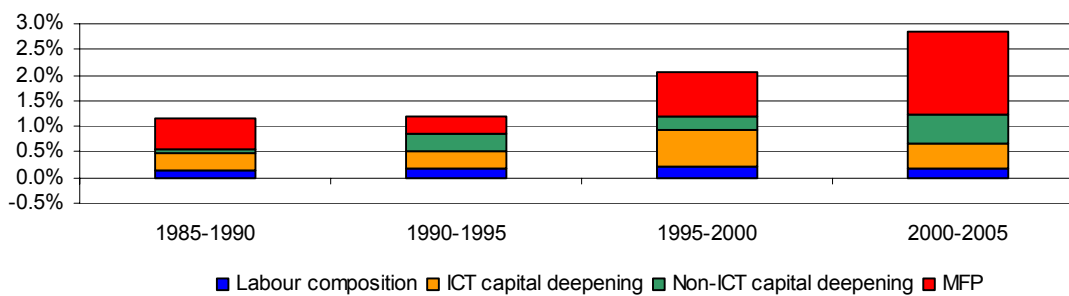
**Figure 21 Contribution to labour productivity growth - EU**  
average annual growth rate in percent



**Figure 22 Contribution to labour productivity growth - Belgium**  
average annual growth rate in percent



**Figure 23 Contribution to labour productivity growth - us**  
average annual growth rate in percent



## 1.7. Structural changes in activities

Growth and productivity evolutions are also the result of changes in the structure of the economy. Between 1970 and 2005, activities generating value added and employment growth changed. To identify these evolutions, four large industries have been defined: manufacturing, market services, non-market services and other activities including agriculture, construction and energy.

Since the seventies, in Belgium, the share of market services in total real value added has known a strong increase. This share went up from 43.5% in the seventies to 49.3% in the recent period 2000-2005. The share of non-market services and manufacturing has been relatively constant and went from 23.3% in the seventies to 21.2% in the last period for non-market services and from 19.0% to 19.9% for manufacturing. Finally, the share of other activities strongly decreased until the mid-eighties before stabilising at around 9.5%.

Evolutions are more visible in terms of shares in employment, measured in hours worked. Manufacturing and services, both market and non-market, followed opposite trends: the share of manufacturing in total hours worked decreased from 29.6% in the seventies to 16.3% in the last period while the share of market and non-market services increased rapidly, from 32.1% to 42.8% and from 24.4% to 32.2%, respectively. Other activities accounted for a decreasing share of hours worked, from 13.9% in the seventies to 8.6% in the last period.

Europe recorded a fall of the share of manufacturing in total real value added over the period 1970-2005. On the contrary, the US knew an increase since the beginning of the nineties and the US manufacturing accounted for 20.1% of the total real value added over the most recent period, a percentage never reached since 1970. This increase was combined with a sharp decrease of the share of hours worked, at 12.9% on average over 2000-2005, what reveals a labour productivity growth higher in manufacturing than in total economy.

The evolution of the share of hours worked in services in Europe and in the US was similar to the evolution observed in Belgium: the share of market and non-market services in total hours worked increased over the whole period. At the same time; the share of market services in total real value added increased and the share of non-market services decreased.

**Table 2** **Structural changes - EU**  
*share in total economy in percent*

Indicators	Period	Manufacturing	Market services	Non-market services	Others
Real value added	1970-1980	23.3	37.0	24.5	14.9
	1980-1990	21.7	40.3	24.8	13.2
	1990-2000	20.1	44.3	23.6	12.0
	2000-2005	18.8	47.7	22.5	11.0
Hours worked	1970-1980	27.6	30.3	19.0	23.0
	1980-1990	23.7	35.0	23.0	18.3
	1990-2000	20.0	39.5	25.8	14.7
	2000-2005	17.3	42.7	27.0	13.0

**Table 3** **Structural changes - Belgium**  
*share in total economy in percent*

Indicators	Period	Manufacturing	Market services	Non-market services	Others
Real value added	1970-1980	19.0	43.5	23.3	13.3
	1980-1990	20.9	44.3	25.1	9.9
	1990-2000	20.7	47.2	22.4	9.7
	2000-2005	19.9	49.3	21.2	9.5
Hours worked	1970-1980	29.6	32.1	24.4	13.9
	1980-1990	23.5	35.6	30.2	10.7
	1990-2000	19.5	39.8	31.0	9.7
	2000-2005	16.3	42.8	32.2	8.6

**Table 4** **Structural changes - us**  
*share in total economy in percent*

Indicators	Period	Manufacturing	Market services	Non-market services	Others
Real value added	1970-1980	18.8	37.1	28.9	14.6
	1980-1990	17.8	42.8	27.8	11.7
	1990-2000	18.8	45.8	25.7	9.8
	2000-2005	20.1	48.0	23.3	8.7
Hours worked	1970-1980	22.5	37.0	27.8	12.7
	1980-1990	19.2	41.1	28.2	11.5
	1990-2000	16.1	43.7	29.7	10.6
	2000-2005	12.9	45.3	30.8	11.0

In Belgium, the slowdown of real value added growth observed in total economy during the last decades is also recorded in the four large industries mainly due to a decreasing growth rate of labour productivity. The deceleration is particularly important in manufacturing where the average annual growth rate of real value added came down from 4.4% in the seventies to 0.2% in the last period 2000-2005. Non-market services knew a strong decrease of real value added growth during the eighties and then a stabilisation at around 1.2% per year. Market services knew a less pronounced slowdown of real value added growth and have recorded a higher growth rate than the total economy since the eighties. This result was due to an acceleration of the growth in hours worked during the eighties and the nineties and an acceleration of labour productivity growth in the last period 2000-2005.

In Belgium, over 1970-2005, the labour productivity growth rate of manufacturing has been on a declining trend although this industry always recorded a higher growth of labour productivity than the total economy. In contrast, labour productivity growth of services, both market and non-market, was always weaker than labour productivity growth of total economy, except for market services, during the last period 2000-2005.

The slowdown of real value added recorded in Belgium in the four industries over the decades was also observable in Europe on average. In the US, a slowdown was observed only over the last period 2000-2005 (except for market services) and mainly in manufacturing and in other activities. In Europe and in the US (with the exception of the nineties), the market services recorded the highest growth rate of real value added over the whole period.

In the US, manufacturing recorded an increasing growth rate of labour productivity over the whole period, contrary to what was observed in Belgium and in Europe. In addition, over 2000-2005, manufacturing and services recorded a strong acceleration of productivity growth rate, but for manufacturing and for the first time for market services, this evolution was combined with a fall of the hours worked.

**Table 5** **Structural changes - EU**  
average annual growth rate in percent

Indicators	Period	Total	Manufacturing	Market services	Non-market services	Others
Real value added	1970-1980	2.8	2.6	3.5	3.2	1.3
	1980-1990	2.4	1.8	3.4	1.9	1.5
	1990-2000	2.1	1.2	3.1	1.7	0.8
	2000-2005	1.5	0.2	2.1	1.4	1.1
Hours worked	1970-1980	-0.3	-1.3	1.0	2.1	-2.7
	1980-1990	0.1	-1.6	1.6	1.4	-2.1
	1990-2000	0.2	-1.6	1.2	1.1	-1.7
	2000-2005	0.4	-2.1	1.1	1.3	-0.3
Productivity	1970-1980	3.1	3.9	2.5	1.1	3.9
	1980-1990	2.3	3.4	1.8	0.5	3.6
	1990-2000	1.9	2.8	1.9	0.6	2.5
	2000-2005	1.1	2.3	1.0	0.1	1.4

**Table 6** **Structural changes - Belgium**  
average annual growth rate in percent

Indicators	Period	Total	Manufacturing	Market services	Non-market services	Others
Real value added	1970-1980	3.6	4.4	3.1	4.6	1.8
	1980-1990	2.0	3.4	2.6	1.1	-0.1
	1990-2000	2.0	1.4	2.5	1.4	2.2
	2000-2005	1.5	0.2	2.4	1.2	0.1
Hours worked	1970-1980	-1.1	-3.4	-0.1	1.2	-3.0
	1980-1990	-0.3	-1.8	0.7	0.3	-2.4
	1990-2000	0.5	-1.9	1.7	0.9	-0.9
	2000-2005	0.4	-2.1	0.9	1.6	-1.2
Productivity	1970-1980	4.7	7.7	3.2	3.3	4.9
	1980-1990	2.4	5.2	1.9	0.7	2.2
	1990-2000	1.5	3.3	0.8	0.5	3.0
	2000-2005	1.1	2.3	1.6	-0.4	1.3

**Table 7** **Structural changes - us**  
average annual growth rate in percent

Indicators	Period	Total	Manufacturing	Market services	Non-market services	Others
Real value added	1970-1980	3.0	2.9	4.4	2.4	0.7
	1980-1990	2.9	2.8	3.8	2.4	0.9
	1990-2000	3.2	4.7	3.8	1.5	1.8
	2000-2005	2.5	1.4	3.5	2.3	-0.1
Hours worked	1970-1980	1.5	0.4	2.5	1.6	0.8
	1980-1990	1.7	-0.4	2.7	2.1	0.5
	1990-2000	1.5	-0.2	2.1	1.6	1.5
	2000-2005	-0.3	-4.4	-0.4	1.3	0.5
Productivity	1970-1980	1.5	2.5	2.0	0.8	-0.1
	1980-1990	1.2	3.2	1.1	0.3	0.4
	1990-2000	1.6	4.9	1.6	-0.1	0.3
	2000-2005	2.8	5.8	4.0	1.0	-0.6

These labour productivity gains can be used by an industry to improve its relative prices by increasing prices more slowly than the rest of the economy or than its main commercial partners, and/or to increase labour compensation by increasing wages faster than the rest of the economy.

In Belgium, large productivity increases have been partly used by manufacturing to improve its domestic price competitiveness by maintaining price increases weaker than increases of the total economy over the whole period. Since 1970 until the end of the nineties, Belgian manufacturing value added prices also increased at a slower pace than the average of European prices. However, since 2000, the Belgian productivity gains have been the same as the European gains but the increase in Belgian value added prices has been much faster than the increase observed in the EU on average. Since the beginning of the eighties, Belgian manufacturing value added prices also increased much faster than the US manufacturing prices. The productivity gains of the Belgian manufacturing were also used to grant higher labour compensation increases than those observed, on average, in total economy which was also the case in the EU and the US. Since the beginning of the nineties, US labour compensation increases have been faster than in Belgium and in the EU.

In contrast with manufacturing, productivity gains in Belgian other industries led to an improvement in relative prices but often jointly with improvements in the labour cost competitiveness of these activities when compared with total economy. Since 1990, increases in Belgian other industries value added prices have been much slower than increases observed in the EU and in the US. Over the most recent period, increases in labour compensation of Belgian other industries were however faster than increases in the EU but still lower than the American ones.

Belgian market services recorded a strong deterioration of their relative prices, with prices in these industries increasing faster than prices in total economy but also than prices in their European and American counterparts during the seventies and the eighties. At the same time, labour compensation per hour worked in the Belgian market services increased also much faster than in the EU and in the US. Since then, Belgian market services value added prices increases have been only slightly faster than increases in total economy and in the EU and in the US. Since 1990, labour costs of Belgian market services increased at a slower pace than labour costs in total economy. Over the most recent period, with an average annual growth rate of 2.7%, increase in labour compensation per hour worked in the Belgian market services was the same than in the EU and below the 4.3% reached by the US market services.

