Productivity: The impact of Privatisation and Liberalisation in Public Services

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Abstract
This paper analyses the evolution of labour productivity and its sources in Electricity and Gas, Post and Telecommunication, Inland Transport and Health and Social Work sectors of Austria, Belgium, Germany, Poland, Sweden and the UK in the presence of privatisation and liberalisation process from 1970 to 2004. The results showed that although some degree of labour productivity growth achieved in all sectors and countries, there has also been significant employment decreases except for Health and Social Work sector. Productivity increase/employment decrease trend is even stronger in the privatisation and liberalisation era for most countries. Decomposition of labour productivity shows that higher productivity, to some extent, was gained at the expense of employment decrease. Although there have been productivity increases in both pre- and post-privatisation periods, the contribution of employment decrease to productivity growth turned out to be quite significant in the post-privatisation period. This brings about the necessity to question the presumption that privatisation brings about higher productivity.

Keywords: Labour productivity, privatisation, liberalisation, public services.

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1. Introduction

The last thirty year has witnessed a mass privatisation of public services and state owned enterprises (SOE) in both developed and developing world. One of the main policy recommendations of international institutions such as the IMF and the World Bank to the developing world was to privatise enterprises and services owned and supplied by the public. The motivation behind this suggestion was the belief or aim that privatisation raises revenue for the state and makes public finance healthier, increases efficiency / productivity of economic agents and increases competition in the market by reducing government intervention in the economy (Megginson et al., 1994: 324). Among a number of aims of the privatisation of public enterprises (see Megginson et al., 1994; Villalonga, 2000; Megginson and Netter, 2001; Sheshinski and Lopez-Calva, 2003 for the theory of privatisation) the most important is the presumption that privatisation and liberalisation will lead to increased efficiency, or productivity. The change in ownership is assumed to provide new incentives to increase output and reduce costs as managers respond to the pressures imposed by the company's shareholders rather than what might be the broader social and political aims of the national or municipal governments that set priorities under public ownership. In that sense improved efficiency, cost reduction and profit maximisation become the focus of management activity and it goes almost without saying that privatisation should lead to an increase in productivity if the organisation is no longer constrained to meet various social and political objectives. The debate then shifts to the value of those other objectives and the extent to which the change in ownership was a necessary condition to achieve the change in focus.

The empirical evidence, in fact, shows that the objective of increased efficiency by privatisation is usually fulfilled in most industries of both developed and developing countries. Ehlrich *et. al.* (1994), for example, finds that the change in ownership from public to private increase productivity of the firm. Similarly, Vinning and Boardman (1992) finds that private firms are more profitable and efficient than both state owned and mixed enterprises. On the productivity change due to privatisation, in the UK gas industry, Price and Weyman-Jones (1996) found significant productivity increase not only aftermath of privatisation but also before privatisation mostly resulting from pre-privatisation regulatory reforms.

The increase in the efficiency of economic agents previously owned by the state has usually come with varying costs to society. The evidence on macroeconomic and especially welfare effects of privatisation is mixed: Pollitt and Smith (2003: 496-7), for

example, finds that privatisation in British rail industry led to increased output and efficiency gains but fall in output quality and government revenues. Tyrrrall (2004: 37) reached a similar conclusion on the UK railway privatisation that increase in output (number of passengers and services) was offset by the decrease in infrastructure quality, service speed and punctuality. Stuckler and King (2007), by using health data as a measure of social cost, found significant positive relationship between the rapid privatisation in the post Soviet Union countries and increase in social costs. The most important social cost of privatisation may be potential increase in unemployment due to privatisation. There is quite large number of studies showing the link between privatisation and unemployment (see for example, Ramamurti, 1997). Nellis (2005: 18) reports worker displacements due privatisation as "150,000 in Argentina between 1987 and 1997, about 50 percent of all employees in firms privatised in Mexico in the 1990s; more than 90,000 in privatised Brazilian railways alone, and about 15 percent of the total labour force in Nicaragua". Tansel (1998) found not only the workers were laid-off with the privatisation in petrochemical and cement industry of Turkey but also the earnings of these laid-off workers decreased about 66%.

The aim of this study is to examine developments in productivity that might be linked to privatisation and/or liberalisation in public services. This study has set out to establish the extent to which privatisation and liberalisation have had an impact on productivity in four sectors of the public services. Countries examined include Austria, Belgium, Germany, Poland, Sweden, and the UK. The four sectors examined are "Electricity and Gas (40)", "Inland Transport (60)", "Post and Telecommunication (64)", and "Health and Social Work (N)". The data used in the analysis are from the EU KLEMS Database (2007). The results showed that although some degree of labour productivity growth achieved in all sectors and countries, there has also been significant employment decreases except for Health and Social Work sector.

The paper is organised as follows: The next section summarises the privatisation and liberalisation experience of the four sectors of the six countries under analysis. Section three determines the capital intensities of the sectors, examines how labour productivity differs between industries with different capital intensity, and evaluates labour productivity of each sector together with aggregate sectors with different capital intensities. Sectoral labour productivity differentials between countries are analysed descriptively in section four. In section five, we examine labour productivity differentials between sectors for each country. Section six searches for the sources of productivity growth by decomposing labour productivity. Section seven

investigates the impact of privatisation/liberalisation on the trend of labour productivity, value added, and employment. Finally, section eight concludes.

2. Privatisation and Liberalisation Experience in the Selected Sectors

2. 1. Privatisation and liberalisation of the electricity industry

The process of privatisation of the electricity industry across the six countries is very varied. The most dramatic change – from wholly nationalised to wholly privatised industry – took place in the UK between 1990 and 1996. Privatisation was a central part of the industrial policy of the Conservative governments in the UK in contrast to other countries where legislation has allowed for an increase in private ownership in the sector rather than requiring the sale of public assets. In the other countries ownership was and remains more mixed with municipal utilities still playing a role in Germany and Austria while the state-owned Vattenfall remains the biggest electricity company in Sweden. In contrast, Belgium has long been dominated by the private sector in the form of Electrabel, now owned by the French utilities multinational Suez.

In some countries it is possible to identify some key dates in the process of electricity privatisation. It should also be acknowledged firstly that the impact of privatisation might take effect before the formal process has been completed. In the UK, for example, electricity companies underwent a process of change in the years leading up to privatisation as they were prepared for flotation on the stock exchange and so while the actual date of the first privatisation in the sector was 1990 it can be assumed that preparation for the sell-off was underway at least two years before this.

Secondly, several major companies are publicly owned but operate more or less as commercial concerns. This is the case, for example, with Vattenfall in Sweden that is now a major European company with substantial operations in Germany as well as other countries. In such cases the challenge is to identify the key period of commercialisation taking place in such companies.

The process of liberalisation has been taking place across the six countries since the early 1990s and has been partly driven by legislation from the European Union. In most cases markets have gradually been opened up so that initially large electricity consumers were free to choose suppliers. As of 2007 all electricity markets had to be open to all domestic consumers to keep in line with EU directives. Some of the countries moved more rapidly towards fully open markets ahead of the EU deadlines. The UK began the process as early as 1990 but only completed it in 1999 while Sweden liberalised its markets in one go in 1996. Austria, Belgium and Germany

Table 1: Privatisation experience in electricity sector.

Country	Privatisation process	Key dates
Austria	Sales of shareholdings in electricity companies since mid-1900s but still significant public ownership	Mid-1900s
Belgium	Private ownership has longed played an important role	No clear date for shift from public to private ownership
Germany	Gradual increase in private ownership since mid-1990s – minority municipal ownership remains	Mid-1990s
Poland	Gradual increase in private ownership since mid-1990s – public ownership still significant	Mid-1990s
Sweden	Gradual increase in private ownership since late 1990s	Late 1990s
UK	Privatisation began in 1990 with sales of regional electricity companies and competed in 1996 with sale of British Energy	1990-1996

Source: Authors elaborations.

began the process in 1999 with Austria completing it in 2001, Germany in 2004 and Belgium by the official deadline of 2007. Poland also met the 2007 deadline having joined the EU in 2004.

2.2. Privatisation and liberalisation of local public transport

There is a very mixed picture of ownership across local transport in the six countries analysed. The UK has gone the furthest with most local bus and rail services in private hands with the exceptions of some of the large metropolitan areas outside London. Significant privatisation also took place in Sweden from 1985 but in other countries there has not been the same determined push by national and/or regional governments to privatise these services. There has also been some private sector involvement in local transport for many years in some of the six countries such as Germany and Austria. Liberalisation has also taken place at very different speeds and scales across the six countries, with no central EU policy driving national developments in this case. Sweden and the UK were again pacesetters back in the mid-1980s but in the other countries there have not been clear and coherent attempts to open up markets to competition in a systematic way.

2.3. Privatisation and liberalisation of postal services

None of the six countries have yet carried out a full privatisation of their national postal service. Partial privatisation has been carried out in Austria and Germany while the other countries have moved from the national organisation being part of government, to

operating as a nationalised industry and now operating in a more commercial way as government-owned public limited companies. The main development in the postal sector has been liberalisation of the letters market. This has been partly pushed through EU directives on post service liberalisation although again some countries have moved more quickly than required by the EU. Sweden liberalised its letters market between 1991 and 1994 while the UK (January 2006) and Germany (2008) are also ahead of the EU's deadline. Countries have been required to liberalise the market for letters of certain weights or cost thresholds but full market liberalisation is not required until 2011.

2.4. Privatisation and liberalisation of hospital services

Although there is increased private involvement and competition in delivering a range of health services in some of the countries, it is more difficult to identify clear national trends in the same way as the other sectors. Germany stands out as the country where there has been complete privatisation of public hospitals through sales to private companies. In the UK there is an increased private sector role in delivering some NHS treatments but the main form of privatisation within the hospitals sector has been the contracting-out of ancillary services to private companies. Some clinical services have also been subject to competitive tendering but not on the same scale as catering, cleaning, security and similar services.

3. Ranking of Industries by Capital Intensity

We begin by ranking all industries in each country according to their capital intensity in order to determine whether labour productivity levels vary between industries with different capital intensity. The aim of this is to see to what extent changes in labour productivity in the four sectors being examined are in line with – or above/below the trends evident in industries in the same capital intensity grouping.

Ranking of industries has been done as follows: We calculated capital/labour ratio (CL) as the ratio of capital compensation to labour compensation. We, then, defined the first five industry with the highest capital/labour ratio as High Capital Intensive (HCI), the following six industries as Medium Capital Intensive (MCI), and the remaining six industries with the lowest CL ratio as Low Capital Intensive (LCI). The summary findings on industry rankings with respect to capital intensity are shown in Table 2 (See appendix 1 for more detailed results on industry ranking).

The table in appendix 1 shows that Health and Social Work (N) sector is a low

Table 2: Capital intensities of sectors across countries, 1970-2004

Country	EG	PT	IT	HSW
Austria	HCI	MCI/HCI	MCI/LCI	LCI
Belgium	HCI	HCI	LCI/MCI	LCI
Germany	HCI	HCI	LCI	MCI
Poland	HCI	MCI	MCI	LCI
Sweden	HCI	MCI	MCI	LCI
UK	HCI	MCI	LCI	LCI

Legend: LCI= Low Capital Intensive Industry, MCI= Medium Capital Intensive Industry, HCI= High Capital Intensive Industry.
Industries: EG= Electricity and Gas, PT= Post and Telecommunication, IT= Inland Transport, HSW= Health and Social Work.
Source: Authors' calculations based on EU KLEMS (2007).

capital-intensive (LCI) sector in all countries from 1970 to 2004 except for Germany. In this country, Health and Social Work sector is found to be a MCI sector. Electricity, Gas, and Water Supply (E), or only Electricity and Gas (40), sector is classified as a HCI sector in all countries in the whole period. Inland Transport (60) varies from country to country: It is a LCI sector in Germany and the UK and a MCI sector in Sweden and Poland. In Austria, relative capital intensity of the other sector increases especially after 1980, thereby; this sector becomes a LCI sector after 1980s while it was a MCI sector in the pre 1980 period. For Belgium, the data was not available for inland transport only the broader sector including water and air transport. This turned out to be an LCI sector in the beginning of the period under analysis, but then became a MCI sector after the 1980s.

The capital intensity of the Post and Telecommunication (64) sector also differs between countries: It is an HCI sector In Belgium and Germany and an MCI sector in Poland, Sweden, and the UK for the whole period. The Post and telecommunications sector in Austria is an MCI industry until the mid-1980s, thereafter its capital intensity increases relative to other industries and it becomes an HCI industry.

3.1. Labour Productivity by Capital Intensity

This section shows how labour productivity differs between industries with different capital intensity. We measure, in this analysis, labour productivity as the real value added per hour worked in national currencies (1995=100). The charts in appendix 2 show the results: In all six countries, labour productivity is the lowest in low (LCI) and medium capital-intensive (MCI) industries from 1970 to 2004. Interestingly, with respect to labour productivity, there is a slight difference between MCI and LCI industries.

Another unexpected finding is that labour productivity in LCI industries is higher than that of MCI industries in Austria until the mid-1990s. While there is not much difference in labour productivity of LCI and MCI industries in Austria, Germany, Sweden and the UK, labour productivity differentials starts to diverge in favour of MCI industries after the mid-1980s in Germany, in Sweden and the UK in the 1990s, and Austria in the late 1990s.

The increase in labour productivity of LCI industries is very small compared with the other industries. The increase in this industry is not more one fold in a 35-year period in all countries except Poland. Poland has achieved the same productivity increase in the last 10 years in LCI sector. We found, on the other hand, mixed results for productivity in high capital intensive (HCI) industries in the six countries: The initial productivity level in this category is about two times larger than the other two industries except in the UK. The highest productivity increase has been achieved in HCI industries. Apart from Sweden and Poland, labour productivity in HCI industries increased threefold over the 34-year period.

Productivity differences between HCI industries and the other two categories over the whole period are the highest in Austria, Germany, Poland and Sweden. Productivity in HCI industries in Austria, Germany and Sweden, for instance, is two-folds higher than the productivity in MCI sector. The figures on labour productivity in the UK are quite interesting: productivity levels across the three categories are almost at the same level until the mid-1980s, but, then, diverge with a sharp increase in the productivity of HCI industries. There is also a sharp increasing trend in productivity of HCI industries in all countries especially after 1990s.

3.2. Comparing the four sectors with the trends of different capital insensitive industries

3.2.1. Electricity and gas

Comparing trends in productivity levels in electricity and gas (and electricity, gas and water for longer periods) with those in higher capital intensive industries reveals some significant developments in the 1990s in Austria, Germany and the UK that might be associated with privatisation and/or liberalisation (see appendix 2). In contrast, the trends in the other countries demonstrate no significant change during the key periods.

Appendix 2 shows that the most marked change comes in the UK where productivity levels in electricity and gas grew in line with higher capital intensive industries between 1972 and 1995. Productivity in electricity and gas was about 20%

higher than in HCI industries in general in the mid-1990s with the gap growing to around 30% by 2003. In Austria the gap between productivity levels in electricity and gas was already 30% by 1988 but the trend continued from then so that by 2003 the gap had grown to around 60%. In Germany the gap between the two productivity levels was negligible until 1995 and then grew gradually until it reached just under 30% by 2003.

These figures indicate that in these three countries productivity levels in the electricity and gas sectors grew above the trend of HCI industries from the early to mid-1990s and so provide a indication of a possible impact from privatisation and liberalisation, although further factors needed to be assessed before drawing firmer conclusions. In contrast, no such evidence is available from the other countries. In Belgium there has been a significant gap between productivity in electricity and gas and that in HCI industries for many years, predating even the earliest moves to liberalise the electricity sector.

Although the data for Poland are very limited they show productivity levels in electricity and gas at well below levels in HCI industries and not catching up in the period between 1995 and 2003.

The Swedish data stand out as showing productivity in electricity, gas and water as higher than in HCI industries from 1970 with the gap widening markedly in the mid-1980s. However, productivity in electricity, water and gas then hardly changes between 1987 and 2003, suggesting that liberalisation and the limited moves towards privatisation have not produced an above-trend growth in productivity.

3.2.2. Inland transport

Inland transport is classified differently in different countries according to our low, medium and high capital-intensive groups of industries. In the UK and Germany it emerges as a low capital-intensive (LCI) industry while in Poland and Sweden it falls into the medium capital-intensive (MCI) group. In Austria and Belgium there is a change over the 30-year period with a shift from MCI to LCI industry in Austria and a shift the other way in Belgium. In the latter two countries the sector stays below the MCI trend for the whole period under investigation. In Austria it is also below the LCI trend while in Belgium it is more or less in line with the LCI trend.

In both Germany and the UK inland transport is below the LCI trend but then the gap closes and productivity levels match that for LCI industries in the UK from 1985 and in Germany from 1995. In Poland, inland transport remains consistently below the MCI trend for the short period from 1994 to 2003 while in Sweden the industry is initially in line with MCI trends but then drops below it for the period from 1990 onwards.

In conclusion, this comparison of productivity levels in inland transport with those in low and medium capital intensive industries reveals no significant shifts in productivity in the sector that might warrant further investigation. In Austria, Belgium and Germany it is difficult to identify specific dates when there have been significant moves towards liberalisation and privatisation. In the UK and Sweden 1985 is a key year for the bus industry in both countries but this data indicates that productivity in inland transport fell below trend with the key date appearing to be 1985 itself in the case of the UK and a few years later – in 1990 in the case of Sweden.

3.3.3. Post and telecommunications

The post and telecommunications sector in Austria is initially an MCI and then becomes an HCI industry. Its labour productivity remains below the average for MCI industries until 1992, it then follows upward trend of HCI industries but well below the average for the sector. Post and telecommunications are an HCI sector in both Belgium and Germany but the productivity trend for the sector in Belgium is below even the LCI trend up until 1990 and remains below the MCI trend for the rest of the period. In Germany the sector's productivity level surpasses that of the MCI average from 1977 and catches up with the HCI average by 1998. An increasing gap then emerges between the sector and the HCI average. Post and telecommunications in Sweden and the UK are an MCI sector. In both countries the sector is below the MCI average until the mid-1990s. It then rises above the average and a gap between the sector and the MCI opens up during the rest of the period up to 2004.

4. Sectoral labour productivity differentials between countries

This section examines whether productivity in the same sector varies between countries. Labour productivity is measured in real terms as gross value added per hour worked (volume indices).

The evolution and cross-country differentials in productivity of Inland Transport sector do not vary between countries until the 1990s (see Appendix 3). Nevertheless, the evolution of productivity in the Inland Transport sector changes after the 1990s. The UK and Germany, especially, record higher productivity increases as compared with the other countries except for Poland. In this second sub-period, productivity increase in the Inland Transport industries of Austria and Belgium just stops. Productivity increases in Poland in this sector are significant.

The charts show that striking labour productivity differentials have been taking place across countries in Post and Telecommunication and Electricity and Gas sectors. All countries in the sample have exhibited large productivity increases in Post and Telecommunication sector from 1970 to 2004. The productivity in this sector in the year 2004 has been at least five times higher than the level of 1970 for all countries excluding Poland. The increase was even higher in some countries e.g. 7.5 times in the UK and seven times in Austria. Increases in productivity accelerated especially after 1990s together with a diverging pattern of productivity among countries: although all countries exhibit increasing productivity pattern, the increase in productivity in this sector seems to be higher in Poland, UK, Austria and Germany.

Similar to Post and Telecommunication industry, labour productivity in the Electricity and Gas sector shows differences between countries. There is a huge productivity difference between Sweden and the remaining countries from the beginning of the period. Overall increase in productivity in Electricity and Gas industry of Sweden found to be one fold from 1970 to the end of period. The ratio was 3.5 for Germany that is the second worst productivity performer. The evolution of productivity of this sector in Poland has been also so poor. Like in Post and Telecommunication industry, acceleration in the increase in productivity and divergence between countries starts after 1980s. This process starts earlier in the UK in the mid-1980s. After the mid-1980s, however, Sweden is the only country exhibiting no improvement in labour productivity in this sector. The UK diverges from the other countries by having the highest labour productivity increase in this sector especially after the beginning of 1990s.

Health and Social Work sector may be the most interesting sector as long as productivity is concerned. Productivity in this sector stays almost constant for the whole period in Sweden, and with some fluctuations Austria and Belgium. In the last decade, productivity in this sector increases about 50% in Germany and the UK. Poland again shows high productivity increases in Health and Social Work sector.

5. Labour productivity differentials between sectors

Appendix 4 presents the findings about how productivity in selected four sectors evolved in each country. One general interpretation of the graphs is that in the pre-1990 period, excluding Poland, Health and Social Work sector has showed no tendency towards increasing productivity in all countries. Second, the highest productivity increase was seen in Post and Telecommunication industry (except for Belgium). In Austria, the highest productivity increase is recorded by Post and Telecommunication industry until 1990s. Yet, then, this industry was the second best with respect to productivity increase. Electricity and Gas industry was the sector exhibiting continuously increasing trend with acceleration especially in the last ten years. We found that Inland Transport sector in Austria recorded productivity increases until the beginning of 1990s, then after, it stabled. The level of labour productivity has been quite low if compared with post and Telecommunication and Electricity and Gas sectors.

The trends in productivity in Belgium is not that much different than Austria: Both Post and Telecommunication and Electricity sectors were the best productivity performers. The increases in productivity in these sectors were even higher in the 1990s. The only difference is that productivity turned out to be in Electricity and Gas sector than Post and Telecommunication. The productivity increase in Inland Transport industry has been quite low: productivity level at the end of period has been higher about 50% than the level of beginning. Like the other countries, the highest productivity increase has been observed in Post and Telecommunication industry of Germany from 1970 to 2004. The productivity of this sector has been 6 folds larger than the level of 1970. The second best productivity performer has been electricity and Gas in this period. One interesting finding on Germany is that there has been a 50% productivity increase in Health and Social Work industry in 1990s.

Poland has experienced important productivity increases in all sectors. Differently from the other countries, there has been significant productivity increase in Inland Transport sector of this country. The UK may be the other country recording productivity increase in all sectors in the post 1990 period. Moreover, The UK has been recorded the highest productivity increase in Post and Telecommunication, Electricity and Gas, and Inland Transport sectors compared with the other countries. Health and Social Work sector of the UK has also showed increase in the 1990s.

Productivity record of Sweden turned out to be the worst among the countries examined. An increasing productivity trend, similar to the other countries, has been

observed in Post and Telecommunication industry of Sweden after the 1990s. Differently from the other countries, increase in productivity in Electricity and Gas industry sector of Sweden was quite low and almost equal to the productivity level of Inland Transport. Productivity in Health and Social work industry at the end of the period has been almost the same as the level of the beginning.

The last implication of the results may be reported as follows: in the 1990s and afterwards, productivity in the Post and Telecommunication sector has sharply increased in all countries in the sample. This will be partly down to developments in technology, particularly the introduction of mobile telephones, as well as the liberalisation and privatisation of national telecom operators. The dynamic developments in these areas make it more difficult to make any sure conclusions about productivity growth in postal services and the data in this section of the report will have to be supplemented with more specific data, particularly from the national postal operators.

6. Sources of productivity growth: labour productivity decomposition

How and why productivity increases is just as important as the magnitude of the increase in evaluating the performance of an industry as a result of privatisation and liberalisation. Therefore, it is vital to acknowledge the source of productivity growth. The common method measuring productivity is to divide output by the size of inputs to find the amount of output produced by each unit of inputs. Labour productivity, therefore, defined as the amount of output, or value added as a better measure, produced by the labour input. In a narrow context, labour input may be measured as the number of employees or worked hours spend in production activity. Labour productivity, then, is determined by both output and labour input: an increase in output will increase productivity, but increase in employment will have decreasing effect on productivity. Therefore, it's possible to have a net productivity increase/decrease without increase in output with fall/rise in the amount of labour. The aim of this sub-section, therefore, is to examine the sources of productivity change by decomposing productivity growth into two parts.

Let $VA_{i,t}$ and $EMPE_{i,t}$ be total gross value added and employment of a given country, subscript *i* and *t* denotes sector and time. Then, labour productivity in sector *i* at time *t* and *t-1*, $LP_{i,t}$ and $LP_{i,t-1}$, may be defined as follows:

$$LP_{i,t} = \frac{VA_{i,t}}{EMPE_{i,t}} \quad \text{and} \quad LP_{i,t-1} = \frac{VA_{i,t-1}}{EMPE_{i,t-1}} \qquad [1]$$

The growth of labour productivity will be as follows:

$$\ln LP_{i,t} - \ln LP_{i,t-1} = \ln\left(\frac{VA_{i,t}}{EMPE_{i,t}}\right) - \ln\left(\frac{VA_{i,t-1}}{EMPE_{i,t-1}}\right) \qquad [2]$$

Rearranging the equation yields:

$$\underbrace{\ln\left(\frac{LP_{i,t}}{LP_{i,t-1}}\right)}_{\substack{growth\ in \\ labour\ productivity}} = \underbrace{\ln\left(\frac{VA_{i,t}}{VA_{i,t-1}}\right)}_{\substack{growth\ in \\ value\ added}} - \underbrace{\ln\left(\frac{EMPE_{i,t}}{EMPE_{i,t-1}}\right)}_{\substack{growth\ in \\ employment}} \qquad [3]$$

Equation [3] means that percentage growth of labour productivity in a sector of a given country is equal to the difference between the growth rates of value added and employment. According to this equation while an increase in gross value added increases productivity, any increase in size of employment will have a negative effect on productivity growth. As a result, the net increase of labour productivity will depend on the changes of both value added and employment. The findings on the decomposition of labour productivity growth for each sector and country are presented in Appendix 5.

The overall implication of the charts is that although some degree of labour productivity growth achieved in all sectors and countries, there has also been significant employment decreases, with the exception of Health and Social Work. This finding implies that, to some extent, the labour productivity growth attained was gained by sacrificing employment increase. The trends in productivity increases and employment decreases are even stronger, sometimes reaching the 10% per annum, in 1980s and 1990s – the period when privatisation and liberalisation were being implemented across most countries.

A more detailed analysis of productivity decomposition is provided in Table 3 by comparing the growth of productivity, value added and employment in the pre- and post-privatisation/liberalisation periods. In some countries and sectors it is difficult to identify specific dates and where relevant we have taken the most relevant date for

privatisation or liberalisation and so we talk about pre- and post-privatisation/liberalisation (pre-P/L and post-P/L). The figures in the table are calculated by taking the mean values of variables of interest in the pre- and the post-P/L periods. The number of years in the pre-P/L period was taken as equal to the post period to make comparison more coherent.

In Austria, Electricity and Gas and Post and Telecom sectors have shown productivity increases both before and after P/L. In the pre-P/L period, while productivity growth resulted wholly from value added increase in the Post and Telecom sector, the contribution of employment cuts contributed about 40% of productivity growth in the post-P/L period. The figures for Electricity and Gas sector are more striking. In the pre-P/L period, almost 100% of productivity growth recorded created by value added increase. In the post-P/L period, on the other hand, 20% of productivity growth has come from falling employment. Labour productivity growth in the sector is positive for virtually the whole of the period from 1976 to 2003 with only two years of nil growth in 1977 and 1981. There is no marked upturn in labour productivity growth until the mid-1990s coinciding with the only sustained period of employment decline over the period. Figures for labour productivity growth match that of value added growth for much of the period apart from the 1997-2003 period of employment decline. The trends suggest that the fall in employment could be linked to the opening of the electricity market to competition although the data available is for too short a period to provide conclusive evidence of an upward shift in productivity growth. The post and telecommunications sector shows a sustained growth in value added and labour productivity right up until 1998 when there are two years of nil growth in value added and labour productivity declines as employment increases. Value added growth then recovers while labour productivity growth shoots up as employee numbers are cut more sharply than any other time in the 30-year period.

Inland Transport industry Austria has shown growth in both productivity and employment in both periods. It is positive for most of the 20 years to 1992 during a period of sustained employment growth. In fact, employment growth is maintained throughout the entire 30-year period under consideration. However, labour productivity growth becomes much more erratic from 1993 with six years of decline and two years of virtually nil growth.

In the pre-P/L period in Germany, the growth of both labour productivity and employment were positive in the Inland Transport and the Post and Telecom with a very small decrease in the employment of Electricity, Gas and Water Supply sectors.

Table 3: Labour productivity decomposition: Comparison of before and after privatisation periods, average growth rates.