Data information: Tables provide the value added price index growth rate for total economy and for each industry, the growth rate of relative prices defined as the ratio between VA price index of the industry and VA price index of total economy. Tables also provide the growth rate of labour costs for total economy calculated as labour compensation divided by hours worked and for each industry, the growth rate of relative labour costs defined as the ratio between labour costs of the industry and labour costs of total economy.



**Table 8 Relative prices and relative labour costs - EU**  
*average annual and relative growth rate compared to total economy in percent*

Indicators	Period	Total	Manufacturing	Market services	Non-market services	Others
Relative prices	1970-1980	4.9	-1.1	0.2	1.3	-0.5
	1980-1990	2.9	0.2	0.1	0.1	-0.9
	1990-2000	1.5	-0.5	-0.1	0.8	-0.5
	2000-2005	1.4	-1.1	0.3	0.3	-0.1
Relative labour costs	1970-1980	8.3	-0.1	-0.5	-0.7	0.2
	1980-1990	4.6	1.5	-0.5	-1.4	0.5
	1990-2000	3.2	0.6	-0.2	-0.3	0.1
	2000-2005	2.3	0.3	0.3	-0.4	-0.3

**Table 9 Relative prices and relative labour costs - Belgium**  
*average annual and relative growth rate compared to total economy in percent*

Indicators	Period	Total	Manufacturing	Market services	Non-market services	Others
Relative prices	1970-1980	6.7	-3.2	1.0	2.1	0.3
	1980-1990	4.1	-1.5	1.1	-0.2	-0.9
	1990-2000	1.9	-1.1	0.3	1.2	-2.0
	2000-2005	2.1	-1.0	0.1	1.1	-1.6
Relative labour costs	1970-1980	12.7	0.2	0.1	-0.1	-0.4
	1980-1990	5.7	1.2	0.6	-0.9	-1.6
	1990-2000	3.6	0.4	-0.1	0.2	-0.5
	2000-2005	2.8	0.2	-0.1	0.1	0.1

**Table 10 Relative prices and relative labour costs - us**  
*average annual and relative growth rate compared to total economy in percent*

Indicators	Period	Total	Manufacturing	Market services	Non-market services	Others
Relative prices	1970-1980	7.1	-0.2	-1.7	0.4	4.1
	1980-1990	4.3	-1.8	0.4	1.8	-1.9
	1990-2000	1.9	-1.9	-0.1	1.4	0.2
	2000-2005	2.5	-1.8	-0.7	0.9	3.8
Relative labour costs	1970-1980	8.3	1.0	-0.7	-0.1	0.6
	1980-1990	5.4	-0.6	0.2	1.1	-1.1
	1990-2000	3.4	1.0	0.1	-0.2	-1.2
	2000-2005	4.4	0.7	0.0	0.6	-1.3

## 1.8. Industry contributions to aggregate growth of GDP and inputs

The estimation of the contribution of each industry to GDP and inputs growth allows to identify which industries were important for growth, employment and capital accumulation. The evolution of these contributions depends on the evolution of GDP and inputs growth in these industries but also crucially on the evolution of the relative size of these industries in the economy. In Belgium, over the two periods, 1985-1995 and 1995-2005, market services contributed to about 1.3 percentage points of total value added growth, which corresponds to respectively 58% and 63% of total value added growth. The three other industries accounted respectively only for about 0.3 percentage points of the total growth, with the exception of other activities which reduced their contribution to 0.1 percentage points during the second period.

Market services also sustained largely inputs growth. Over the two periods, market services made the largest contribution to labour growth mainly thanks increases in hours worked but also thanks a positive labour composition evolution. Their contribution to capital growth already the most important over the first period, intensified during the second period with the major role played by ICT capital. However, market services contributed negatively to MFP growth, to which only manufacturing and other activities contributed positively. The negative contribution of market and non-market services during the second period generated a negative MFP growth for total economy.

In the EU and in the US, market services were also the most important contributor to aggregate value added and inputs growth during the considered periods. The contribution of market services to value added growth remained stable at 1.4 percentage points over the two periods in the EU and increased from 1.5 to 1.9 in the US. In the EU, the contribution of the three other industries to aggregate value added growth experienced a reduction over the second period while an increase or a stabilisation for non-market services was observed in the US.

In the EU, the slowdown of MFP growth observed in total economy over the second period, 1995-2005, is mainly explained by a reduction of the contribution of manufacturing, market services and other activities. On the contrary, the increase in the contribution of manufacturing and market services to MFP growth in the US allowed an acceleration of MFP growth in total economy.

Data information: growth of total value added/inputs can be decomposed as the weighted sum of the value added/inputs growth recorded in each industry. For the estimation of the contribution of industries to total value added growth, weights are the share of each industry in total nominal value added ; for labour input, weights are shares in total labour compensation ; for capital input, weights are shares in total ICT and non-ICT capital compensation ; for MFP, weights are shares in total value added. The difference between the aggregate growth of GDP and inputs and the sum of the industry contributions to growth gives the reallocation effect, corresponding to changes in the industrial composition of output and inputs growth.

**Table 11 Industry contributions to aggregate growth of GDP and inputs - EU**  
average annual growth rate in percent

	Value added growth		Labour		Hours worked		Labour composition		Capital		Capital ICT		Capital Non-ICT		MFP	
	85-95	95-05	85-95	95-05	85-95	95-05	85-95	95-05	85-95	95-05	85-95	95-05	85-95	95-05	85-95	95-05
Total	2.4	2.0	0.7	1.0	0.2	0.8	0.5	0.3	3.5	3.4	11.4	12.3	2.7	2.3	0.8	0.2
Manufacturing	0.4	0.2	-0.3	-0.1	-0.3	-0.2	0.1	0.1	0.6	0.3	1.7	1.5	0.5	0.2	0.3	0.2
Market services	1.4	1.4	0.7	0.8	0.5	0.6	0.2	0.1	2.2	2.4	7.7	8.7	1.7	1.6	0.3	0.1
Non-market ser.	0.4	0.3	0.4	0.4	0.4	0.4	0.0	0.1	0.4	0.4	1.6	1.7	0.3	0.3	0.0	-0.1
Others	0.2	0.1	-0.1	0.0	-0.2	0.0	0.1	0.1	0.3	0.2	0.5	0.4	0.2	0.2	0.2	0.0
Reallocation	0.0	0.0	0.0	0.0	-0.1	0.0	0.1	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0

**Table 12 Industry contributions to aggregate growth of GDP and inputs - Belgium**  
average annual growth rate in percent

	Value added growth		Labour		Hours worked		Labour composition		Capital		Capital ICT		Capital Non-ICT		MFP	
	85-95	95-05	85-95	95-05	85-95	95-05	85-95	95-05	85-95	95-05	85-95	95-05	85-95	95-05	85-95	95-05
Total	2.3	2.0	1.0	1.2	0.3	0.9	0.8	0.3	4.0	4.3	13.6	17.3	2.8	2.4	0.2	-0.3
Manufacturing	0.3	0.3	-0.2	-0.1	-0.4	-0.3	0.2	0.1	1.2	0.7	3.2	2.4	1.0	0.4	0.0	0.2
Market services	1.3	1.3	0.9	0.8	0.5	0.7	0.3	0.2	2.2	3.3	8.6	12.9	1.4	1.8	0.0	-0.4
Non-market ser.	0.3	0.3	0.4	0.5	0.2	0.4	0.2	0.1	0.3	0.2	1.1	1.3	0.2	0.1	0.0	-0.1
Others	0.3	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.2	0.6	0.7	0.3	0.1	0.2	0.1
Reallocation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

**Table 13 Industry contributions to aggregate growth of GDP and inputs - US**  
average annual growth rate in percent

	Value added growth		Labour		Hours worked		Labour composition		Capital		Capital ICT		Capital Non-ICT		MFP	
	85-95	95-05	85-95	95-05	85-95	95-05	85-95	95-05	85-95	95-05	85-95	95-05	85-95	95-05	85-95	95-05
Total	2.7	3.3	1.8	1.1	1.5	0.8	0.3	0.3	3.1	3.6	12.0	13.6	2.2	2.2	0.5	1.2
Manufacturing	0.6	0.7	0.1	-0.3	0.0	-0.4	0.1	0.1	0.4	0.4	1.9	1.6	0.2	0.2	0.5	0.7
Market services	1.5	1.9	0.9	0.7	0.8	0.5	0.2	0.2	2.1	2.5	8.2	10.1	1.5	1.4	0.1	0.5
Non-market ser.	0.5	0.5	0.7	0.5	0.7	0.5	0.0	0.0	0.5	0.5	1.6	1.4	0.4	0.4	-0.1	0.0
Others	0.1	0.2	0.1	0.2	0.0	0.1	0.1	0.0	0.1	0.2	0.5	0.5	0.0	0.2	0.0	0.0
Reallocation	0.0	0.0	0.0	0.0	0.1	0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0

### 1.9. Industry contributions to aggregate labour productivity growth

Aggregate labour productivity growth can be considered as a weighted sum of industrial productivity growth rates, which depends on the productivity growth rates of industries and on the evolution of the share of hours worked by industry representing the weights. This weighted sum constitutes the intra-branch productivity growth effect, usually named the within effect. The difference between the aggregate labour productivity growth and the within effect corresponds to the reallocation effect or structural change effect which identifies change in the industrial composition of growth. The estimation of the reallocation effect is better when the industry contribution to aggregate productivity growth is calculated at a detailed industry-level.

In Belgium, manufacturing made the largest contribution to labour productivity growth over the three first decades covering the period 1970-2000. Over this period, the contribution of manufacturing was however decreasing, such as the contribution of the three other industries and like in Europe. Over the most recent period, market services knew a strong increase in their contribution, contrary to the three other industries and became the most important contributor to aggregate labour productivity growth.

In Europe, the most important contributor to productivity growth was also manufacturing over the two first decades, then market services over the third decades. Over the recent period, the two industries recorded the same contribution. Contrary to Europe, an acceleration of the contribution of manufacturing and market services has been observed in the US since 1990. Market services recorded a strong increase in their contribution over the most recent period and became largely the most important contributors.

In Belgium as well as in the EU, the persistent but decreasing labour productivity growth can be mainly explained by the decline in intra-branch labour productivity growth (within effect) between 1970 and 2005. However, in Belgium, the positive structural change effect also decreased over time and since the beginning of the nineties, it has become weaker than the European structural change effect.

The within effect has been even more important in the US where since the eighties, the between or structural effect has been negative or equal to zero. This means that in the US, the shift of labour has been towards sectors with weaker productivity gains as confirmed by the strong increase in hours worked in services sector and the decline of the hours worked in the manufacturing.

Data information: aggregate labour productivity growth can be decomposed as the weighted sum of labour productivity growth rates in each industry. The weights used are the share of hours worked by each industry. This weighted sum constitutes the intra-branch productivity growth effect, usually named the within effect. The difference between the aggregate labour productivity growth and the within effect corresponds to the reallocation effect or structural change effect. This effect is mainly caused by a shift of labour input towards industries with a higher or lower productivity growth.