Country		Pre-Privatisation				Post-Privatisation			
	Sector	Period	LP	VA	EMPE	Period	LP	VA	EMPE
Austria	EGW	1985-94	0.034	0.032	-0.001	1995-04	0.055	0.044	-0.011
	EG	1985-94	0.033	0.034	0.001	1995-04	0.061	0.047	-0.014
	IT	1993-98	-0.023	-0.017	0.006	1999-04	-0.006	0.000	0.005
	PT	1992-97	0.061	0.059	-0.003	1998-04	0.053	0.033	-0.019
Belgium	EGW	1993-98	0.040	0.032	-0.008	1999-04	0.032	0.010	-0.021
	EG	1993-98	0.040	0.028	-0.012	1999-04	0.045	0.013	-0.032
	IT	1999-01	0.014	0.046	0.032	2002-04	-0.024	-0.022	0.002
	PT	1977-90	0.055	0.050	-0.005	1991-04	0.038	0.037	-0.001
Germany	EGW	1983-93	0.030	0.030	-0.001	1994-04	0.053	0.027	-0.026
	EG	1983-93	n.a.	n.a.	n.a.	1994-04	0.056	0.028	-0.028
	IT	1985-94	0.010	0.015	0.005	1995-04	0.014	0.000	-0.014
	PT	1975-88	0.021	0.030	0.009	1989-04	0.070	0.052	-0.018
Poland	EGW		n.a.	n.a.	n.a.		0.036	0.018	-0.018
	EG		n.a.	n.a.	n.a.		0.041	0.016	-0.026
	IT		n.a.	n.a.	n.a.		0.085	0.053	-0.032
	PT		n.a.	n.a.	n.a.		0.110	0.097	-0.013
Sweden	EGW	1987-95	0.024	0.005	-0.019	1996-04	-0.011	-0.002	0.009
	EG	1987-95	n.a.	n.a.	n.a.	1996-04	n.a.	n.a.	n.a.
	IT	1971-84	0.019	0.027	0.008	1985-04	0.022	0.021	-0.001
	PT	1977-90	0.042	0.051	0.009	1991-04	0.068	0.050	-0.018
The UK	EGW	1975-89	0.040	0.022	-0.019	1990-04	0.066	0.026	-0.040
	EG	1975-89	0.039	0.020	-0.019	1990-04	0.067	0.024	-0.043
	IT	1971-84	0.039	0.014	-0.025	1985-04	0.026	0.021	-0.005
	PT	1997-00	0.143	0.173	0.031	2001-04	0.035	0.032	-0.003

Note: Period shows the year for which the mean growth level of labour productivity, value added, and employment calculated, percentage change.
Legend: LP: Labour productivity, VA= Value added, and EMPE= Employment.
Industries: EGW= Electricity, Gas, and Water Supply, EG= Electricity and Gas, IT= Inland Transport, PT= Post and Telecommunication.
Source: Authors' calculations based on EU KLEMS (2007

That means that in this period the growth of value added produced in these sectors was higher than productivity to compensate the negative effect of employment increase on productivity. In the post-P/L period, the growth rates of productivity in all sectors were higher than that of pre-P/L period. One of the sources of this productivity increase was clearly the relative decrease in employment. In Electricity, Gas and Water Supply industry, for instance, 50% of the 5.3% growth of labour productivity came from decreasing employment in the post-P/L period. There was a steady increase in employee numbers between 1972 and 1990, after which employment falls every single year to 2003. Changes in value added growth are more erratic with no clear upward shift in the post-1990 period. There is a sustained period of higher labour productivity growth from 1994 but this coincides with the highest falls in employee numbers. In Inland Transport industry the finding is even more interesting in that all productivity growth (1.4%) resulted from cuts to employment. There is also a significant spike in labour productivity growth between 1993 and 1996. This coincided with a significant fall in employment between 1992 and 2000 but labour productivity fell again in 1997 and was negative for the following four years. Value added in this industry has shown no growth in this period. Again, a quarter of the 7% annual growth in Post and Telecommunication sector in Germany was due to falling employment in the post-P/L period. Value added growth in the sector also shows a sustained period of growth towards the end of the period – at or around 6% from 1998. Labour productivity growth has stayed above 4% since 1990 reaching 10% in the middle of the decade. However, this also coincided with several years of employment decline between 1993 and 1999.

In Belgium, positive productivity and negative employment growth were recorded in both pre- and post-P/L periods. However productivity growth due relative employment decrease increased from 25% in the pre-P/L period to 70% in the post-P/L period. Although there has been some employment decrease in Post and Telecommunication industry, it is negligible. There were some large fluctuations in value added and labour productivity growth since 1972 ranging from –2% to nearly 12%. Significant increases in the 1980s were followed by a period of low and negligible growth between 1991 and 1997. Since then value added growth has been at or above 6% although the period is too short to provide any conclusive proof of an upward shift in productivity growth. Employment increased in Inland Transport in Belgium before and after privatisation or liberalisation, but there has also been a decrease in value added after P/L, leading to negative productivity growth. The 30-year period reveals an erratic pattern of labour productivity growth with a marked surge at the end of the

1980s preceded and then followed by annual growth mostly below 2% with several years of negative growth. Labour productivity growth in electricity, gas and water was highest, topping 8% each year, in the first seven years of the 1972-2003 period. Growth was more erratic over the remaining period with a notable fall in the five years 1999-2003 when liberalisation measures were being implemented. Growth in value added fell during these five years with negative growth in 2002 and 2003. Only a sharper fall in employee numbers kept labour productivity positive in these years.

Since we have data for Poland only from 1995, we assumed this after 1995 period to be the period of privatisation and liberalisation. Under this assumption, the results are striking: more than 50%, 30%, and 10% of productivity in Electricity and Gas, Inland Transport, and Post and Telecommunication industries respectively were due to decreasing employment.

Inland transport in Sweden reveals some varying trends with employment stable or growing between 1972 and 1991, declining between 1992 and 1995 then growing again for four years before falling in 2002 and 2003. Comparing the pre- and post-1985 periods, there is no significant difference in the trend in labour productivity with five years of negative growth both before and after that date, although overall the improvement in productivity is higher in the post-1985 period. In spite of the fact that the employment decrease/productivity increase trend was seen in the Inland Transport and Post and Telecommunication sectors, this tendency is reversed in Electricity, Gas and Water Supply by having productivity increases and employment decreases in the pre-P/L period and employment increases together with productivity decreases in the post-P/L period. The value added growth in post and telecommunications was at or above 4% for most of the 30-year period with notable falls below this level only in 1976 and 1992-93. Labour productivity growth has been at or above 5% since 1997, although cuts in employment were an important factor in the early 1990s and again at the end of the period.

For the UK, the figures are different from the other countries. All industries under examination have recorded positive growth rates in productivity and negative growth rates in employment both before and after privatisation and liberalisation except for the Post and Telecommunication sector. The difference between the pre- and post-P/L periods is the magnitude of these growth rates. The contribution of employment decrease to productivity growth is found to be 50% higher in the post-P/L period of Electricity and Gas industry. The sector is notable for the sharp and sustained falls in employment. The growth in value added is steady after 1990, but mainly at a low level

– around 2% ranging up to 4%. This compares to significant fluctuations in the pre-1990 period. Labour productivity growth is at a higher level for several years in the post-1990 period but this is mainly linked to the sharp falls in employee numbers with falls exceeding 4% in the seven years 1991-1997. Increases in employment in the pre-P/L period of Post and Telecommunication industry of the UK has turned to negative contributing positively to productivity, although it is negligible. There was a major surge in value added growth from the early 1990s, staying in double figures for much of the decade, although falling back to much more modest levels at the end of the period. In inland transport, labour productivity growth is consistently positive before 1985 but there are four years of negative growth and two years of more or less nil growth following 1985 and privatisation and deregulation of the bus industry outside London. Employment change is negative for most of the 30-year period with the only years of growth coming in the late 1980s and early 1990s then again in the late 1990s after four further years of decline.

The overall implication of these results is that, with few exceptions, relative employment decrease was one of the common features of the post-P/L period. Although there has been productivity increases in both periods, the contribution of employment decrease to productivity should not be disregarded.

7. Impact of privatisation / liberalisation on the labour productivity trend

The results of decomposition analysis show that employment decrease was one of the sources of productivity growth especially after privatisation/liberalisation period for most countries. In order to test whether privatisation has significant impact on the evolution of labour productivity, we estimate a series of basic econometric models. The estimated models for each sector and each country may be written as follows for three different variables of interest:

Labour productivity equation:

$$LP_t = \beta_0 + \beta_1 PDUM_t + \varepsilon_t \quad [4]$$

Value added equation;

$$VA_t = \beta_0 + \beta_1 PDUM_t + \varepsilon_t \quad [5]$$

Employment Equation;

$$EMPE_t = \beta_0 + \beta_1 PDUM_t + \varepsilon_t \quad [6]$$

In the equation above, the variable on the left hand side is the dependent variable. $PDUM_t$ is a dummy variable that takes a value of 1 for each year in the post privatisation period and 0 in the pre-privatisation period. Finally, ε_t is the usual error term.

Each estimated constant term (β_0) from these equations will give us the mean value of the dependent variable. Estimated value of slope term (β_1), on the other hand, will indicate the effect of privatisation on the trend of dependent variable by representing the value of the difference in the mean value of the dependent variable. In the labour productivity equation, for example, a significant positive estimate of (β_1) will show a higher mean value of labour productivity and a negative estimate of the coefficient will indicate the lower productivity level in the privatisation period. A significant coefficient of $PDUM_t$ shows only the difference in productivity between the two periods, but it does not mean that productivity change in the post-privatisation period was due to privatisation. On the other hand, a simultaneous comparison of productivity equation with that of employment can tell whether a reverse impact of privatisation on employment is observed. If so, we may argue that, to some extent, the change in productivity was due to privatisation. The best way, indeed, to account for the impact of privatisation on labour productivity is to control for the change in inputs and technology used in production.

The estimation results of the models are presented in Tables 4.a-e for each country and sector. The models were not estimated for Poland since Poland data was only available from 1995. The implications of the results may be summarised as follows:

In Austria, except for Inland Transport, labour productivity was significantly higher in the post-P/L period. However, we found statistically significant decrease in the mean value of employment in the Electricity and Gas Sector and the Post and Telecommunication sectors. This finding proves the link between productivity increase-employment decrease for these two sectors of Austria. Finally, there seems to be a significant increase in employment in the in the Inland Transport industry of Austria in the post-P/L period, while there has been no significant change in productivity.

Belgium's figures are very similar to that of Austria: significant productivity increase in the post-P/L period is accompanied by a significant decrease in productivity implying that the some part of the increase in productivity resulting form privatisation was due to significant employment decrease in the Electricity and Gas and the Post and Telecom sectors.

Table 4.a: Austria

Dep. Var.		EGW	EG	IT	PT
Labour Productivity	PDUM	47.792***	51.967***	-1.325	48.810***
		[10.078]	[11.298]	[2.325]	[6.836]
	CONSTANT	86.684***	87.720***	104.912***	70.070***
		[7.126]	[7.989]	[1.644]	[4.834]
	Observations	20	20	12	20
	R-squared	0.555	0.54	0.031	0.739
	Adj. R-squared	0.531	0.515	-0.065	0.725
	F-Stat.	22.488	21.157	0.325	50.988
Value Added	PDUM	35.978***	37.987***	1.397	42.018***
		[6.499]	[6.879]	[2.030]	[5.844]
	CONSTANT	87.349***	87.213***	104.025***	74.561***
		[4.595]	[4.864]	[1.436]	[4.132]
	Observations	20	20	12	20
	R-squared	0.63	0.629	0.045	0.742
	Adj. R-squared	0.609	0.608	-0.05	0.727
	F-Stat.	30.65	30.495	0.473	51.701
Employment	PDUM	-1.873***	-1.632***	4.711***	-6.204***
		[0.504]	[0.530]	[0.847]	[1.122]
	CONSTANT	34.773***	30.203***	137.359***	65.597***
		[0.356]	[0.375]	[0.599]	[0.793]
	Observations	20	20	12	20
	R-squared	0.434	0.345	0.756	0.629
	Adj. R-squared	0.403	0.309	0.731	0.609
	F-Stat.	13.812	9.484	30.955	30.567

Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%
Note: The length of pre-and post-privatisation period is equal.
PDUM=1 for year=1995 and onward for EGW and EG.
PDUM=1 for year=1999 and onward for IT.
PDUM=1 for year=1995 and onward for PT.
Source: Authors' calculations based on EU KLEMS (2007)

Table 4.b: Belgium

Dep. Var.		EGW	EG	IT	PT
Labour Productivity	PDUM	32.269***	39.822***	2.394	56.656***
		[5.856]	[6.707]	[1.802]	[7.069]
	CONSTANT	105.609***	106.817***	98.267***	60.843***
		[4.141]	[4.742]	[1.274]	[4.999]
	Observations	12	12	6	28
	R-squared	0.752	0.779	0.306	0.712
	Adj. R-squared	0.727	0.757	0.133	0.701
	F-Stat.	30.361	35.255	1.764	64.235
Value Added	PDUM	21.549***	23.929***	0.99	53.731***
		[4.907]	[5.033]	[3.705]	[6.565]
	CONSTANT	105.869***	106.837***	109.752***	64.032***
		[3.469]	[3.559]	[2.620]	[4.642]
	Observations	12	12	6	28
	R-squared	0.659	0.693	0.018	0.72
	Adj. R-squared	0.624	0.663	-0.228	0.71
	F-Stat.	19.288	22.601	0.071	66.995
Employment	PDUM	-2.327***	-2.535***	4.800*	-3.717***
		[0.532]	[0.581]	[2.031]	[0.930]
	CONSTANT	28.368***	21.318***	118.883***	82.933***
		[0.391]	[0.427]	[1.535]	[0.669]
	Observations	13	13	7	29
	R-squared	0.635	0.633	0.528	0.372
	Adj. R-squared	0.602	0.6	0.433	0.349
	F-Stat.	19.113	19.007	5.585	15.989

Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%
Note: The length of pre-and post-privatisation period is equal.
PDUM=1 for year=1999 and onward for EGW and EG.
PDUM=1 for year=2002 and onward for IT.
PDUM=1 for year=1991 and onward for PT.
Source: Authors' calculations based on EU KLEMS (2007)

Table 4.c: Germany

Dep. Var.		EGW	EG	IT	PT
Labour Productivity	PDUM	57.317***	51.060***	27.557***	75.685***
		[8.178]	[16.039]	[1.900]	[13.110]
	CONSTANT	77.227***	85.237***	79.051***	48.762***
		[5.783]	[14.217]	[1.344]	[9.270]
	Observations	22	14	20	32
	R-squared	0.711	0.458	0.921	0.526
	Adj. R-squared	0.696	0.413	0.917	0.51
	F-Stat.	49.123	10.134	210.279	33.329
Value Added	PDUM	27.488***	30.079***	7.748***	54.137***
		[3.870]	[4.176]	[2.585]	[6.768]
	CONSTANT	86.315***	84.094***	86.014***	55.912***
		[2.736]	[2.953]	[1.828]	[4.786]
	Observations	22	22	20	32
	R-squared	0.716	0.722	0.333	0.681
	Adj. R-squared	0.702	0.708	0.296	0.67
	F-Stat.	50.46	51.877	8.985	63.986
Employment	PDUM	-77.162***	-68.788***	-137.937***	-18.453
		[10.301]	[18.679]	[20.232]	[22.108]
	CONSTANT	402.253***	348.333***	1,030.437***	613.071***
		[7.284]	[16.557]	[14.306]	[15.633]
	Observations	22	14	20	32
	R-squared	0.737	0.531	0.721	0.023
	Adj. R-squared	0.724	0.491	0.705	-0.01
	F-Stat.	56.113	13.561	46.482	0.697

Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%
Note: The length of pre-and post-privatisation period is equal.
PDUM=1 for year=1994 and onward for EGW and EG.
PDUM=1 for year=1995 and onward for IT.
PDUM=1 for year=1989 and onward for PT.
Source: Authors' calculations based on EU KLEMS (2007)

Table 4.d: Sweden

Dep. Var.		EGW	EG	IT	PT
Labour Productivity	PDUM	3.672	6.585	26.170***	67.324***
		[2.136]	[4.869]	[4.256]	[9.804]
	CONSTANT	95.140***	94.730***	73.702***	55.133***
		[1.470]	[4.217]	[3.218]	[6.933]
	Observations	19	12	35	28
	R-squared	0.148	0.155	0.534	0.645
	Adj. R-squared	0.098	0.07	0.52	0.631
	F-Stat.	2.956	1.829	37.801	47.152
Value Added	PDUM	-1.553	0.293	33.779***	64.572***
		[1.083]	[1.980]	[3.793]	[8.938]
	CONSTANT	98.763***	97.798***	65.525***	58.966***
		[0.745]	[1.714]	[2.867]	[6.320]
	Observations	19	12	35	28
	R-squared	0.108	0.002	0.706	0.667
	Adj. R-squared	0.055	-0.098	0.697	0.655
	F-Stat.	2.058	0.022	79.311	52.192
Employment	PDUM	-3.715***	-0.84	5.341***	-14.347***
		[1.012]	[1.037]	[1.525]	[1.856]
	CONSTANT	36.070***	28.167***	97.783***	101.210***
		[0.696]	[0.898]	[1.153]	[1.312]
	Observations	19	12	35	28
	R-squared	0.442	0.062	0.271	0.697
	Adj. R-squared	0.41	-0.032	0.249	0.685
	F-Stat.	13.484	0.656	12.261	59.769

Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%
Note: The length of pre-and post-privatisation period is equal.
PDUM=1 for year=1996 and onward for EGW and EG.
PDUM=1 for year=1985 and onward for IT.
PDUM=1 for year=1991 and onward for PT.
Source: Authors' calculations based on EU KLEMS (2007)

Table 4.e: The UK

Dep. Var.		EGW	EG	IT	PT
Labour Productivity	PDUM	72.420***	74.984***	39.433***	37.473*
		[9.465]	[9.541]	[4.843]	[16.525]
	CONSTANT	45.661***	43.739***	65.619***	181.937***
		[6.693]	[6.747]	[3.661]	[12.492]
	Observations	30	30	35	7
	R-squared	0.676	0.688	0.668	0.507
	Adj. R-squared	0.665	0.677	0.658	0.408
	F-Stat.	58.542	61.762	66.3	5.142
Value Added	PDUM	34.412***	33.587***	28.510***	60.729**
		[3.775]	[3.447]	[3.490]	[17.405]
	CONSTANT	72.223***	73.035***	73.838***	188.981***
		[2.669]	[2.437]	[2.638]	[13.157]
	Observations	30	30	35	7
	R-squared	0.748	0.772	0.669	0.709
	Adj. R-squared	0.739	0.764	0.659	0.651
	F-Stat.	83.086	94.943	66.739	12.174
Employment	PDUM	-115.624***	-102.978***	-162.059***	59.151**
		[11.912]	[10.938]	[16.520]	[19.411]
	CONSTANT	272.749***	227.049***	680.219***	447.719***
		[8.423]	[7.734]	[12.488]	[14.673]
	Observations	30	30	35	7
	R-squared	0.771	0.76	0.745	0.65
	Adj. R-squared	0.763	0.751	0.737	0.58
	F-Stat.	94.21	88.64	96.236	9.286

Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%
Note: The length of pre-and post-privatisation period is equal.
PDUM=1 for year=1990 and onward for EGW and EG.
PDUM=1 for year=1985 and onward for IT.
PDUM=1 for year=2001 and onward for PT.
Source: Authors' calculations based on EU KLEMS (2007)

The impact of privatisation in the examined sectors of Germany is one of the good examples of the negative relationship between productivity and employment. Privatisation not only increased significantly labour productivity, it but also decreased the size of employment in all sectors in this country.

In Sweden, there has not been observed a significant productivity difference between the pre- and post-privatisation periods in Electricity, Gas and Water supply industry. Moreover, there has been statistically significant employment decreases in this sector. Interestingly, Inland Transport sector shoved significant productivity and employment increases at the same time in the post privatisation period of this country. Post and Telecommunication industry of Sweden, on the other hand, was not different that the other countries that some part of productivity increase was due to employment decrease in the post privatisation period.

The findings on the UK are different than the other countries in the sample. The difference from the other countries is that the UK is the only country having both statistically significant productivity and employment increase in Post and Telecommunication industry. The picture for the other industries is not different: Productivity increase accompanied by the employment decrease. So, some part of productivity increases come form employment decrease, and it statistically significant.

8. Conclusions

This study analyses the evolution of labour productivity and its sources over the period between 1970 and 2004 in Electricity and Gas, Post and Telecommunication, Inland Transport and Health and Social Work sectors of Austria, Belgium, Germany, Poland, Sweden and the UK focusing in particular on the impact of privatisation and liberalisation particularly in the period from 1985 onwards.

Our findings show that the industries under examination in this report differ with respect to capital intensity. Moreover, capital intensity of the same industry may vary from country to country. Ranking industries is important in the sense that different capital-intensive industries show different productivity trends. We found that high capital intensive industries have not only much higher levels of labour productivity but also higher growth than that of low and medium capital intensive industries across all countries.

The overall results show an increasing labour productivity trend from 1970 to 2004 apart from in the Health and Social Work sector where the statistics are inappropriate in terms of trying to reflect improved output and outcomes in this sector.

The increase in productivity and the divergence between sectors and countries have risen sharply, especially after the late 1980s. While all countries have recorded quite significant productivity increases in Post and Telecommunication and Electricity and Gas, productivity performance of Inland transport sector tuned out to be quite poor.

The magnitude of the increase in productivity and productivity growth is important in evaluating the performance of an industry and the potential impact of privatisation and liberalisation, however, the key questions are also about how and why productivity changed. Therefore, it is vital to acknowledge the source of productivity growth. In order to understand where productivity comes form, we carried out a decomposition analysis. The results of this analysis showed that although some degree of labour productivity growth achieved in all sectors and countries, there has been also significant employment decreases. This finding implies that, to some extent, the labour productivity growth attained was gained by sacrificing employment increase. The trends in productivity increases and falling employment levels trend are even stronger in 1980s and 1990s, generally corresponding to the period when privatisation and liberalisation were being implemented in various degrees across the six countries.

The examination of the growth in productivity, value added and employment before and after privatisation and/or liberalisation revealed that the increase in productivity in most countries was higher in the post-privatisation/liberalisation period. Employment, on the other hand, has not grown as much as productivity. Relative employment decrease, in fact, was one of the common features of the post-privatisation/liberalisation period. Higher productivity, to some extent, was gained at the expense of employment. Although there has been productivity increases in both periods, the contribution of employment decrease to productivity turned out to be quite significant. This brings about the necessity to question the presumption that privatisation brings about higher productivity.

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Appendix 1: Industry rankings with respect to capital intensity.

Austria					
year	**40**	**60**	**64**	**E**	**N**
1970		2	2	3	1
1971		2	2	3	1
1972		2	2	3	1
1973		2	2	3	1
1974		2	2	3	1
1975		2	2	3	1
1976	3	1	2	3	1
1977	3	2	2	3	1
1978	3	2	2	3	1
1979	3	2	2	3	1
1980	3	1	2	3	1
1981	3	1	2	3	1
1982	3	2	2	3	1
1983	3	1	2	3	1
1984	3	1	3	3	1
1985	3	1	3	3	1
1986	3	1	3	3	1
1987	3	1	3	3	1
1988	3	1	3	3	1
1989	3	1	3	3	1
1990	3	1	3	3	1
1991	3	2	3	3	1
1992	3	2	3	3	1
1993	3	2	3	3	1
1994	3	2	3	3	1
1995	3	1	3	3	1
1996	3	1	3	3	1
1997	3	1	3	3	1
1998	3	1	3	3	1
1999	3	1	3	3	1
2000	3	1	3	3	1
2001	3	1	3	3	1
2002	3	1	3	3	1
2003	3	1	3	3	1
2004	3	1	3	3	1

Belgium					
year	**40**	**60+63**	**64**	**E**	**N**
1970		1	3	3	1
1971		1	3	3	1
1972		1	3	3	1
1973		1	3	3	1
1974		1	3	3	1
1975		1	3	3	1
1976		1	3	3	1
1977		1	3	3	1
1978		1	3	3	1
1979		1	3	3	1
1980		1	3	3	1
1981		1	3	3	1
1982		1	3	3	1
1983		1	3	3	1
1984		2	3	3	1
1985		2	3	3	1
1986		2	3	3	1
1987		2	3	3	1
1988		1	3	3	1
1989		2	3	3	1
1990		2	3	3	1
1991		2	3	3	1
1992		2	3	3	1
1993		2	3	3	1
1994		2	3	3	1
1995		2	3	3	1
1996		2	3	3	1
1997		2	3	3	1
1998		2	3	3	1
1999		2	3	3	1
2000		2	2	3	1
2001		2	2	3	1
2002		2	3	3	1
2003		2	3	3	1
2004		2	3	3	1

Legend: 1= Low Capital Intensive Industry (LCI), 2= Medium Capital Intensive Industry (MCI), 3= High Capital Intensive Industry (HCI).
Industries: E= Electricity, Gas, and Water Supply, 40= Electricity and Gas, 60= Inland Transport, 64= Post & Telecommunication, N= Health and Social Work.
Source: Authors'' calculations based on EU KLEMS (2007).

Appendix 1 (cont.): Industry rankings with respect to capital intensity.

Germany						Poland					
year	**40**	**60**	**64**	**E**	**N**	**year**	**40**	**60**	**64**	**E**	**N**
1970		1	3	3	1	1970					
1971		1	3	3	2	1971					
1972		1	3	3	2	1972					
1973		1	3	3	2	1973					
1974		1	3	3	2	1974					
1975		1	3	3	2	1975					
1976		1	3	3	2	1976					
1977		1	3	3	2	1977					
1978		1	3	3	2	1978					
1979		1	3	3	2	1979					
1980		1	3	3	2	1980					
1981		1	3	3	2	1981					
1982		1	3	3	2	1982					
1983		1	3	3	2	1983					
1984		1	3	3	2	1984					
1985		1	3	3	2	1985					
1986		1	3	3	2	1986					
1987		1	3	3	1	1987					
1988		1	3	3	2	1988					
1989		1	3	3	2	1989					
1990		1	3	3	2	1990					
1991	3	1	3	3	1	1991					
1992	3	1	3	3	1	1992					
1993	3	1	3	3	2	1993					
1994	3	1	3	3	2	1994					
1995	3	1	3	3	2	1995	3	1	2	3	1
1996	3	1	3	3	2	1996	3	1	2	3	1
1997	3	1	3	3	2	1997	3	1	2	2	1
1998	3	1	3	3	2	1998	3	1	2	3	1
1999	3	1	3	3	2	1999	3	1	2	3	1
2000	3	1	3	3	2	2000	3	1	2	2	1
2001	3	1	3	3	2	2001	3	1	2	3	1
2002	3	1	3	3	2	2002	3	2	2	3	1
2003	3	1	3	3	2	2003	3	1	3	3	1
2004	3	1	3	3	2	2004	3	1	3	3	1

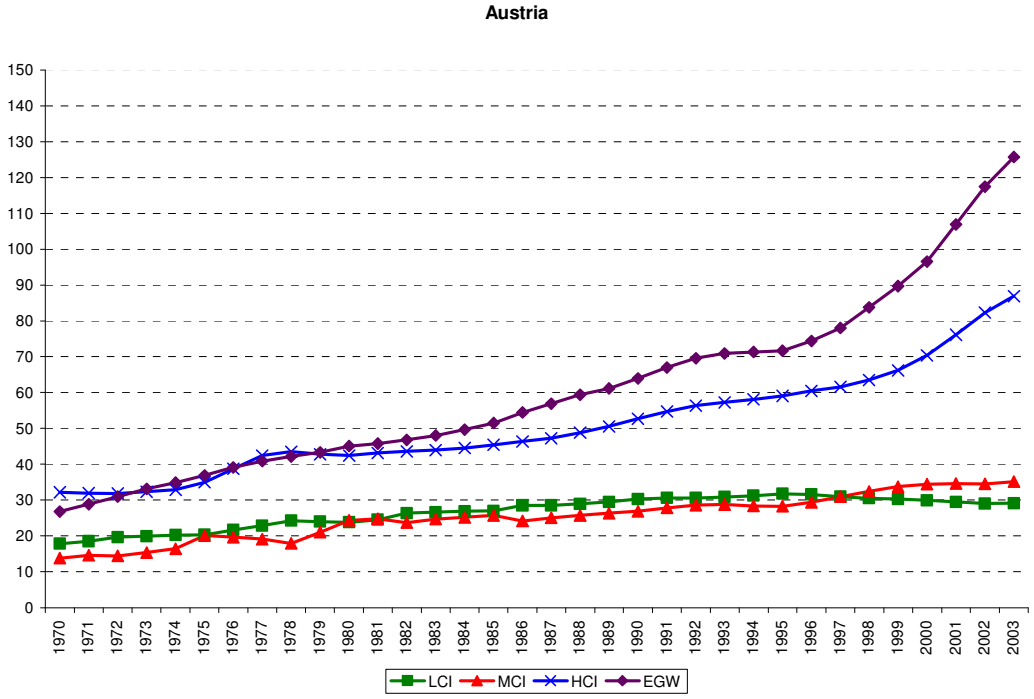
Legend: 1= Low Capital Intensive Industry (LCI), 2= Medium Capital Intensive Industry (MCI), 3= High Capital Intensive Industry (HCI).
Industries: E= Electricity, Gas, and Water Supply, 40= Electricity and Gas, 60= Inland Transport, 64= Post & Telecommunication, N= Health and Social Work.
Source: Authors'' calculations based on EU KLEMS (2007).