**Table 14 Industry contributions to aggregate labour productivity growth**  
*average annual growth rate in percent*

	EU				Belgium				US			
	70-80	80-90	90-00	00-05	70-80	80-90	90-00	00-05	70-80	80-90	90-00	00-05
Total	3.1	2.3	1.9	1.1	4.7	2.4	1.5	1.1	1.5	1.2	1.6	2.8
Manufacturing	1.1	0.8	0.6	0.4	2.3	1.2	0.6	0.4	0.6	0.6	0.8	0.8
Market services	0.8	0.6	0.7	0.4	1.0	0.7	0.3	0.7	0.7	0.5	0.7	1.8
Non-market ser.	0.2	0.1	0.1	0.0	0.8	0.2	0.2	-0.1	0.2	0.1	0.0	0.3
Others	0.9	0.7	0.4	0.2	0.7	0.2	0.3	0.1	0.0	0.0	0.0	-0.1
Reallocation	0.2	0.1	0.1	0.0	-0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.0

**Table 15 Contributions to aggregate labour productivity growth - EU**  
*average annual growth rate in percent*

	1970-1980	1980-1990	1990-2000	2000-2005
Total labour productivity growth	3.1	2.3	1.9	1.1
Within effect	2.4	2.4	1.5	0.9
Reallocation effect	0.7	-0.1	0.4	0.2

Remark: the within effect is the sum of the contribution of 47 sectors of activity to aggregate labour productivity growth.

**Table 16 Contributions to aggregate labour productivity growth - Belgium**  
*average annual growth rate in percent*

	1970-1980	1980-1990	1990-2000	2000-2005
Total labour productivity growth	4.7	2.4	1.5	1.1
Within effect	4.3	2.1	1.4	1.0
Reallocation effect	0.3	0.3	0.1	0.1

Remark: the within effect is the sum of the contribution of 47 sectors of activity to aggregate labour productivity growth.

**Table 17 Contributions to aggregate labour productivity growth - us**  
*average annual growth rate in percent*

	1970-1980	1980-1990	1990-2000	2000-2005
Total labour productivity growth	1.5	1.2	1.6	2.8
Within effect	1.3	1.4	1.6	3.0
Reallocation effect	0.2	-0.2	0.0	-0.2

Remark: the within effect is the sum of the contribution of 47 sectors of activity to aggregate labour productivity growth.



## 2. Manufacturing

**Table 18 Summary of main findings - Belgian Manufacturing**  
*average annual growth rates in percent*

	1970-1980	1980-1990	1990-2000	2000-2006
<b>Value added</b>	4.4	3.4	1.4	0.6
- Hour worked contribution	-2.3	-1.3	-1.3	-1.2
- Labour composition contribution	n.a.	0.3	0.6	0.4
- ICT capital contribution	0.4	0.8	0.6	0.4
- Non-ICT capital contribution	0.3	1.0	1.1	0.3
- MFP contribution	n.a.	2.5	0.4	0.8
<b>Value added per hour worked</b>	7.7	5.2	3.3	2.5
- ICT capital deepening	0.5	0.9	0.7	0.4
- Non-ICT capital deepening	1.3	1.5	1.6	0.8
<b>Hours worked</b>	-3.4	-1.8	-1.9	-1.8

Remark: Labour composition is not available for the period 1970-1985 and for 2006. For the period 1980-1985, the structure of qualification of 1986 was fixed. For 2006, the labour composition contribution of 2005 was used.

## 2.1. Decomposition of value added growth

Over the whole period, 1985-2005, the value added growth of manufacturing in the US was always stronger than the growth observed for manufacturing in Belgium and in the EU.

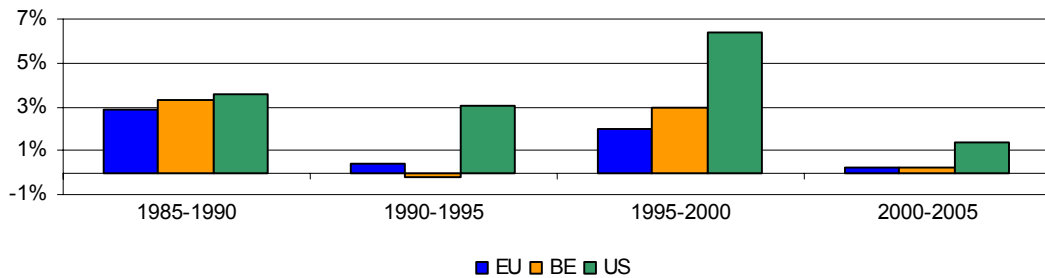
The overall picture given by the average contribution calculated by decade shows that since the beginning of the nineties, labour contribution in terms of hours worked has always been negative in manufacturing as opposed to what has been observed for the total economy in Belgium as well as in the EU and the US. In the three geographical areas but particularly in the US, this negative labour contribution in manufacturing was even more pronounced during the most recent period, 2000-2005, than during the previous decades. However, in the three zones, this negative contribution has been partly compensated by a positive labour composition effect higher in manufacturing than in total economy.

As opposed to labour, capital has always contributed positively to real value added growth in manufacturing in the three areas. However, over the whole period, the contribution of capital was the strongest in the Belgian manufacturing. In Belgium and in the EU, this positive contribution was particularly strong over 1985-1990 and 1995-2000. When this capital contribution is divided into ICT capital contribution and non-ICT capital contribution, ICT capital contribution in the Belgian manufacturing was higher than non-ICT capital contribution only during the most recent period, 2000-2005. Moreover, over the whole period, 1985-2005, Belgian manufacturing ICT capital contribution was always higher than the ICT capital contribution in the European and American manufacturing.

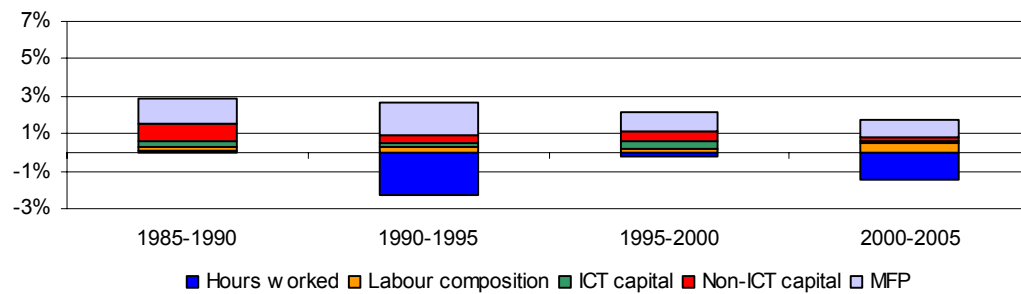
The MFP contribution was the strongest in the US manufacturing and the weakest in the Belgian manufacturing whatever the period considered. In Belgium, this contribution was even negative over 1990-1995. During the most recent period, 2000-2005, MFP contribution reached on average 0.6% in Belgium, 0.9% in the EU and 3.8% in the US underlying the privileged role of manufacturing as channel of technical progress in this country.



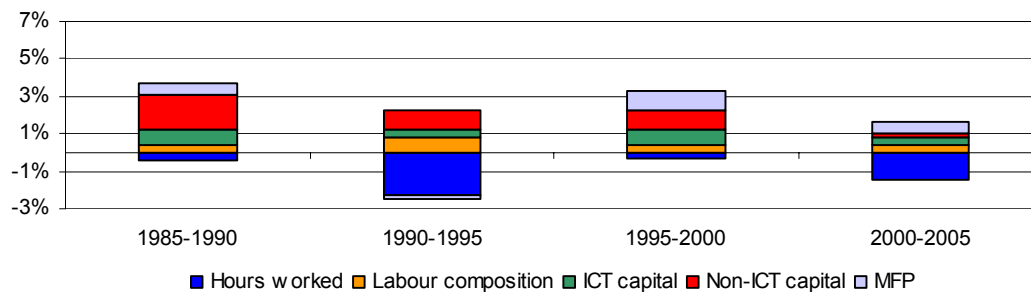
**Figure 24 Value added growth in manufacturing**  
average annual growth rates in percent



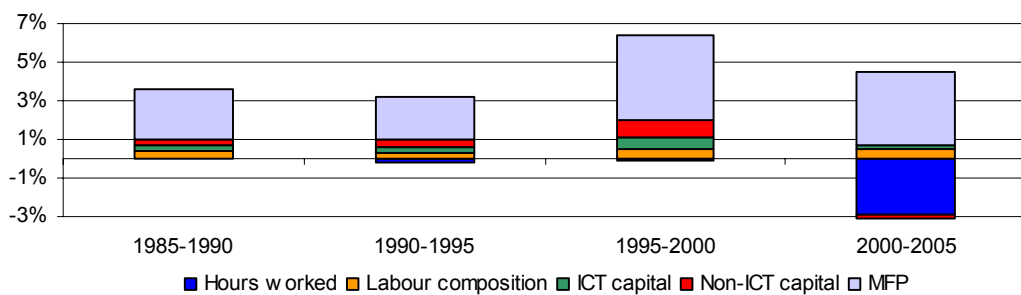
**Figure 25 Contribution to real value added growth - EU**  
average annual growth rates in percent



**Figure 26 Contribution to real value added growth - Belgium**  
average annual growth rates in percent



**Figure 27 Contribution to real value added growth - us**  
average annual growth rates in percent



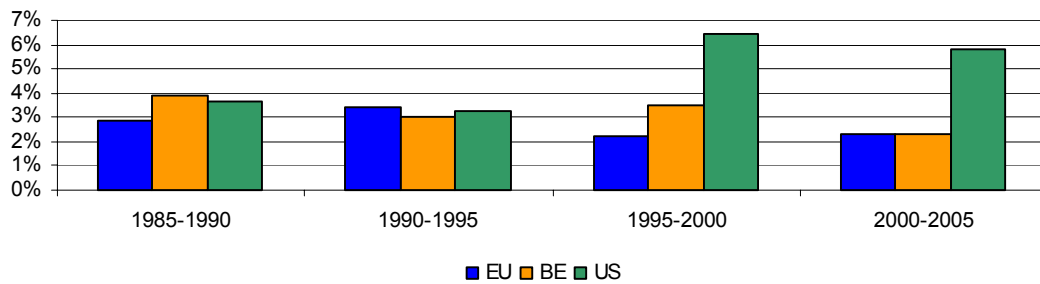
## 2.2. Decomposition of labour productivity growth

Since 1995, the labour productivity growth of manufacturing has been much stronger in the US than in the EU and in Belgium. Over the whole period, with the exception of the period 1990-1995, manufacturing productivity growth increased faster in Belgium than in the EU. However, during the most recent period, the difference between these growth rates was very modest.

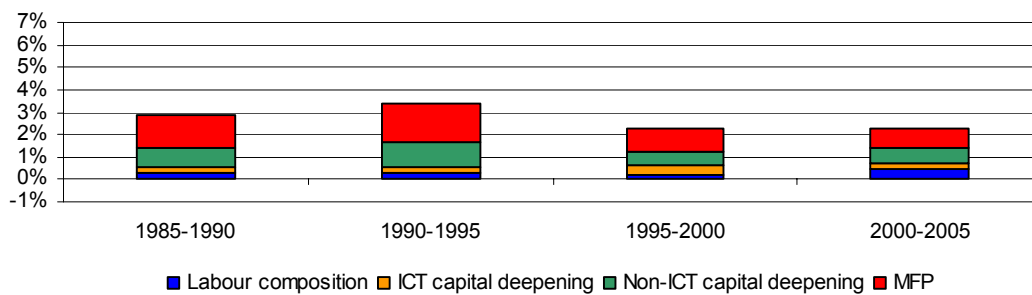
The decomposition of labour productivity growth shows that the main explanation of the US leadership since 1995 has to be found in the MFP contribution which accelerated strongly between 1995 and 2005 in the US while it decelerated in the EU and in Belgium.

In Belgium, capital deepening was particularly high in manufacturing from the mid-eighties to the mid-nineties. This decade corresponds to a rapid restructuring of Belgian manufacturing, leading businesses to replace labour with capital given the evolution of their relative prices. Over the whole period, both ICT and non-ICT capital deepening was much more pronounced in Belgium than in the EU and in the US with the exception of 2000-2005. Indeed, over the most recent period, capital deepening was stronger in the US thanks a stronger non-ICT capital deepening in this country in comparison with Belgium.