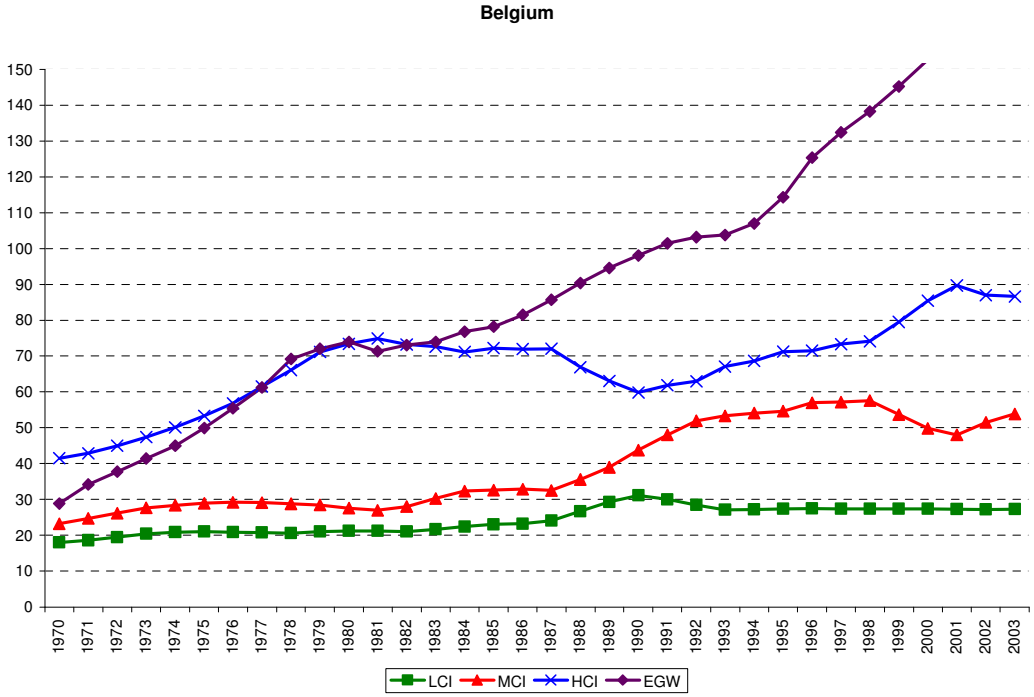
Appendix 1 (cont.): Industry rankings with respect to capital intensity.

Sweden						UK					
year	**40**	**60**	**64**	**E**	**N**	**year**	**40**	**60**	**64**	**E**	**N**
1970		2	2	3	1	1970	3	1	2	3	1
1971		2	2	3	1	1971	3	1	2	3	1
1972		2	2	3	1	1972	3	1	2	3	1
1973		2	2	3	1	1973	3	1	2	3	1
1974		2	2	3	1	1974	3	1	2	3	1
1975		2	2	3	1	1975	3	1	2	3	1
1976		2	2	3	1	1976	3	1	2	3	1
1977		2	2	3	1	1977	3	1	2	3	1
1978		2	2	3	1	1978	3	1	2	3	1
1979		2	2	3	1	1979	3	1	2	3	1
1980		2	2	3	1	1980	3	1	2	3	1
1981		2	2	3	1	1981	3	1	2	3	1
1982		2	2	3	1	1982	3	1	2	3	1
1983		2	2	3	1	1983	3	1	2	3	1
1984		1	2	3	1	1984	2	1	3	2	1
1985		2	2	3	1	1985	3	1	3	3	1
1986		2	2	3	1	1986	3	1	2	3	1
1987		2	2	3	1	1987	3	1	2	3	1
1988		2	2	3	1	1988	3	1	2	3	1
1989		2	2	3	1	1989	3	1	2	3	1
1990		2	2	3	1	1990	3	1	2	3	1
1991		2	2	3	1	1991	3	1	2	3	1
1992		2	2	3	1	1992	3	1	2	3	1
1993	3	2	2	3	1	1993	3	1	2	3	1
1994	3	1	2	3	1	1994	3	1	2	3	1
1995	3	1	2	3	1	1995	3	1	2	3	1
1996	3	1	2	3	1	1996	3	1	2	3	1
1997	3	2	2	3	1	1997	3	1	2	3	1
1998	3	2	3	3	1	1998	3	1	2	3	1
1999	3	2	3	3	1	1999	3	1	2	3	1
2000	3	2	2	3	1	2000	3	1	2	3	1
2001	3	2	2	3	1	2001	3	1	2	3	1
2002	3	2	2	3	1	2002	3	1	2	3	1
2003	3	2	2	3	1	2003	3	1	2	3	1
2004	3	2	2	3	1	2004	3	1	2	3	1

Legend: 1= Low Capital Intensive Industry (LCI), 2= Medium Capital Intensive Industry (MCI), 3= High Capital Intensive Industry (HCI).
Industries: E= Electricity, Gas, and Water Supply, 40= Electricity and Gas, 60= Inland Transport, 64= Post & Telecommunication, N= Health and Social Work.
Source: Authors' calculations based on EU KLEMS (2007).

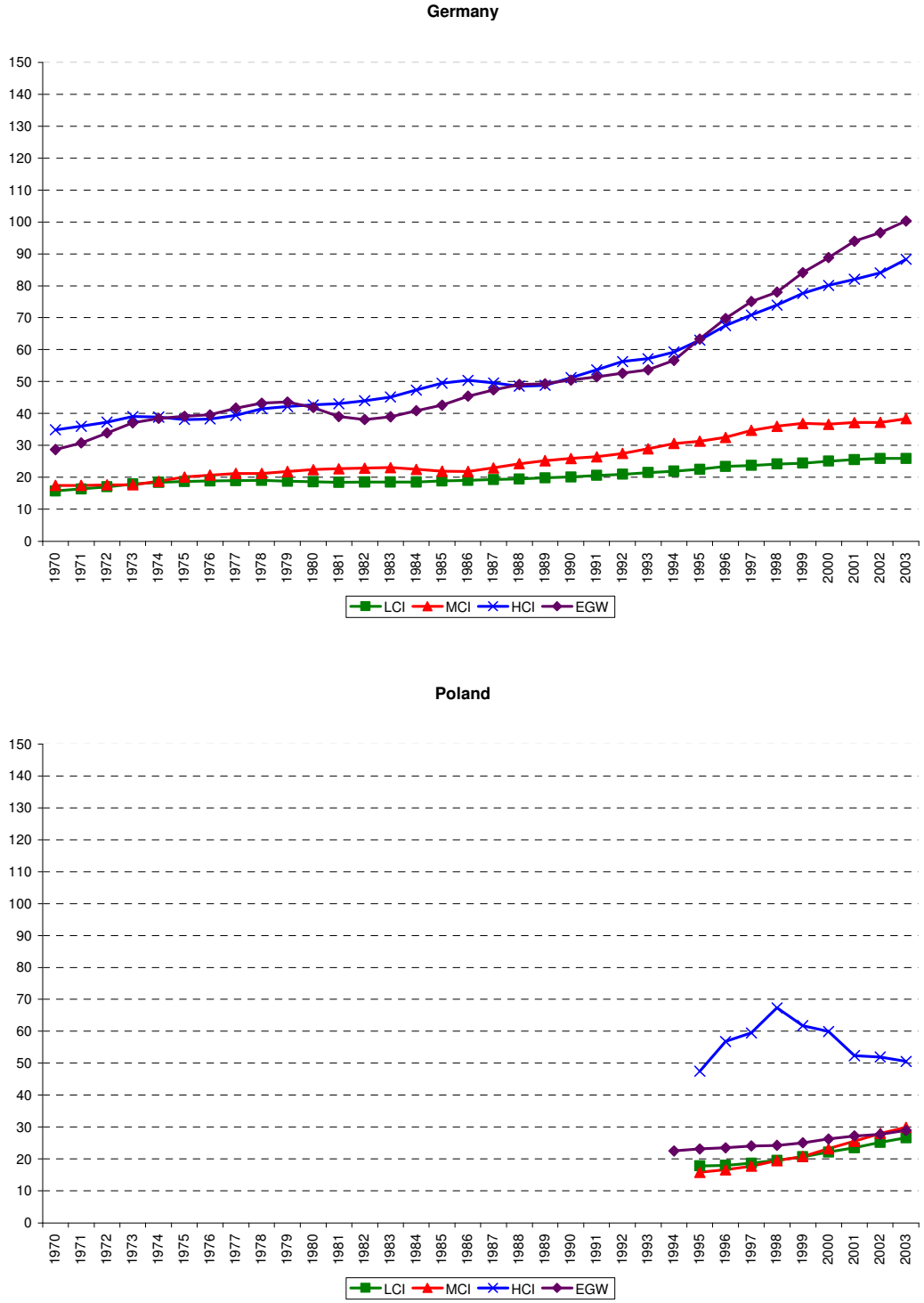
Appendix 2.a: Comparison of labour productivity in selected sectors with different capital intensive sectors: Electricity, Gas and Water Supply Sector





Note: Labour productivity is gross value added at constant prices per hour worked in national currencies with 1995 prices. The figures are three year averages.
Source: Authors' calculations based on EUKLEMS (2007).

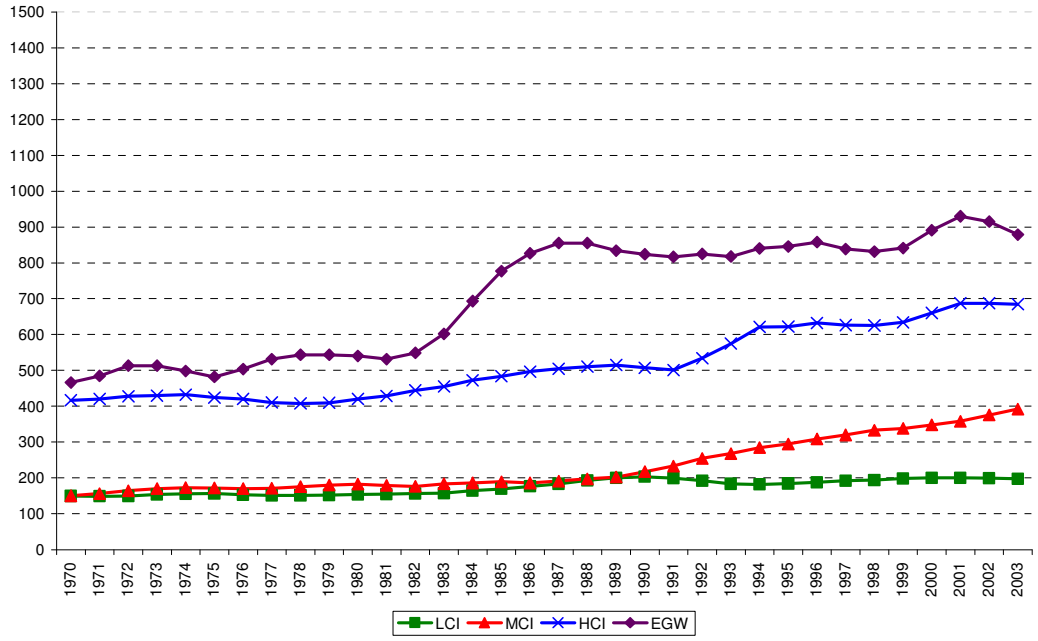
Appendix 2.a (cont.): Comparison of labour productivity in selected sectors with different capital intensive sectors: Electricity, Gas and Water Supply Sector



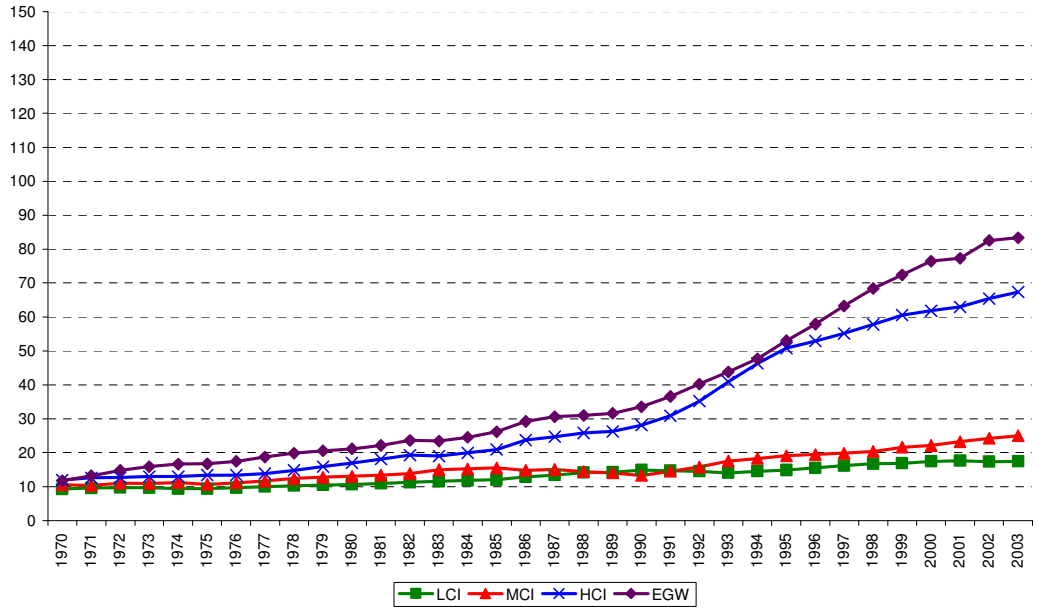
Note: Labour productivity is gross value added at constant prices per hour worked in national currencies with 1995 prices. The figures are three year averages.
Source: Authors' calculations based on EUKLEMS (2007).

Appendix 2.a (cont.): Comparison of labour productivity in selected sectors with different capital intensive sectors: Electricity, Gas and Water Supply Sector

Sweden

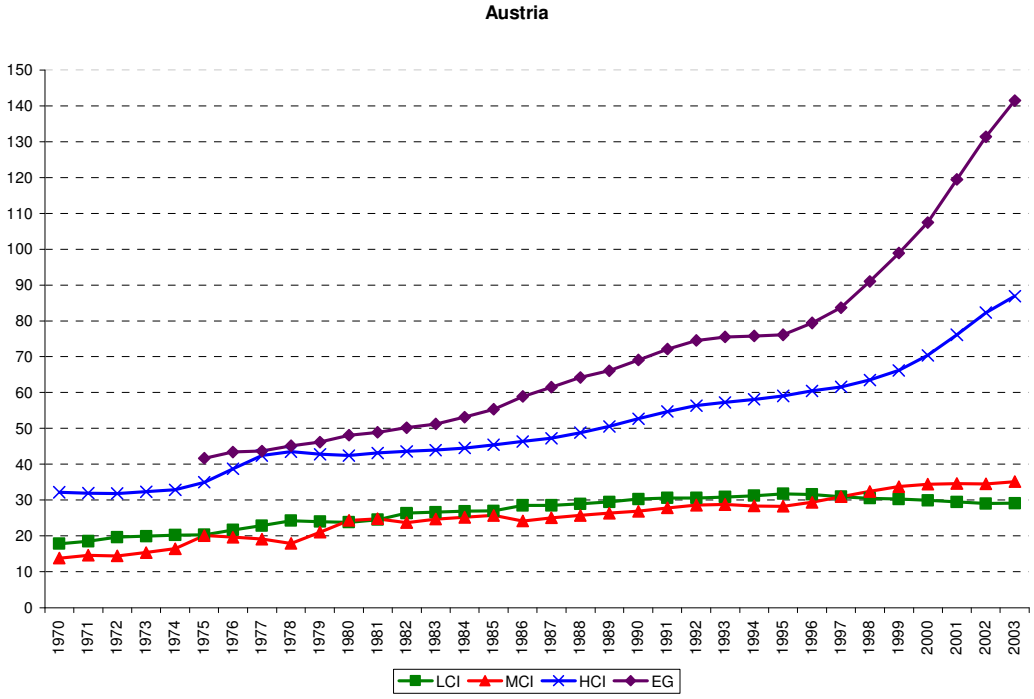


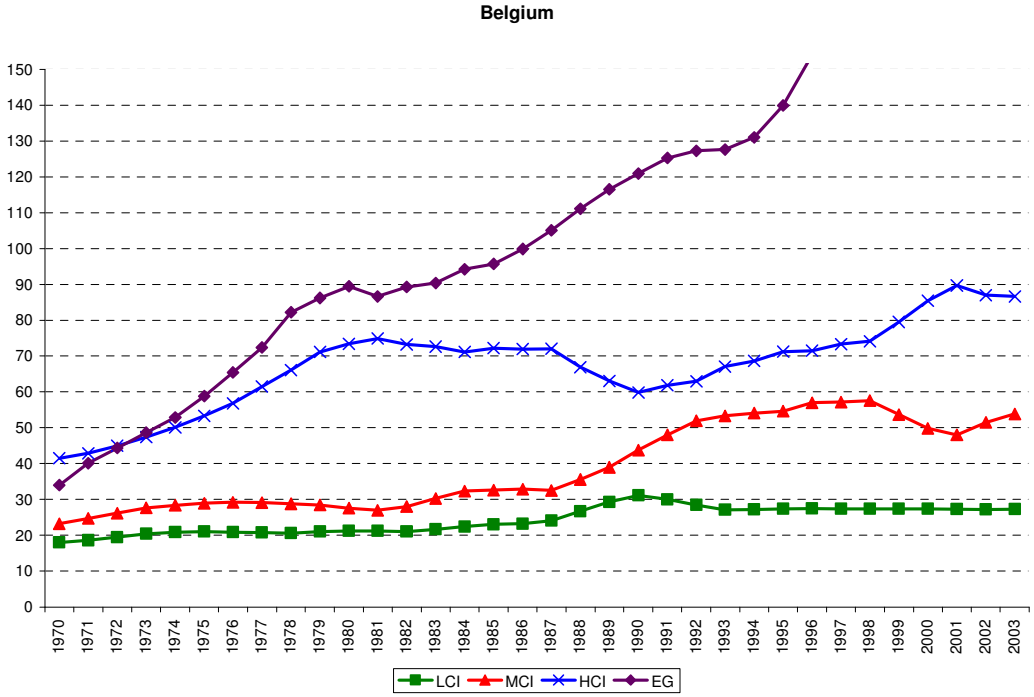
UK



Note: Labour productivity is gross value added at constant prices per hour worked in national currencies with 1995 prices. The figures are three year averages.
Source: Authors' calculations based on EUKLEMS (2007).

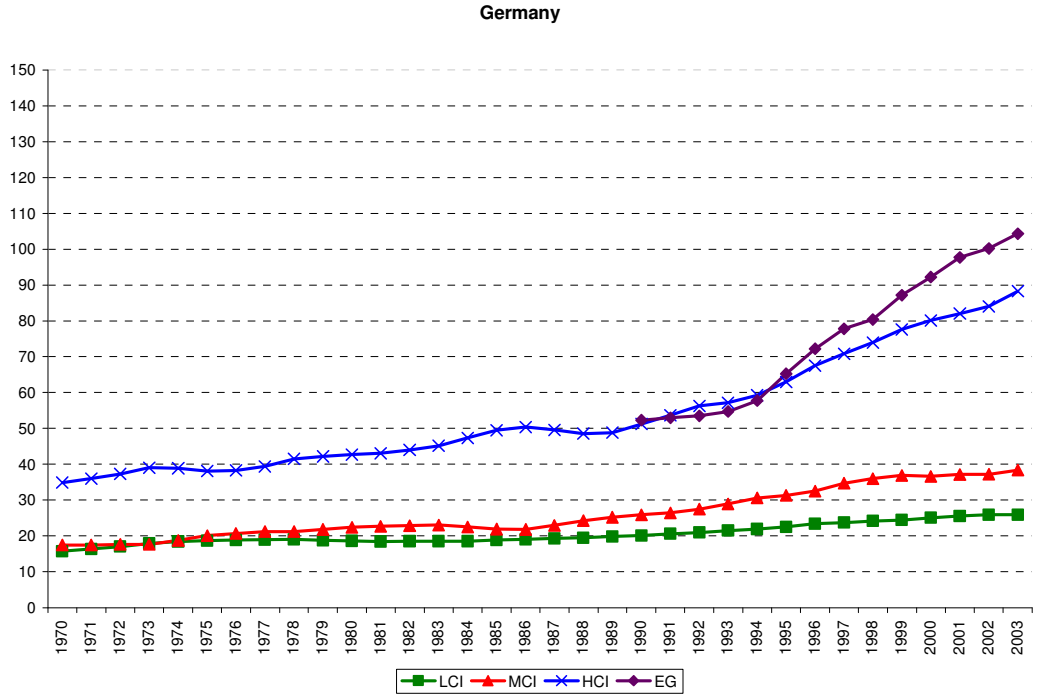
Appendix 2.b: Comparison of labour productivity in selected sectors with different capital intensive sectors: Electricity and Gas Sector

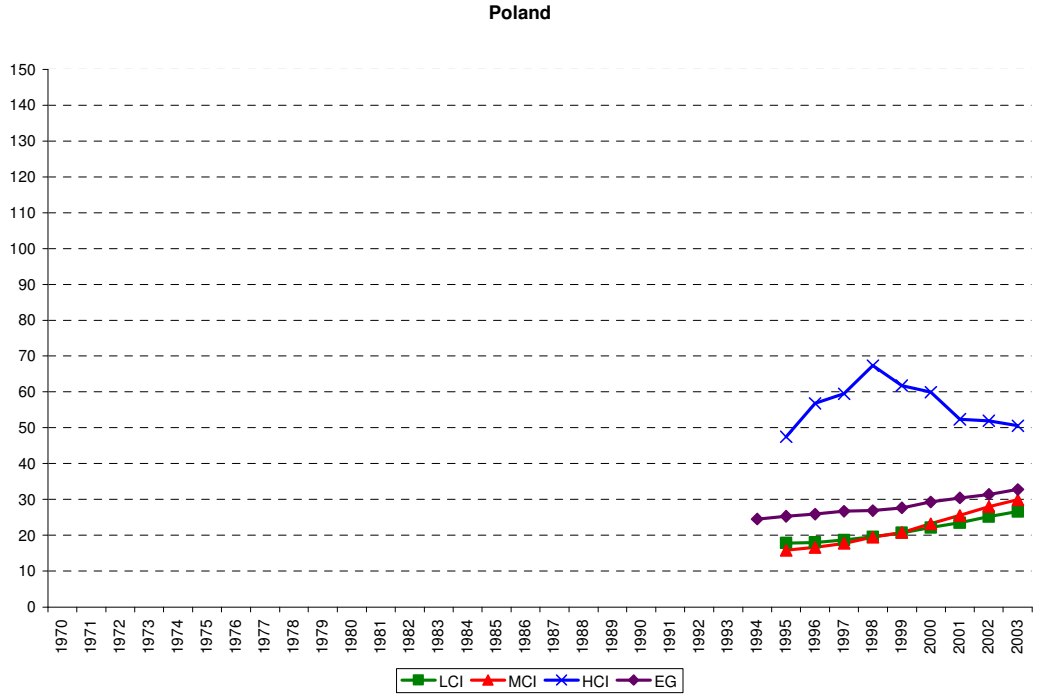




Note: Labour productivity is gross value added at constant prices per hour worked in national currencies with 1995 prices. The figures are three year averages.
Source: Authors' calculations based on EUKLEMS (2007).

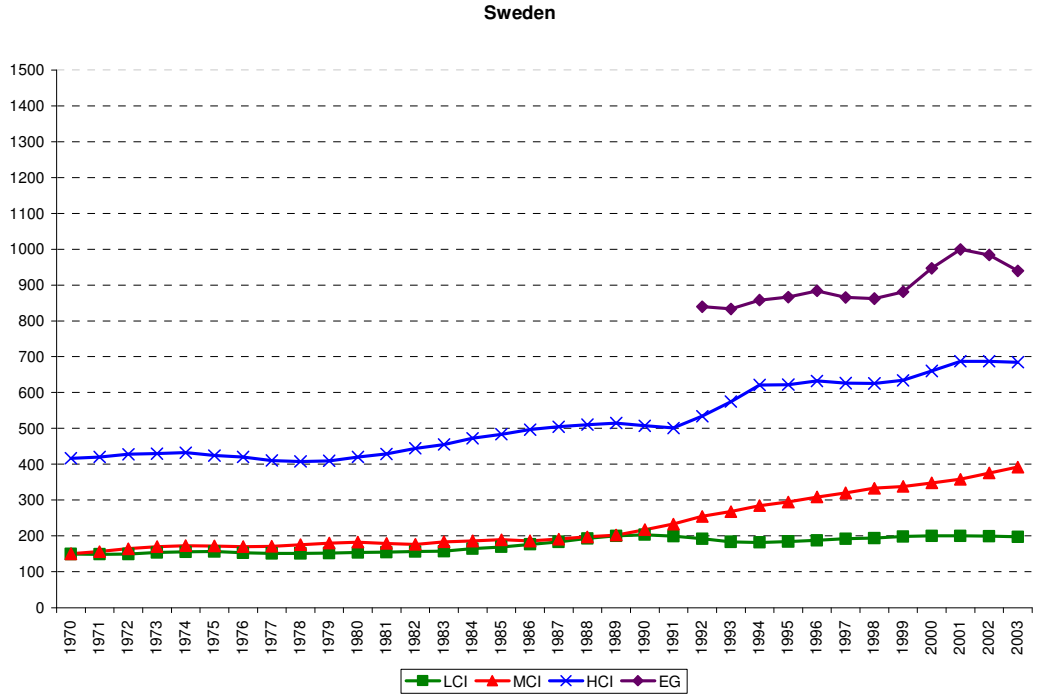
Appendix 2.b (cont.): Comparison of labour productivity in selected sectors with different capital intensive sectors: Electricity and Gas Sector

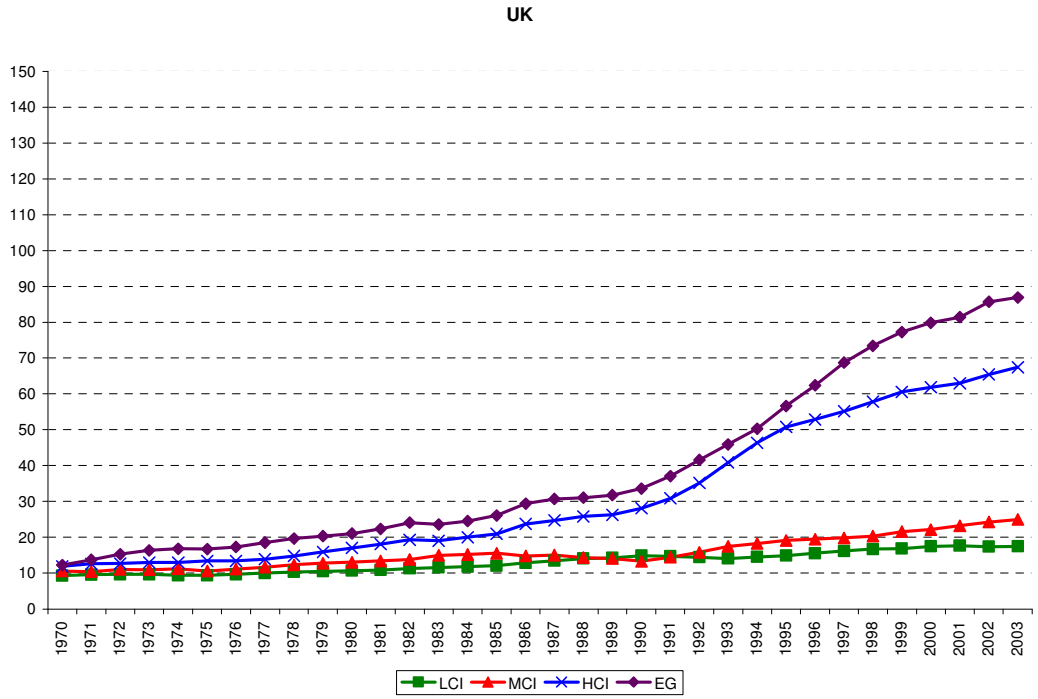




Note: Labour productivity is gross value added at constant prices per hour worked in national currencies with 1995 prices. The figures are three year averages.
Source: Authors' calculations based on EUKLEMS (2007).