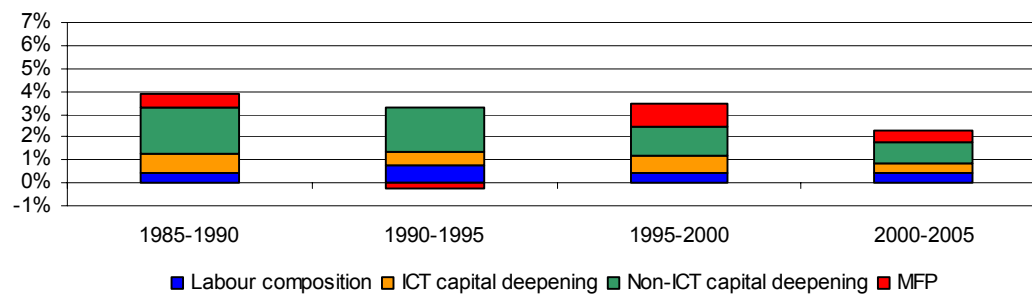
**Figure 28 Labour productivity growth in manufacturing**  
average annual growth rates in percent



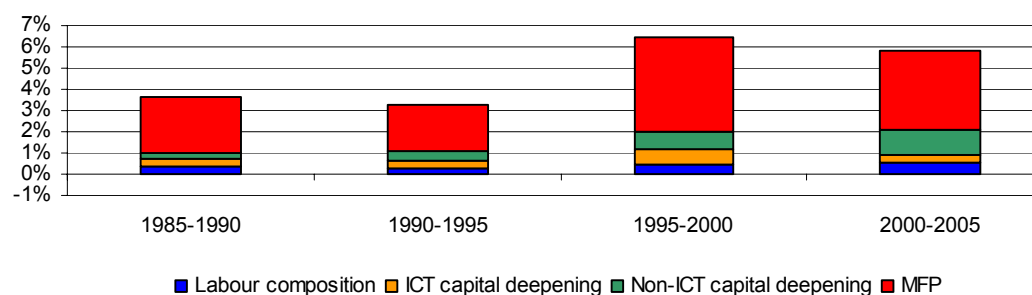
**Figure 29 Contribution to labour productivity growth - EU**  
average annual growth rates in percent



**Figure 30 Contribution to labour productivity growth - Belgium**  
average annual growth rates in percent



**Figure 31 Contribution to labour productivity growth - us**  
average annual growth rates in percent



### 2.3. Structural changes in manufacturing

Within manufacturing, strong changes in the nature of activities took place from the mid-eighties in Belgium as well as in the EU and in the US. In terms of nominal value added, some activities saw their relative importance declining over the last few decades. This is particularly true for Textiles, leather and footwear and to a lesser extent for Basic metals and fabricated metal products, especially in Belgium. By contrast, other activities recorded an increase in their relative importance within manufacturing. This is clearly the case for Chemicals and chemical products, particularly in Belgium, for Food, beverage and tobacco, for Rubber and plastics but also for Transport equipment in the EU and in Belgium.

In 2005, the five most important industries in terms of value added in manufacturing were respectively: Basic metals and fabricated metal products, Machinery and equipment, Transport equipment, Food, beverages and tobacco and Chemicals and chemical products in the EU, Chemicals and chemical products, Basic metals and fabricated metal products, Food, beverages and tobacco, Transport equipment and Machinery and equipment in Belgium and Chemicals and chemical products, Food, beverages and tobacco, Transport equipment, Basic metals and fabricated metal products and Machinery and equipment in the US.

The average annual growth rate of real value added by industry over 1970-2005 sheds light on divergences in structural evolutions of manufacturing between the EU, Belgium and the US. The decrease of Textile, leather and footwear is particularly important in the EU and in Belgium where a negative average annual growth rate was recorded. The economic importance of ICT is also clearly visible in the US where Office, accounting and computing machinery and Radio, television and communication equipment have recorded skyrocketing growth rates but also in the EU where the growth rates of the value added in these two industries have been the highest even if they were far below the American ones. By contrast, the growth rates of these industries appeared much more modest in Belgium where the real value added growth was the strongest in Chemicals and chemical products, Rubber and plastics, Wood and wood products and Transport equipment.

Data information: real value added for aggregated level (total economy, manufacturing, market services etc) is calculated using a Tornqvist index for which the weights are the average shares in nominal value added in period t and t-1 of each industry. Therefore, the sum of real value added of all industries is not equal to the real value added of the total economy.

**Table 19 Nominal value added of manufacturing by activity**  
*share in manufacturing nominal value added in percent*

	EU		Belgium		US	
	1970	2005	1970	2005	1970	2005
Food, beverages and tobacco	9.5	10.2	12.5	13.5	9.5	10.6
Textiles, leather and footwear	12.3	4.7	11.3	4.2	7.7	2.1
Wood and wood products	1.8	1.9	1.4	1.8	2.6	2.5
Pulp, paper and paper products	2.3	2.4	2.7	2.4	4.1	3.8
Printing and publishing	4.1	5.5	4.0	5.0	6.1	7.4
Coke, refined petroleum and nuclear fuel	0.8	1.6	1.0	4.5	1.7	4.3
Chemicals and chemical products	9.6	10.1	10.7	19.8	9.1	12.2
Rubber and plastic products	3.8	5.3	1.6	4.2	2.6	4.4
Other non-metallic mineral products	6.5	4.2	6.7	5.0	3.4	3.3
Basic metals and fabricated metal products	18.1	15.5	23.7	15.2	15.1	10.2
Machinery and equipment n.e.c.	9.6	12.3	7.4	6.4	10.8	8.8
Office, accounting and computing machinery	1.0	0.6	0.3	0.2	1.6	1.5
Electrical machinery	4.8	4.4	4.2	3.5	4.7	4.2
Radio, television and communication equipment	2.4	2.5	2.9	2.3	3.1	4.0
Medical, precision and optical instruments	2.2	3.2	0.9	1.1	3.6	6.5
Transport equipment	8.1	10.7	5.7	8.0	10.4	10.3
Manufacturing n.e.c.; recycling	3.3	4.9	3.1	3.0	3.8	3.8
Total Manufacturing	100.0	100.0	100.0	100.0	100.0	100.0

**Table 20 Growth rate of real value added of manufacturing by activity**  
*average annual growth rate, 1970-2005, in percent*

	EU	Belgium	US
	Food, beverages and tobacco	1.1	1.7
Textiles, leather and footwear	-0.9	-0.6	1.1
Wood and wood products	1.8	5.3	1.3
Pulp, paper and paper products	1.6	2.0	1.8
Printing and publishing	1.4	2.0	1.6
Coke, refined petroleum and nuclear fuel	-1.1	2.5	2.2
Chemicals and chemical products	3.8	7.0	1.8
Rubber and plastic products	3.6	7.7	4.7
Other non-metallic mineral products	1.6	1.2	1.9
Basic metals and fabricated metal products	0.7	1.5	0.9
Machinery and equipment n.e.c.	1.1	1.6	1.0
Office, accounting and computing machinery	6.6	1.3	39.4
Electrical machinery	1.7	1.8	5.6
Radio, television and communication equipment	5.9	2.3	12.8
Medical, precision and optical instruments	3.8	2.4	3.9
Transport equipment	1.7	4.0	2.4
Manufacturing n.e.c.; recycling	0.8	0.4	2.6
Total Manufacturing	1.6	2.6	3.2

Globally, in the three areas, the number of hours worked in manufacturing declined over 1970-2005 but this decline was more pronounced in Belgium than in the EU and in the US. Indeed, US industries recorded less negative average annual growth rates of hours worked than Belgian and European industries. Moreover, contrary to what was observed in Belgium and in the EU, some industries in the US recorded positive average annual growth rates of hours worked. This was the case of Printing and Publishing, Rubber and Plastic products, Wood and wood products, Office, accounting and computing machinery, Medical, precision and optical instruments and Manufacturing n.e.c. and recycling.

In Belgium, the most negative average annual growth rates were recorded by Textiles, leather and footwear, Radio, television and communication equipment, Manufacturing n.e.c. and recycling, Office, accounting and computing equipment and Other non-metallic mineral products.

In 1970, the top-three industries in terms of hours worked in manufacturing were Textiles, leather and footwear, Basic metals and fabricated metal products and Food, beverages and tobacco in the EU as well as in Belgium and in the US even if the ranking of these three industries changed according to the country considered. In 2005, the top-three industries were Basic metals and fabricated metal products, Food, beverages and tobacco and Machinery n.e.c. in the EU, Basic metals and fabricated metal products, Food, beverages and tobacco and Chemicals and chemical products in Belgium and Basic metals and fabricated metal products, Transport equipment and Food, beverages and tobacco in the US.

**Table 21 Hours worked in manufacturing by activity**  
*share in manufacturing hours worked in percent*

	EU		Belgium		US	
	1970	2005	1970	2005	1970	2005
Food, beverages and tobacco	10.9	13.4	11.7	14.7	10.5	10.6
Textiles, leather and footwear	15.9	6.8	17.7	6.3	12.5	4.6
Wood and wood products	3.1	3.3	1.8	2.4	3.8	5.3
Pulp, paper and paper products	2.6	2.4	2.4	2.4	4.0	3.5
Printing and publishing	4.3	6.0	4.0	5.3	5.0	8.0
Coke, refined petroleum and nuclear fuel	0.7	0.5	0.7	1.0	1.1	0.8
Chemicals and chemical products	5.4	5.8	7.2	12.3	5.6	6.3
Rubber and plastic products	3.0	5.0	2.2	4.4	3.5	5.6
Other non-metallic mineral products	5.2	4.5	6.6	5.2	3.2	3.5
Basic metals and fabricated metal products	15.0	15.6	19.1	17.3	14.3	11.9
Machinery and equipment n.e.c.	10.7	11.3	6.2	6.9	10.3	8.9
Office, accounting and computing machinery	0.5	0.6	0.2	0.2	1.4	1.8
Electrical machinery	4.3	4.6	3.9	3.9	4.4	4.1
Radio, television and communication equipment	2.6	2.3	4.1	2.3	3.1	3.8
Medical, precision and optical instruments	2.9	3.1	0.6	1.3	3.8	5.0
Transport equipment	8.3	9.0	5.2	9.7	9.4	10.7
Manufacturing n.e.c.; recycling	4.6	5.9	6.3	4.5	4.2	5.5
Total Manufacturing	100.0	100.0	100.0	100.0	100.0	100.0

**Table 22 Growth rate of hours worked in manufacturing by activity**  
*average annual growth rate, 1970-2005, in percent*

	EU	Belgium	US
Food, beverages and tobacco	-1.0	-1.7	-0.6
Textiles, leather and footwear	-4.0	-5.3	-3.5
Wood and wood products	-1.4	-1.6	0.3
Pulp, paper and paper products	-1.8	-2.3	-1.0
Printing and publishing	-0.6	-1.5	0.7
Coke, refined petroleum and nuclear fuel	-2.5	-1.4	-1.5
Chemicals and chemical products	-1.4	-0.8	-0.3
Rubber and plastic products	-0.1	-0.4	0.7
Other non-metallic mineral products	-2.0	-3.0	-0.4
Basic metals and fabricated metal products	-1.5	-2.6	-1.2
Machinery and equipment n.e.c.	-1.4	-2.0	-1.1
Office, accounting and computing machinery	-1.2	-3.1	0.1
Electrical machinery	-1.4	-2.4	-0.9
Radio, television and communication equipment	-1.9	-4.0	-0.1
Medical, precision and optical instruments	-1.3	-0.1	0.1
Transport equipment	-1.4	-0.6	-0.3
Manufacturing n.e.c.; recycling	-0.9	-3.3	0.1
Total Manufacturing	-1.6	-2.3	-0.7

## 2.4. Industry contributions to manufacturing labour productivity growth

Over the whole period, the labour productivity in manufacturing increased in the US and decreased in the EU and in Belgium. This decrease was due to the decline of the contribution of the same industries in the EU and in Belgium. These industries were mainly Textiles, leather and footwear, Chemicals and chemical products and Basic metal and fabricated metallic products. By contrast, the US manufacturing labour productivity growth was mainly due to the increase in the contribution of Printing and publishing, Machinery and equipment n.e.c., Transport equipment and industries linked to ICT production, particularly in the nineties.