Appendix 2.b (cont.): Comparison of labour productivity in selected sectors with different capital intensive sectors: Electricity and Gas sector

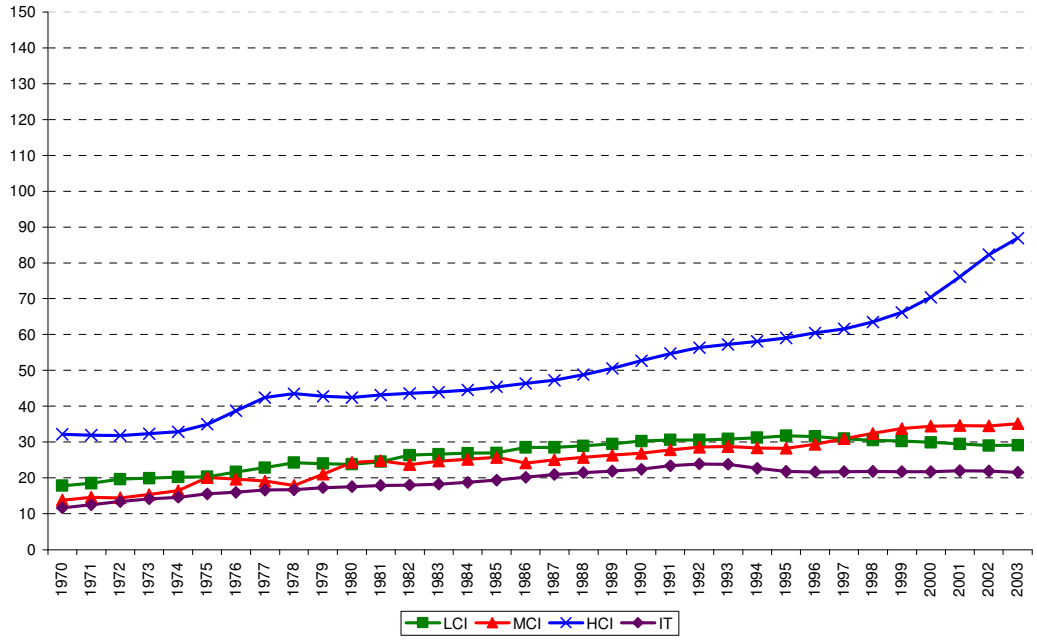




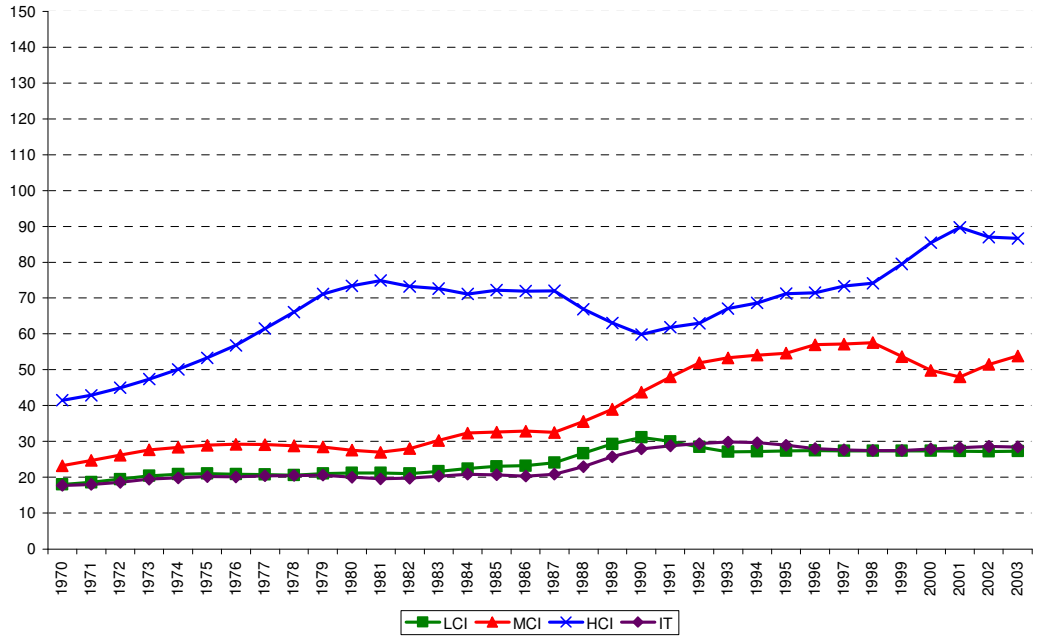
Note: Labour productivity is gross value added at constant prices per hour worked in national currencies with 1995 prices. The figures are three year averages.
Source: Authors' calculations based on EUKLEMS (2007).

Appendix 2.c (cont.): Comparison of labour productivity in selected sectors with different capital intensive sectors: Inland Transport

Austria

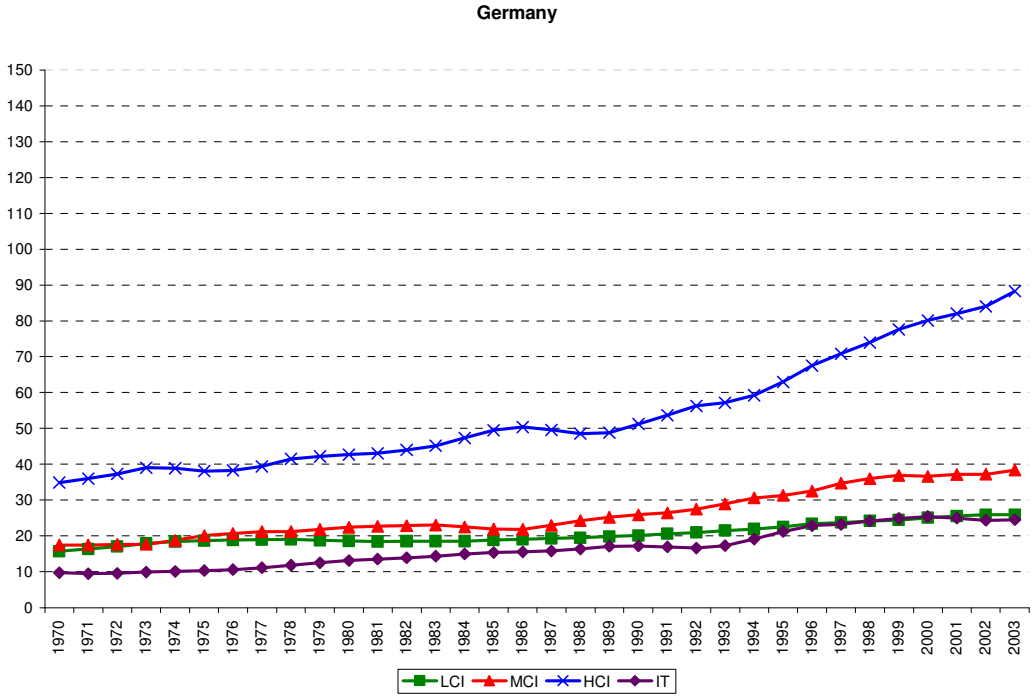


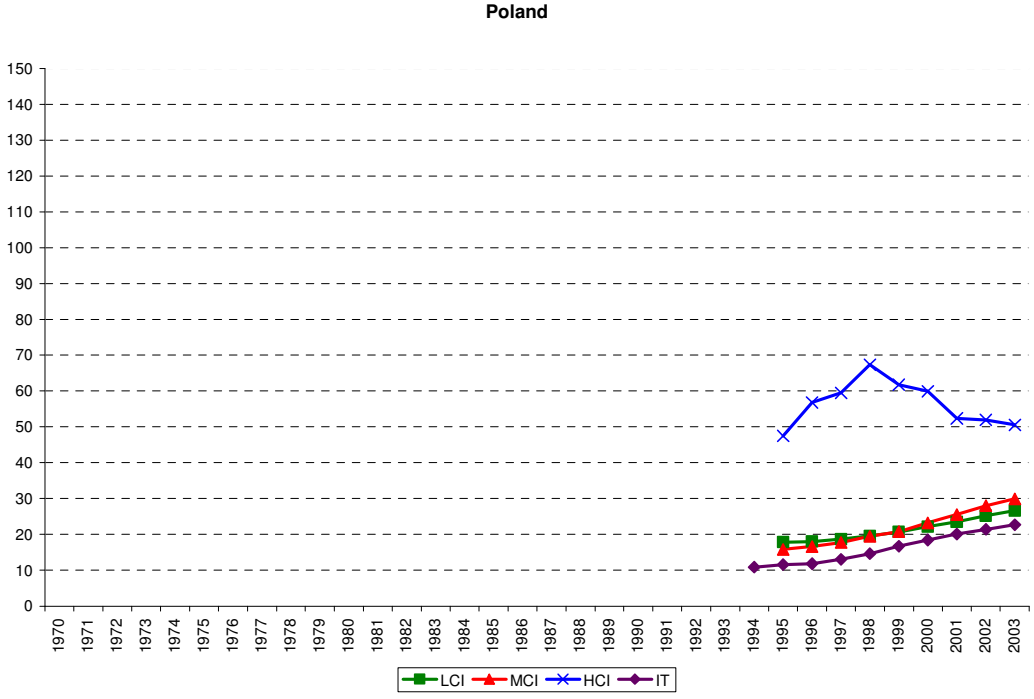
Belgium



Note: Labour productivity is gross value added at constant prices per hour worked in national currencies with 1995 prices. The figures are three year averages.
Source: Authors' calculations based on EUKLEMS (2007).

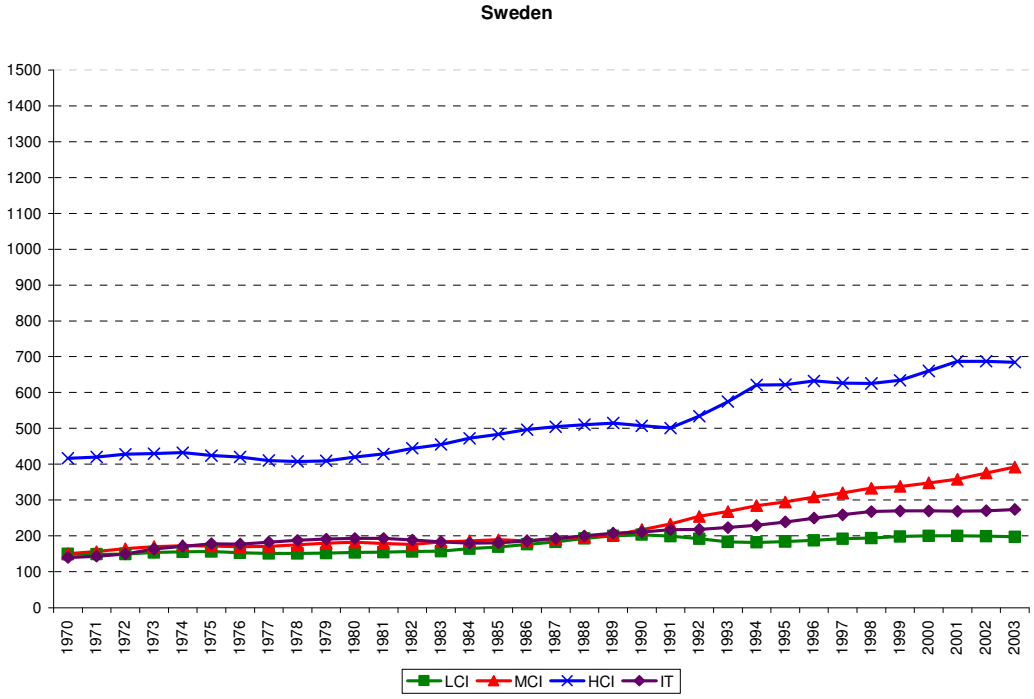
Appendix 2.c (cont.): Comparison of labour productivity in selected sectors with different capital intensive sectors: Inland Transport

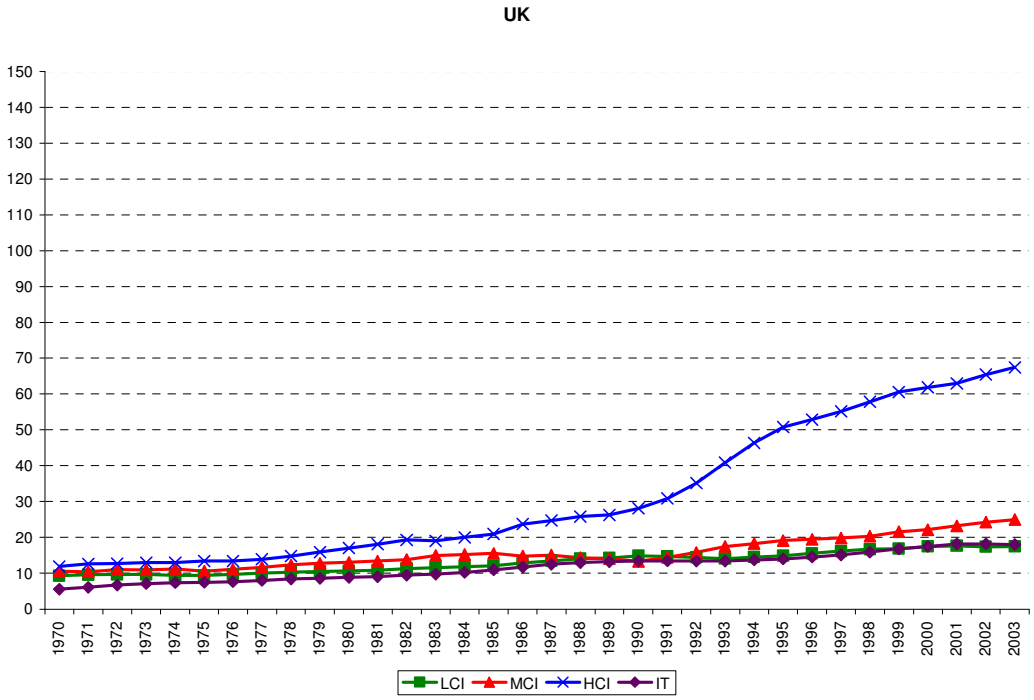




Note: Labour productivity is gross value added at constant prices per hour worked in national currencies with 1995 prices. The figures are three year averages.
Source: Authors' calculations based on EUKLEMS (2007).

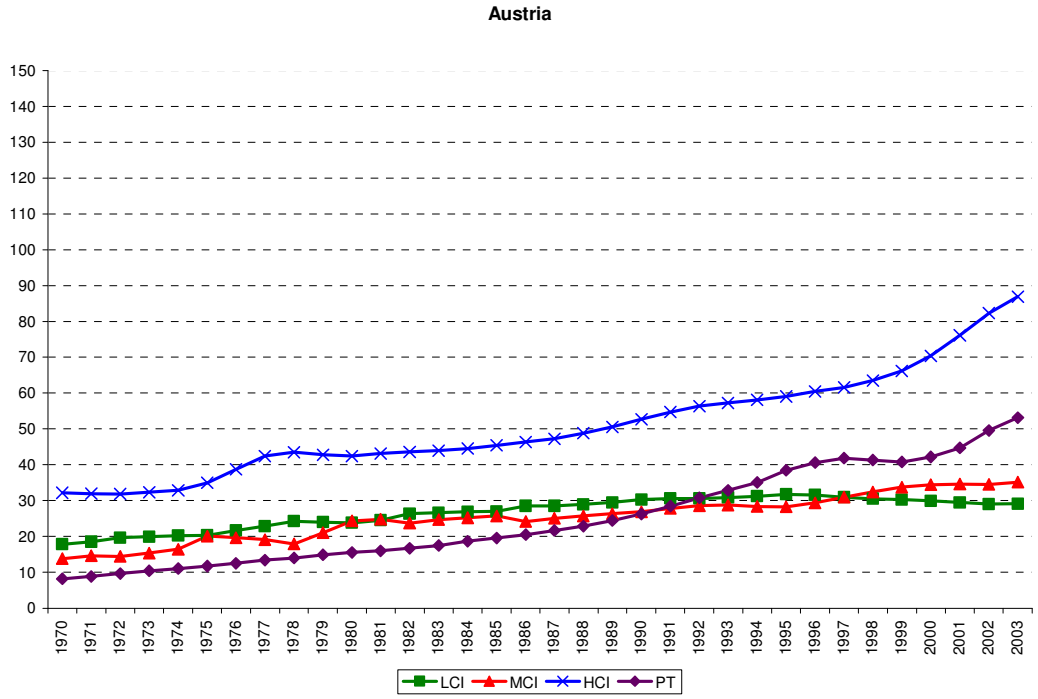
Appendix 2.c (cont.): Comparison of labour productivity in selected sectors with different capital intensive sectors: Inland Transport