Since 1990, the main contributors to labour productivity growth have been Food, beverages and tobacco, Transport equipment and Rubber and plastic products in Belgium and Transport equipment, Office, accounting and computing machinery, Machinery and equipment n.e.c., Electrical machinery and Radio, television and communication equipment in the US. This last industry has made a negative contribution to labour productivity growth in Belgium over the most recent period.

**Table 23** Industry contributions to manufacturing labour productivity growth - EU  
*average annual growth rate in percent*

	1970-1980	1980-1990	1990-2000	2000-2005
Total Manufacturing	3.9	3.4	2.8	2.3
Food, beverages and tobacco	0.4	0.3	0.1	0.1
Textiles, leather and footwear	0.6	0.4	0.3	0.1
Wood and wood products	0.1	0.1	0.1	0.1
Pulp, paper and paper products	0.1	0.1	0.1	0.1
Printing and publishing	0.1	0.1	0.1	0.1
Coke, refined petroleum and nuclear fuel	0.0	0.0	0.0	0.0
Chemicals and chemical products	0.4	0.3	0.2	0.2
Rubber and plastic products	0.1	0.1	0.2	0.2
Other non-metallic mineral products	0.2	0.2	0.1	0.1
Basic metals and fabricated metal products	0.4	0.3	0.3	0.2
Machinery and equipment n.e.c.	0.3	0.3	0.2	0.2
Office, accounting and computing machinery	0.0	0.0	0.1	0.1
Electrical machinery	0.2	0.2	0.1	0.1
Radio, television and communication equipment	0.2	0.2	0.3	0.2
Medical, precision and optical instruments	0.2	0.1	0.2	0.1
Transport equipment	0.2	0.4	0.2	0.3
Manufacturing n.e.c.; recycling	0.1	0.1	0.1	0.1
Reallocation	0.1	0.2	0.1	0.2



**Table 24 Industry contributions to manufacturing labour productivity growth - Belgium**  
*average annual growth rate in percent*

	1970-1980	1980-1990	1990-2000	2000-2005
Total Manufacturing	7.7	5.2	3.3	2.3
Food, beverages and tobacco	0.7	0.4	0.2	0.4
Textiles, leather and footwear	0.7	0.6	0.4	0.2
Wood and wood products	0.2	0.1	0.1	0.1
Pulp, paper and paper products	0.1	0.1	0.1	0.1
Printing and publishing	0.2	0.2	0.1	0.2
Coke, refined petroleum and nuclear fuel	0.2	0.0	-0.1	0.0
Chemicals and chemical products	1.0	0.8	0.6	0.2
Rubber and plastic products	0.3	0.3	0.1	0.3
Other non-metallic mineral products	0.4	0.3	0.1	0.1
Basic metals and fabricated metal products	1.1	0.9	0.5	0.1
Machinery and equipment n.e.c.	0.4	0.2	0.2	0.1
Office, accounting and computing machinery	0.0	0.0	0.0	0.0
Electrical machinery	0.3	0.1	0.1	0.1
Radio, television and communication equipment	0.3	0.2	0.3	-0.1
Medical, precision and optical instruments	0.0	0.0	0.0	0.0
Transport equipment	0.4	0.4	0.2	0.4
Manufacturing n.e.c.; recycling	0.5	0.1	0.2	0.0
Reallocation	0.8	0.3	0.1	0.1

**Table 25 Industry contributions to manufacturing labour productivity growth - us**  
*average annual growth rate in percent*

	1970-1980	1980-1990	1990-2000	2000-2005
Total Manufacturing	2.5	3.2	4.9	5.8
Food, beverages and tobacco	0.3	0.2	0.2	0.4
Textiles, leather and footwear	0.7	0.2	0.4	0.4
Wood and wood products	0.0	0.2	-0.1	0.1
Pulp, paper and paper products	0.1	0.0	0.1	0.2
Printing and publishing	0.0	0.0	0.1	0.3
Coke, refined petroleum and nuclear fuel	-0.1	0.2	0.0	0.0
Chemicals and chemical products	0.0	0.1	0.2	0.2
Rubber and plastic products	0.1	0.2	0.2	0.3
Other non-metallic mineral products	0.0	0.1	0.1	0.1
Basic metals and fabricated metal products	0.0	0.2	0.5	0.2
Machinery and equipment n.e.c.	0.1	0.0	0.2	0.7
Office, accounting and computing machinery	0.6	0.8	1.1	0.7
Electrical machinery	0.1	0.1	0.6	0.5
Radio, television and communication equipment	0.3	0.3	0.8	0.5
Medical, precision and optical instruments	0.3	0.1	0.1	0.2
Transport equipment	0.2	0.1	0.2	0.9
Manufacturing n.e.c.; recycling	0.0	0.1	0.1	0.3
Reallocation	-0.4	0.2	0.0	-0.1



### 3. Market services

**Table 26 Summary of main findings - Belgian Market services**  
*average annual growth rates in percent*

	1970-1980	1980-1990	1990-2000	2000-2006
<b>Value added</b>	3.1	2.6	2.5	2.4
- Hour worked contribution	0.0	0.4	0.9	0.6
- Labour composition contribution	n.a.	0.3	0.4	0.1
- ICT capital contribution	1.1	1.2	1.0	0.9
- Non-ICT capital contribution	1.2	0.6	1.0	1.1
- MFP contribution	n.a.	0.1	-0.8	-0.3
<b>Value added per hour worked</b>	3.2	1.9	0.8	1.4
- ICT capital deepening	1.1	1.2	0.9	0.9
- Non-ICT capital deepening	1.2	0.3	0.4	0.7
<b>Hours worked</b>	-0.1	0.7	1.7	1.1

Remark: Labour composition is not available for the period 1970-1985 and for 2006. For the period 1980-1985, the structure of qualification of 1986 was fixed. For 2006, the labour composition contribution of 2005 was used.

### 3.1. Decomposition of value added growth

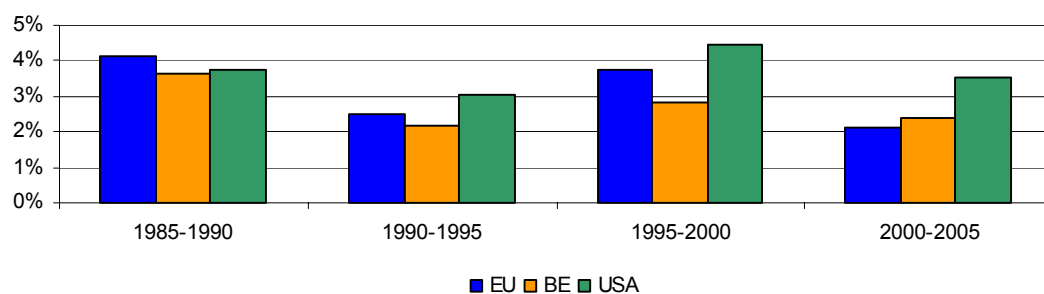
Over the whole period, 1985-2005, the value added growth of market services in Belgium was always slower than the growth in the US and in Europe, except over the most recent period.

The decomposition of value added growth shows that capital was the most important contributor in Belgium, in the EU and in the US. The contribution of capital in Belgium and in particular the contribution of ICT capital was always higher than the contribution in the EU and in the US over the whole period, with the exception of the second period 1990-1995. Capital contribution in market services in Belgium was also higher than the percentage recorded by the total economy.

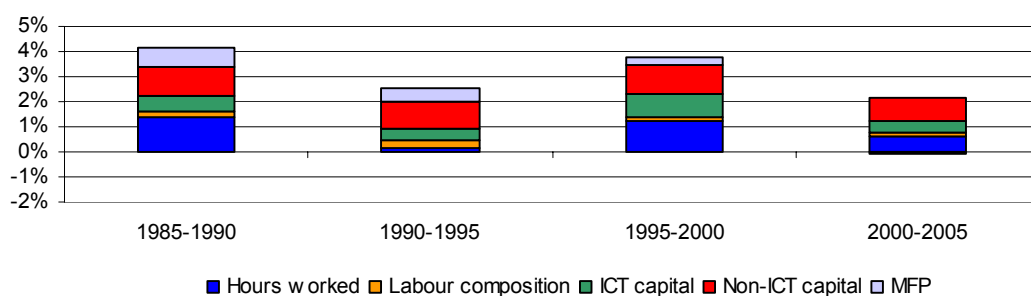
The contribution of hours worked in market services in Belgium was higher than the contribution observed in total economy over the whole period but lower than the contribution in the US, with the exception of the last period where the US recorded a negative contribution. The contribution of labour composition was higher in Belgium than in the two other areas at the beginning of the period, but became very small in Belgium during the last period.

Contrary to capital, MFP contribution was very weak in Belgium. After providing a positive but limited contribution in the period 1985-1990, MFP has negatively influenced value added growth in market services since the beginning of the nineties. In Europe, the MFP contribution was positive but decreasing over the three first periods. While Europe knew a zero MFP contribution over the last period, US recorded a strong acceleration. MFP contribution in market services in US reaching 2.0% during this last period, which was higher than the percentage observed in the whole economy.

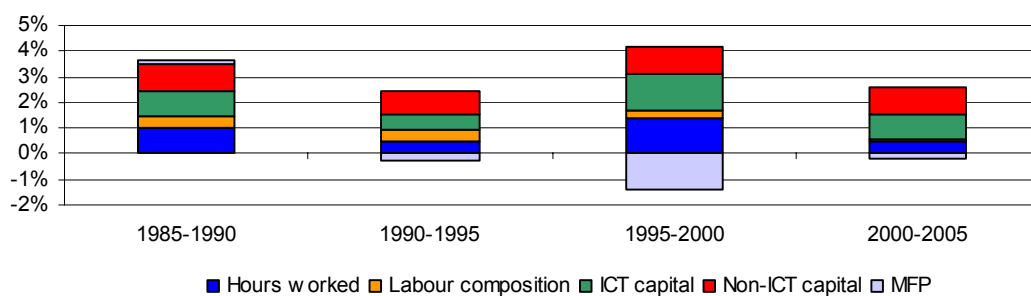
**Figure 32 Value added growth in market services**  
average annual growth rates in percent



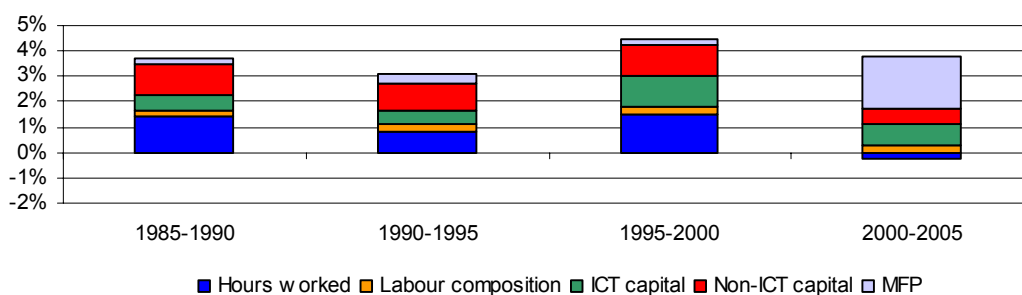
**Figure 33 Contribution to real value added growth - EU**  
average annual growth rates in percent



**Figure 34 Contribution to real value added growth - Belgium**  
average annual growth rates in percent



**Figure 35 Contribution to real value added growth - us**  
average annual growth rates in percent



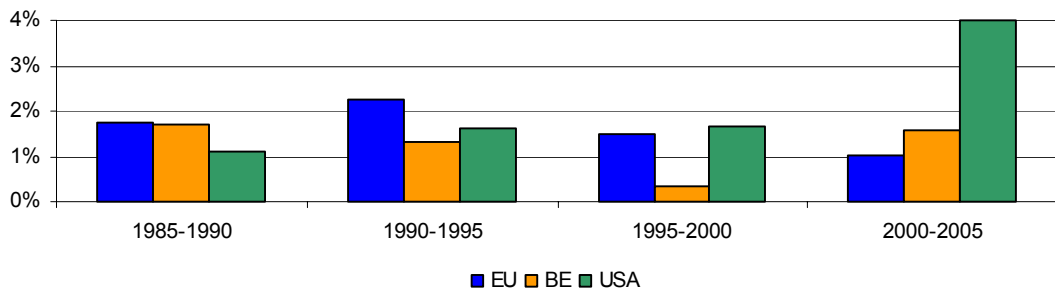
### 3.2. Decomposition of labour productivity growth

The labour productivity growth of market services in Belgium was lower than in total economy and than in the EU over the period 1985-2000. During the last period, Belgium knew a strong increase in the labour productivity growth of market services and recorded a higher growth than Europe but largely lower than the US knowing an increasing labour productivity growth in market services since the beginning of the period in 1985.

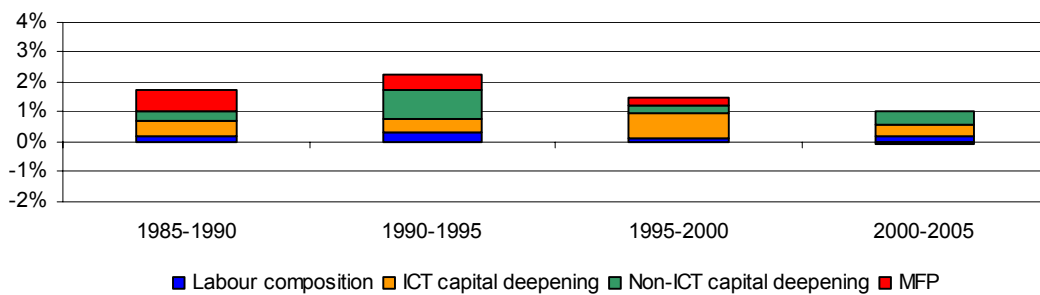
In Belgium, the evolution of labour productivity in market services was mainly driven by the contribution of capital deepening and more particularly by the contribution of ICT capital deepening. ICT capital deepening has been higher than non-ICT capital deepening over the whole period, with the exception of the second considered period. An acceleration of the contribution of ICT capital deepening has been observed in market services in Belgium since 1995. ICT capital deepening in market services has always been higher than in the total economy, in the EU and in the US.

As mentioned previously, MFP contribution was very weak in Belgium. After providing a positive but limited contribution in the period 1985-1990, MFP has negatively influenced labour productivity growth in market services since the beginning of the nineties.

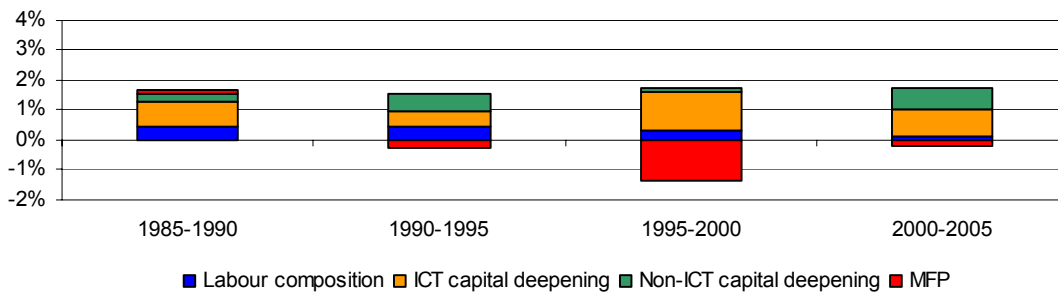
**Figure 36 Labour productivity growth in market services**  
average annual growth rates in percent



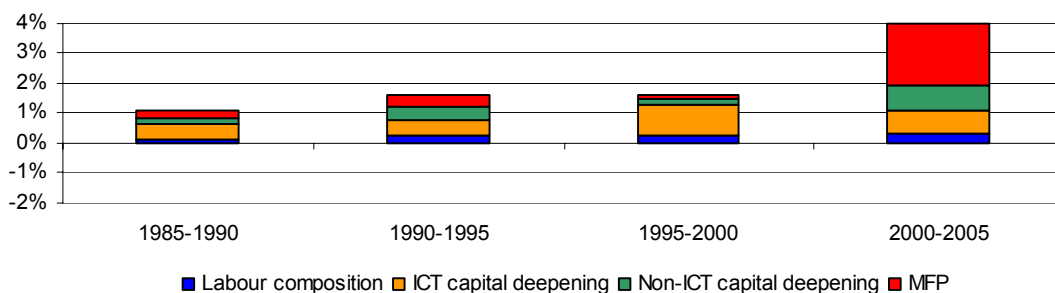
**Figure 37 Contribution to labour productivity growth - EU**  
average annual growth rates in percent



**Figure 38 Contribution to labour productivity growth - Belgium**  
average annual growth rates in percent



**Figure 39 Contribution to labour productivity growth - us**  
average annual growth rates in percent



### 3.3. Structural changes in market services

Between 1970 and 2005, changes took place in the relative importance of activities in market services in Belgium, in the US and in the EU. In the three areas, Real estate, renting and business services largely increased their share in nominal value added of market services. This evolution can be explained by an increase in outsourcing of business services in various industrial sectors and by the strong development of interim offices included in Real estate, renting and business services. In the EU and the US, this activity had already the most important share in 1970. In Belgium, Wholesale and retail trade had the highest share of total value added of market services in 1970. In the US, Financial activities recorded also a strong increase in their relative importance.

Some activities recorded a fall in their relative importance in terms of nominal value added. In Belgium, it was the case of Wholesale and retail trade and of Financial activities. In Europe and in the US, Wholesale and retail trade and Transport, storage and communication knew a decrease of their relative importance.

The average annual growth rate of real value added by industry over the period 1970-2005 shows that in Belgium, Real estate, renting and business services knew the highest growth rate in market services and a higher rate than in the EU and in the US. The growth in this activity was also important in the two other areas, but in the US, the growth was higher in the Financial activities, Wholesale and retail trade and Transport, storage and communication. In these three industries, US recorded higher rates than in the EU and in Belgium. In the EU, a high rate was also observed in Transport, storage and communication.

The increase in relative importance of Real estate, renting and business services in terms of nominal value added in the three areas went hand in hand with a large upsurge in the share of this industry in total hours worked in market services. In Belgium, this activity recorded the highest share of hours worked in market services in 2005 against Wholesale and retail trade in the beginning of the period in 1970. In the EU and the US, Wholesale and retail trade remained the most important sector in terms of hours worked despite a weak growth in hours worked in this sector.

The only sectors recording a negative average annual growth rate of hours worked during the period 1970-2005 were Wholesale and retail trade and Transport, storage and communication in Belgium.

Data information: real value added for aggregated level (total economy, manufacturing, market services etc) is calculated using a Tornqvist index for which the weights are the average shares in nominal value added in period  $t$  and  $t-1$  of each industry. Therefore, the sum of real value added of all industries is not equal to the real value added of the total economy.



**Table 27 Nominal value added of market services by activity**  
*share in market services nominal value added in percent*

	EU		Belgium		US	
	1970	2005	1970	2005	1970	2005
Wholesale and retail trade	31.5	20.5	33.8	25.4	29.4	22.5
Hotels and restaurants	4.5	4.9	3.8	3.1	5.8	4.6
Transport, storage and communication	21.0	16.3	17.8	16.4	15.4	10.3
Financial activities	11.0	12.6	20.8	11.5	9.3	14.1
Real estate, renting and business services	32.0	45.8	23.7	43.5	40.1	48.5
Total market services	100.0	100.0	100.0	100.0	100.0	100.0

**Table 28 Growth rate of real value added of market services by activity**  
*average annual growth rate, 1970-2005, in percent*

	EU	Belgium	US
Wholesale and retail trade	2.4	0.9	4.4
Hotels and restaurants	1.3	1.5	1.5
Transport, storage and communication	3.8	2.8	4.0
Financial activities	2.8	2.5	4.8
Real estate, renting and business services	3.7	4.6	3.7
Total market services	3.1	2.7	3.9

**Table 29 Hours worked in market services by activity**  
*share in market services hours worked in percent*

	EU		Belgium		US	
	1970	2005	1970	2005	1970	2005
Wholesale and retail trade	47.9	35.2	48.0	32.3	50.8	36.5
Hotels and restaurants	10.6	11.7	7.0	6.2	11.0	12.9
Transport, storage and communication	20.8	14.7	23.3	17.4	13.7	10.3
Financial activities	6.8	6.9	9.1	7.7	10.1	10.1
Real estate, renting and business services	13.9	31.5	12.6	36.5	14.4	30.1
Total market services	100.0	100.0	100.0	100.0	100.0	100.0

**Table 30 Growth rate of hours worked in market services by activity**  
*average annual growth rate, 1970-2005, in percent*

	EU	Belgium	US
Wholesale and retail trade	0.4	-0.4	1.1
Hotels and restaurants	1.5	0.4	2.5
Transport, storage and communication	0.2	-0.1	1.2
Financial activities	1.3	0.3	2.0
Real estate, renting and business services	3.6	3.8	4.1
Total market services	1.2	0.8	2.0

### **3.4. Industry contributions to market services labour productivity growth**

Labour productivity growth in market services was decreasing over the period 1970-2000 and then knew acceleration over the last period 2000-2005. The growth recorded over the last period was however lower than the growth observed in the US, which has recorded an increasing growth since the eighties. On the opposite, Europe knew a decreasing labour productivity growth in market services over the whole period.

In Belgium, labour productivity growth in market services was, over the seventies, mainly sustained by Wholesale and retail trade, which explained 46% of the growth. Over the eighties, the contribution of this industry fell and Transport, storage and communication, that recorded an increasing contribution, became the main contributors to labour productivity growth. In the nineties, the contribution of Transport, storage and communication fell and Financial activities recording an increasing contribution since the beginning of the period became the most important contributor to labour productivity growth. Over the most recent period, the contribution of each industry reached between 0.3 and 0.5 percentage points, with the exception of Hotels and restaurants recording a zero contribution.

In Europe and in the US, Wholesale and retail trade remained the most important contributor to market services labour productivity growth over the whole period. In the US, Real estate, renting and business services recorded also a large contribution over the last period, after three periods of negative contribution to market services labour productivity growth.

**Table 31 Industry contributions to market services labour productivity growth - EU**  
*average annual growth rate in percent*

	1970-1980	1980-1990	1990-2000	2000-2005
Total market services	2.5	1.8	1.9	1.0
Wholesale and retail trade	1.0	0.9	0.9	0.5
Hotels and restaurants	0.1	-0.1	0.0	-0.1
Transport, storage and communication	0.7	0.6	0.7	0.3
Financial activities	0.1	0.1	0.2	0.2
Real estate, renting and business services	0.3	0.3	0.1	0.1
Reallocation effect	0.4	0.0	0.0	0.0

**Table 32 Industry contributions to market services labour productivity growth - Belgium**  
*average annual growth rate in percent*

	1970-1980	1980-1990	1990-2000	2000-2005
Total market services	3.2	1.9	0.8	1.6
Wholesale and retail trade	1.5	0.0	0.2	0.5
Hotels and restaurants	0.1	0.2	0.0	0.0
Transport, storage and communication	0.7	1.1	0.2	0.5
Financial activities	-0.3	0.3	0.6	0.4
Real estate, renting and business services	0.8	0.3	-0.1	0.3
Reallocation effect	0.5	0.0	0.0	0.0

**Table 33 Industry contributions to market services labour productivity growth - us**  
*average annual growth rate in percent*

	1970-1980	1980-1990	1990-2000	2000-2005
Total market services	2.0	1.1	1.6	4.0
Wholesale and retail trade	1.6	1.2	1.2	1.7
Hotels and restaurants	-0.3	-0.2	-0.1	0.4
Transport, storage and communication	0.5	0.2	0.1	0.7
Financial activities	0.2	0.3	0.4	0.2
Real estate, renting and business services	-0.2	-0.2	-0.1	1.0
Reallocation effect	0.1	0.0	0.0	0.0



## 4. Non-market services

#### 4.1. Structural changes in non-market services

The structural changes in non-market services have been influenced by ageing population and by progresses in medical sciences. The shares of Health and social work in nominal value added and in hours worked increased between 1970 and 2004 in Belgium as well as in the EU and in the US. In Belgium and in the EU, Health and social work recorded the highest average annual growth rate of real value added and of hours worked among non-market services industries. Real value added and hours worked in Other community, social and personal services also rapidly increased in the three areas but especially in the US.

In the three geographical areas, Public administration recorded a decrease of its relative importance, measured by its share in nominal value added as well as in hours worked in non-market services. However, Public administration still represented the highest share of hours worked in 2005 in Belgium what was not more the case in the EU and in the US where Health and social work played this role.

The main divergence between the US and at a lesser extent the EU and Belgium is found in Education and particularly in terms of hours worked. The share of Education in hours worked in non-market services increased in the US between 1970 and 2005, remained stable in the EU but decreased in Belgium. The average growth rate of hours worked in Education over 1970-2005 is more than four times higher in the US than in Belgium and three times higher in the EU than in Belgium.

Data information: real value added for aggregated level (total economy, manufacturing, market services etc) is calculated using a Tornqvist index for which the weights are the average shares in nominal value added in period  $t$  and  $t-1$  of each industry. Therefore, the sum of real value added of all industries is not equal to the real value added of the total economy.

**Table 34 Nominal value added of non-market services by activity**  
*share in non-market services nominal value added in percent*

	EU		Belgium		US	
	1970	2005	1970	2005	1970	2005
Public administration	48.0	28.6	40.7	30.9	49.0	35.0
Education	22.2	26.6	31.1	28.0	23.8	21.9
Health and social work	17.3	27.5	18.3	29.6	15.0	29.4
Other community, social and personal services	10.8	15.5	6.4	10.1	10.3	13.3
Private households with employed persons	1.7	1.9	3.5	1.4	1.9	0.5
Total non-market services	100.0	100.0	100.0	100.0	100.0	100.0

**Table 35 Growth rate of real value added of non-market services by activity**  
*average annual growth rate, 1970-2005, in percent*

	EU	Belgium	US
Public administration	1.7	1.5	1.2
Education	2.0	1.8	2.5
Health and social work	2.9	3.6	3.0
Other community, social and personal services	2.3	3.6	3.5
Private households with employed persons	1.9	-0.4	-0.4
Total non-market services	2.1	2.2	2.1

**Table 36 Hours worked in non-market services by activity**  
*share in non-market services hours worked in percent*

	EU		Belgium		US	
	1970	2005	1970	2005	1970	2005
Public administration	34.5	23.7	37.7	33.2	41.7	24.6
Education	19.4	19.6	23.8	20.4	18.5	22.2
Health and social work	25.6	32.1	12.5	29.5	17.7	28.3
Other community, social and personal services	14.8	17.3	9.1	10.3	17.0	22.9
Private households with employed persons	5.6	7.2	17.0	6.6	5.1	2.1
Total non-market services	100.0	100.0	100.0	100.0	100.0	100.0

**Table 37 Hours worked in non-market services by activity**  
*average annual growth rate, 1970-2005, in percent*

	EU	Belgium	US
Public administration	0.4	0.6	0.2
Education	1.5	0.5	2.2
Health and social work	2.1	3.4	3.0
Other community, social and personal services	1.9	1.3	2.5
Private households with employed persons	2.2	-1.8	-0.9
Total non-market services	1.5	0.9	1.7





## 5. Other industries

## 5.1. Relative importance of other industries

Other industries constitute a heterogeneous group including industries not elsewhere classified, i.e. Agriculture, Fishing, Extractive activities, Energy, Water and Construction. It is therefore useful to analyse them separately rather than as a group.

In Belgium, as in Europe and in the US (with the exception of one sector), all activities of other industries recorded a decrease in their relative importance in terms of nominal value added and of hours worked. As expected, Agriculture and Mining saw a sharp decline in their relative importance measured both in terms of nominal value added and of hours work. In 2005, the relative importance of these activities is lower in Belgium than in the two other areas. In Belgium and in Europe, the real value added growth rate in these industries over the whole period 1970-2005 is weaker than in total economy. In the US, Agriculture knew over the whole period a higher growth rate of real value added than total economy. This activity is however the only sector in other industries recorded in the US a reduction of hours worked.

Electricity, gas and water supply knew a more limited reduction of their relative importance in terms of nominal value added and hours worked in Belgium and in Europe between 1970 and 2005. In the US, this sector recorded an increase of its share in total nominal value added over the considered period. In Belgium and in Europe, real value added of Electricity, gas and water supply increased stronger than in total economy and than in the US. A reduction of hours worked was recorded in Belgium and in Europe in this sector.

The relative importance of construction activities whether in terms of nominal value added or of hours worked decreased in the three areas, with the exception of hours worked in the US which recorded an increase. A reduction of hours worked was observed in Belgium and in Europe. The growth of real value added remained lower in this sector than in total economy in the three areas. Belgium knew however a higher growth rate than in the EU and in the US.

Data information: other industries are defined as all industries included in the NACE classification A, B, C, E and F. Real value added for aggregated level (total economy, manufacturing, market services etc) is calculated using a Tornqvist index for which the weights are the average shares in nominal value added in period  $t$  and  $t-1$  of each industry. Therefore, the sum of real value added of all industries is not equal to the real value added of the total economy.

**Table 38 Nominal value added of other industries by activity**  
*share in total economy nominal value added in percent*

	EU		Belgium		US	
	1970	2005	1970	2005	1970	2005
Agriculture, hunting, forestry and fishing	5.5	1.3	3.9	0.9	2.9	1.8
Mining and quarrying	1.7	0.6	3.4	0.1	2.2	1.5
Electricity, gas and water supply	2.3	2.1	2.9	2.0	1.9	2.1
Construction	8.8	6.2	6.9	4.8	6.3	4.8

**Table 39 Growth rate of real value added of other industries by activity**  
*average annual growth rate, 1970-2005, in percent*

	EU	Belgium	US
Agriculture, hunting, forestry and fishing	1.4	1.6	3.8
Mining and quarrying	-0.6	-5.1	-0.1
Electricity, gas and water supply	3.1	3.7	1.1
Construction	0.6	1.3	0.4
Total economy	2.3	2.4	2.9

**Table 40 Hours worked in other industries by activity**  
*share in total economy hours worked in percent*

	EU		Belgium		US	
	1970	2005	1970	2005	1970	2005
Agriculture, hunting, forestry and fishing	14.1	4.1	4.4	1.8	6.4	3.1
Mining and quarrying	1.2	0.2	1.4	0.1	0.8	0.5
Electricity, gas and water supply	0.9	0.6	0.9	0.6	0.8	0.5
Construction	9.6	8.0	8.6	5.8	5.3	7.1

**Table 41 Growth of hours worked in other industries by activity**  
*average annual growth rate, 1970-2005, in percent*

	EU	Belgium	US
Agriculture, hunting, forestry and fishing	-3.5	-2.7	-0.7
Mining and quarrying	-5.1	-8.5	0.1
Electricity, gas and water supply	-1.2	-1.1	0.0
Construction	-0.4	-1.4	2.2
Total economy	0.1	-0.2	1.3

## 5.2. Main evolutions in Electricity, gas and water supply

In Belgium, real value growth in Electricity, gas and water supply was very dynamic during the second half of the eighties and particularly during the second half of the nineties. During these periods, Belgium recorded in this sector a value added growth rate much higher than that of Europe and the US. Compared with the total economy, growth was particularly high during the second half of the nineties, the second half of the eighties showing a rate equivalent to total economy. However, the most recent period, 2000-2005, was marked by a strong decrease in value added of these activities, while Europe knew an acceleration of its growth rate. The US recorded a slowdown of growth in this sector over the most recent period.

In Belgium, this strong value added growth observed during 1985-1990 and particularly during 1995-2000 was mainly explained by the strong contribution of MFP. Over the second half of the nineties, MFP growth reached 5.3%, which corresponds to 94% of value added growth of the sector. This strong growth was largely higher than that of Europe and of the US. However, over the most recent period, MFP contribution in Belgium became negative, contrary to the acceleration observed in Europe.

Over the whole period, hours worked contribution to value added growth was negative in the three areas. Labour composition effect decreased in Belgium and in Europe and remained close to zero in the US over the whole period. Capital contribution to value added growth was always positive. However, when this contribution is split between ICT and non-ICT capital, only ICT capital contribution maintained a positive sign over the whole period, with non-ICT capital contribution being negative between 1995 and 2005. ICT capital recorded increasing contribution and has been higher than non-ICT capital contribution in the EU and in the US since 1990.

Labour productivity growth was especially high in Electricity, gas and water supply in Europe and in Belgium over the whole period, except in Belgium during the most recent period where a fall was observed. In the US, labour productivity growth was lower than in Europe over the whole period and than in Belgium until 2000. Capital deepening, both ICT and non-ICT, has always contributed positively to productivity growth with ICT capital contribution higher in Belgium than in the two other areas at the end of the period.

Productivity gains contributed to the slower pace of increase in the value added deflator of Electricity, gas and water supply than in that of the total economy. The labour cost evolution was also slower than in total economy during the two first periods and then faster during the two following periods.

Data information: the growth rate of relative prices corresponds to the growth rate of the ratio between VA price index of Electricity, gas and water supply and VA price index of total economy. The growth rate of relative labour costs corresponds to the growth rate of the ratio between labour costs of Electricity, gas and water supply and labour costs of total economy. Labour costs is equal to labour compensation divided by hours worked.

**Table 42 Main indicators for Electricity, gas and water supply - EU**  
*average annual growth rate in percent*

	1985-1990	1990-1995	1995-2000	2000-2005
<b>Value added</b>	4.0	1.8	2.4	3.0
- Hours worked contribution	0.0	-0.9	-1.2	-0.5
- Labour composition contribution	0.3	0.2	0.2	0.0
- ICT capital contribution	0.3	0.3	0.4	0.2
- Non-ICT capital contribution	1.1	1.6	0.7	0.6
- MFP contribution	2.3	0.6	2.4	2.6
<b>Value added per hour worked</b>	4.0	4.1	5.8	4.3
- ICT capital deepening	0.3	0.4	0.5	0.3
- Non-ICT capital deepening	1.0	2.9	2.8	1.5
Relative prices	-2.0	-1.3	-4.9	0.6
Relative labour costs	0.8	-0.5	-1.0	0.7

**Table 43 Main indicators for Electricity, gas and water supply - Belgium**  
*average annual growth rate in percent*

	1985-1990	1990-1995	1995-2000	2000-2005
<b>Value added</b>	3.1	1.1	5.6	-1.8
- Hours worked contribution	-0.4	-0.5	-0.4	-0.9
- Labour composition contribution	0.6	0.4	0.0	0.1
- ICT capital contribution	0.3	0.4	0.9	0.7
- Non-ICT capital contribution	0.3	1.5	-0.2	-0.3
- MFP contribution	2.4	-0.7	5.3	-1.4
<b>Value added per hour worked</b>	4.3	2.4	6.6	0.5
- ICT capital deepening	0.3	0.4	0.9	0.8
- Non-ICT capital deepening	1.0	2.3	0.4	1.0
Relative prices	-3.7	-1.7	-4.5	-2.2
Relative labour costs	-1.9	-0.4	0.5	0.6

**Table 44 Main indicators for Electricity, gas and water supply - us**  
*average annual growth rate in percent*

	1985-1990	1990-1995	1995-2000	2000-2005
<b>Value added</b>	2.2	0.1	3.4	0.6
- Hours worked contribution	-0.4	-0.4	-0.5	-0.5
- Labour composition contribution	0.0	0.1	0.2	0.1
- ICT capital contribution	0.5	0.2	0.3	0.3
- Non-ICT capital contribution	1.5	0.1	0.2	1.1
- MFP contribution	0.5	0.0	3.2	-0.4
<b>Value added per hour worked</b>	3.3	1.5	5.2	2.2
- ICT capital deepening	0.5	0.3	0.4	0.4
- Non-ICT capital deepening	2.2	1.0	1.4	2.2
Relative prices	-1.1	1.2	-1.5	2.5
Relative labour costs	-1.5	-0.1	2.6	1.5

### 5.3. Main evolutions in Construction

Real value added growth in Construction in Belgium was very high during the second half of the eighties compared with total economy (5.7% in Construction against 3.1% in total economy), decreased to 0.4% during the first half of the nineties before reaching 1.9% over 1995-2000 and 1.5% over 2000-2005. Value added growth was always higher in Belgium than in Europe and than in the US which recorded negative growth rates, except over 1995-2000 where the growth rate was higher than in Belgium.

The hours worked contribution to this evolution of value added was important over the first period and became negative over the second and fourth period. Labour composition contribution was equal or close to zero over the whole period. ICT capital contribution varied between 0.1% and 0.3% over the whole period. The contribution of non-ICT capital was relatively important over the first period and became weaker over the rest of the period. MFP contribution was weak during the first period and nonexistent during the third period but accelerated to reach 0.7% over 1990-1995 and 1.3% over the most recent period. MFP contribution of construction in Belgium was always higher than in Europe from 1990 and than in the US over the whole period, which recorded both negative growth rates over these periods.

Labour productivity growth was influenced by and followed the same pattern as MFP: initially, weak during the second half of the eighties and over the third period, higher during the second and the fourth period. Labour productivity growth in Belgium was higher than in Europe and than in the US, which recorded negative growth rates over the whole period.

Over the two first periods and over the most recent period, the value added deflator of Construction increased at a slower pace than the deflator of the whole economy. After a slower increase of labour costs in Construction during the period 1985-2000, labour costs increased a little faster than labour costs in total economy.

Data information: the growth rate of relative prices corresponds to the growth rate of the ratio between VA price index of Construction and VA price index of total economy. The growth rate of relative labour costs corresponds to the growth rate of the ratio between labour costs of Construction and labour costs of total economy. Labour costs is equal to labour compensation divided by hours worked.

**Table 45 Main indicators for Construction - EU**  
*average annual growth rate in percent*

	1985-1990	1990-1995	1995-2000	2000-2005
<b>Value added</b>	3.5	-0.5	0.7	1.4
- Hours worked contribution	2.0	-0.9	0.6	0.7
- Labour composition contribution	-0.2	0.4	0.2	0.1
- ICT capital contribution	0.1	0.1	0.1	0.1
- Non-ICT capital contribution	0.4	0.4	0.5	0.9
- MFP contribution	1.2	-0.5	-0.9	-0.4
<b>Value added per hour worked</b>	0.9	0.6	-0.1	0.6
- ICT capital deepening	0.1	0.1	0.1	0.1
- Non-ICT capital deepening	-0.2	0.6	0.3	0.7
Relative prices	2.1	2.1	0.2	0.8
Relative labour costs	1.1	2.0	-1.7	-0.6

**Table 46 Main indicators for Construction - Belgium**  
*average annual growth rate in percent*

	1985-1990	1990-1995	1995-2000	2000-2005
<b>Value added</b>	5.7	0.4	1.9	1.5
- Hours worked contribution	3.6	-1.1	0.8	-0.8
- Labour composition contribution	0.1	0.1	0.0	0.0
- ICT capital contribution	0.3	0.1	0.2	0.2
- Non-ICT capital contribution	1.5	0.6	0.8	0.8
- MFP contribution	0.3	0.7	0.0	1.3
<b>Value added per hour worked</b>	0.9	1.9	0.8	2.6
- ICT capital deepening	0.2	0.1	0.2	0.2
- Non-ICT capital deepening	0.3	1.0	0.6	1.1
Relative prices	-1.7	-0.3	0.1	-0.6
Relative labour costs	-3.0	-0.2	-0.7	0.3

**Table 47 Main indicators for Construction - us**  
*average annual growth rate in percent*

	1985-1990	1990-1995	1995-2000	2000-2005
<b>Value added</b>	-2.1	-1.2	2.9	-0.2
- Hours worked contribution	1.7	0.7	4.1	0.6
- Labour composition contribution	0.3	0.3	0.1	0.1
- ICT capital contribution	0.0	0.2	0.3	0.2
- Non-ICT capital contribution	0.1	0.1	0.9	0.3
- MFP contribution	-4.2	-2.5	-2.5	-1.4
<b>Value added per hour worked</b>	-4.1	-2.0	-1.9	-0.9
- ICT capital deepening	0.0	0.1	0.2	0.1
- Non-ICT capital deepening	-0.2	0.0	0.3	0.1
Relative prices	1.2	0.8	2.2	4.5
Relative labour costs	-3.9	-2.2	-2.9	-0.6





## 6. Appendix

### 6.1. The growth accounting model

The growth accounting model is based on various assumptions, among which the following are the most important: (i) the production function exhibits constant returns to scale and (ii) product and factor markets are characterised by perfect competition.

The growth accounting model divides the growth of value added ( $V_t$ ) into three different sources: increase in capital, in labour and in multi-factor productivity (MFP). Capital contribution is obtained by multiplying the increase in capital ( $K_t$ ) by capital's share in the nominal value added ( $w_t^K$ ) and labour contribution is obtained by multiplying the increase in labour ( $L_t$ ) by labour's share in the nominal value added ( $w_t^L$ ). Because MFP ( $A_t$ ) is not observable directly, it is measured indirectly as the change in output that cannot be explained by changes in inputs.

Value added growth of an industry can be decomposed as follows:

$$\Delta \ln V_t = \overline{w_t^K} \Delta \ln K_t + \overline{w_t^L} \Delta \ln L_t + \Delta \ln A_t$$

where  $\overline{w_t}$  is the two period average share of the input in nominal value added. The value share of each input is defined as follows:

$$w_t^K = \frac{p_t^K K_t}{p_t^V V_t} \quad \text{and} \quad w_t^L = \frac{p_t^L L_t}{p_t^V V_t}$$

The increase in labour input of an industry is measured by using the volume index of labour services given by:

$$\Delta \ln L_t = \sum_l \overline{v_t^l} \Delta \ln H_t^l \quad \text{with} \quad v_t^l = \frac{p_t^l H_t^l}{\sum_l p_t^l H_t^l}$$

where  $H_t^l$  is the number of hours worked by labour type l at time t,  $\overline{v_t^l}$  is the two-period average share of labour type l in total labour compensation and  $p_t^l$  is the price of one hour worked by labour type l at time t.

The growth of labour services can be decomposed into:

- the hours worked effect =  $\Delta \ln(\sum_l H_t^l)$
- the labour composition effect =  $\Delta \ln L_t - \Delta \ln(\sum_l H_t^l)$

The increase in capital input of an industry is measured by using the volume index of capital services given by:

$$\Delta \ln K_t = \sum_i \bar{v}_t^i \Delta \ln K_t^i \quad \text{with} \quad v_t^i \equiv \frac{uc_t^i K_t^i}{\sum_i uc_t^i K_t^i}$$

where  $K_t^i$  is the productive capital stock of the asset type  $i$  at time  $t$ ,  $\bar{v}_t^i$  is the two-period average share of capital asset  $i$  in total capital compensation and  $uc_t^i$  is the user cost of the asset  $i$  at time  $t$ .

## 6.2. Sensitivity analysis of MFP growth to output and inputs measures

In the EUKLEMS database and consequently in this paper, a Tornqvist quantity index is used for all aggregations and for all variables. This aggregation approach uses annual moving weights based on averages of adjacent points in time. For example, the GDP growth rate of total economy is equal to a weighted sum of the value added growth rate of each industry with the average shares in nominal value added in period  $t$  and  $t-1$  as weights. The table below shows the impact of the use of a Tornqvist index for aggregation compared with a basic aggregation equal to the growth rate of a non-weighted sum of the real value added of each industry.

**Table 48** GDP growth rate  
average annual growth rate, 1995-2005, in percent

	Aggregation with the Tornqvist index	Basic aggregation
Total economy	2.04	1.98
Manufacturing	1.59	1.42
Market services	2.61	2.59

In the framework of the growth accounting theory, MFP is calculated as a residue by subtracting from GDP growth the contribution of labour and capital, weighted by the respective share of their costs in the GDP. In the absence of perfect statistical measures of labour and capital, MFP also includes, in addition to pure technical progress, the different measurement errors.

The table below analyses the effects of the improved estimation of the contribution of inputs, labour and capital, on the measure of MFP. The first column of the table gives a basic measure of the average annual growth rate of MFP over the period 1995-2005. The basic measure is estimated by using the number of persons engaged for the contribution of labour and capital stocks for the contribution of capital. The second column shows the effects on MFP growth (basic measure) of the use of hours worked instead of persons engaged as measure of the contribution of labour. The third column gives the effects on MFP growth (basic measure) of the distinction between different types of labour (labour composition effect). The fourth column shows the effects on MFP growth (basic measure) of the estimation of the flow of services produced by each type of capital asset rather than capital stocks. Finally, the last column gives the final measure of MFP growth that is used in the paper.

**Table 49** MFP growth rate sensitivity to different measures of inputs  
*average annual growth rate, 1995-2005, in percent*

	MFP growth rate: basic measure	Effect of worked hours	Effect of labour composition	Effect of capital services	MFP growth rate: final measure
Total economy	0.69	-0.01	-0.21	-0.74	-0.26
Manufacturing	1.66	0.08	-0.41	-0.53	0.80
Market services	0.59	-0.06	-0.20	-1.12	-0.80