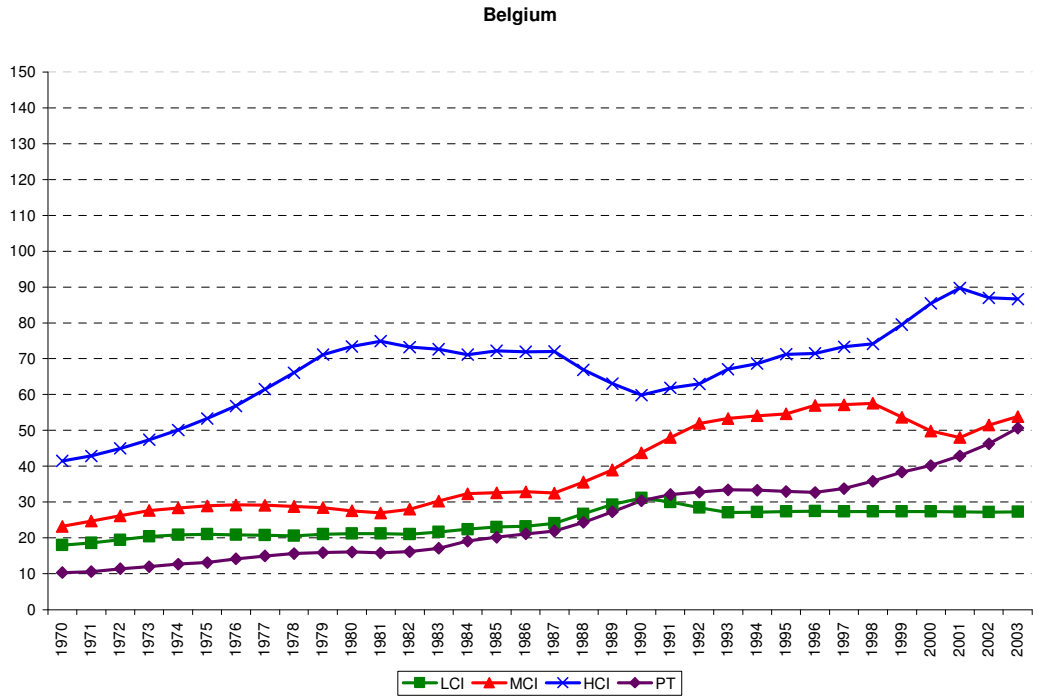




Note: Labour productivity is gross value added at constant prices per hour worked in national currencies with 1995 prices. The figures are three year averages.
Source: Authors' calculations based on EUKLEMS (2007).

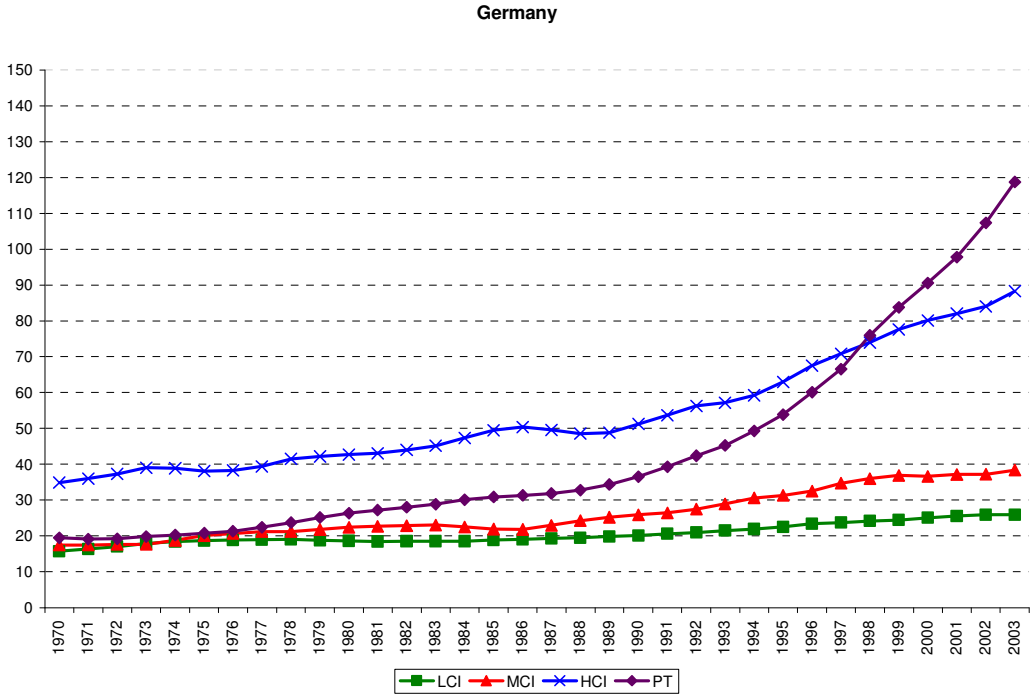
Appendix 2.d (cont.): Comparison of labour productivity in selected sectors with different capital intensive sectors: Post and Telecommunication

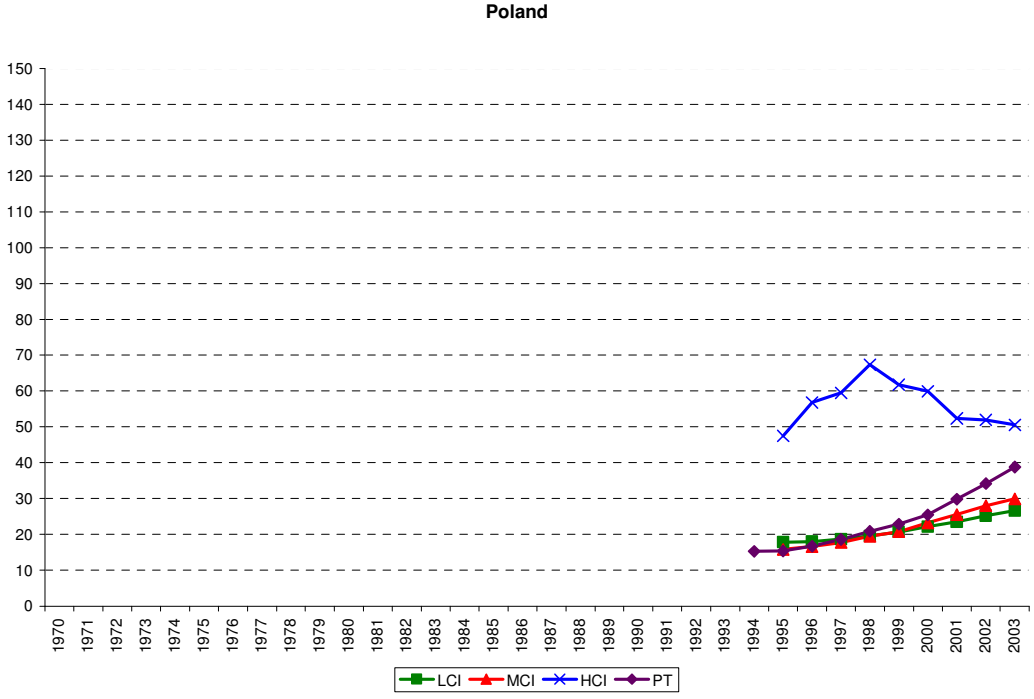




Note: Labour productivity is gross value added at constant prices per hour worked in national currencies with 1995 prices. The figures are three year averages.
Source: Authors' calculations based on EUKLEMS (2007).

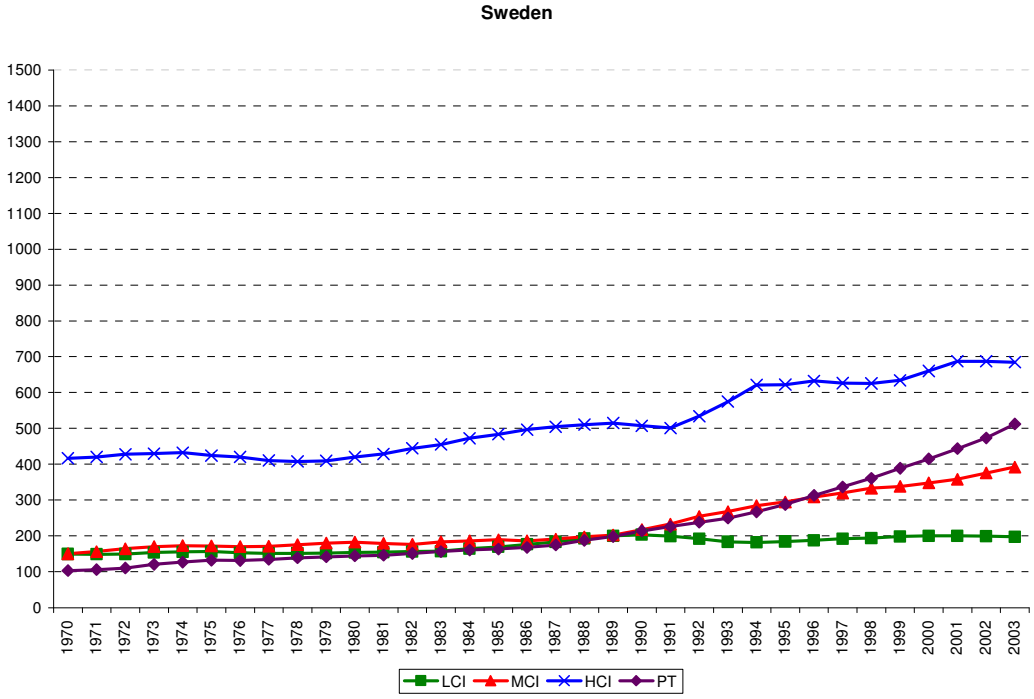
Appendix 2.d (cont.): Comparison of labour productivity in selected sectors with different capital intensive sectors: Post and Telecommunication

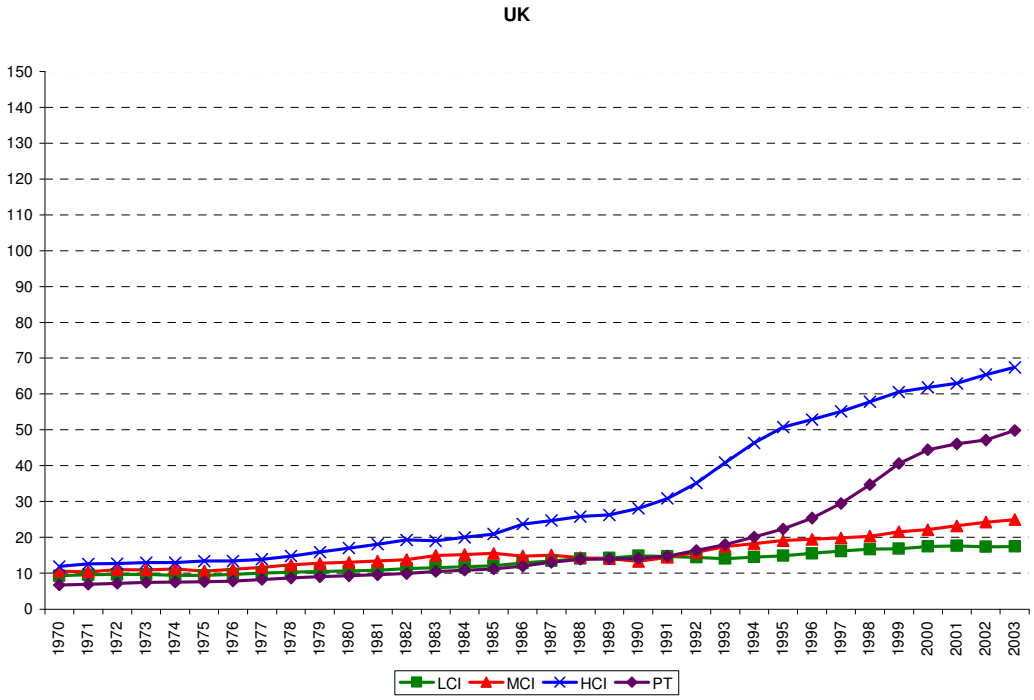




Note: Labour productivity is gross value added at constant prices per hour worked in national currencies with 1995 prices. The figures are three year averages.
Source: Authors' calculations based on EUKLEMS (2007).

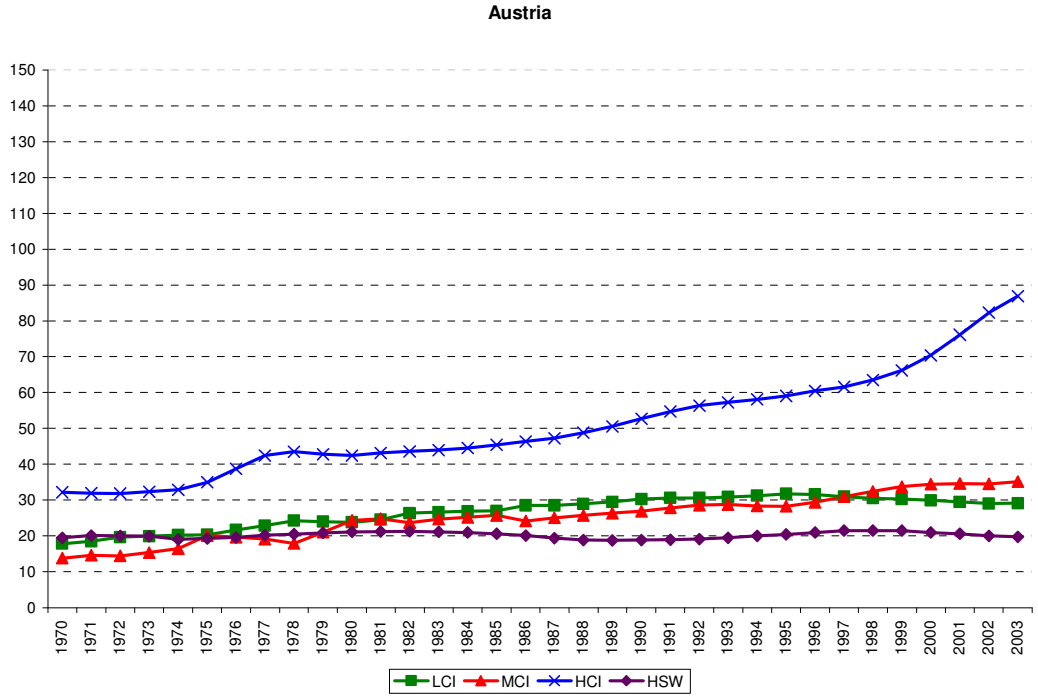
Appendix 2.d (cont.): Comparison of labour productivity in selected sectors with different capital intensive sectors: Post and Telecommunication

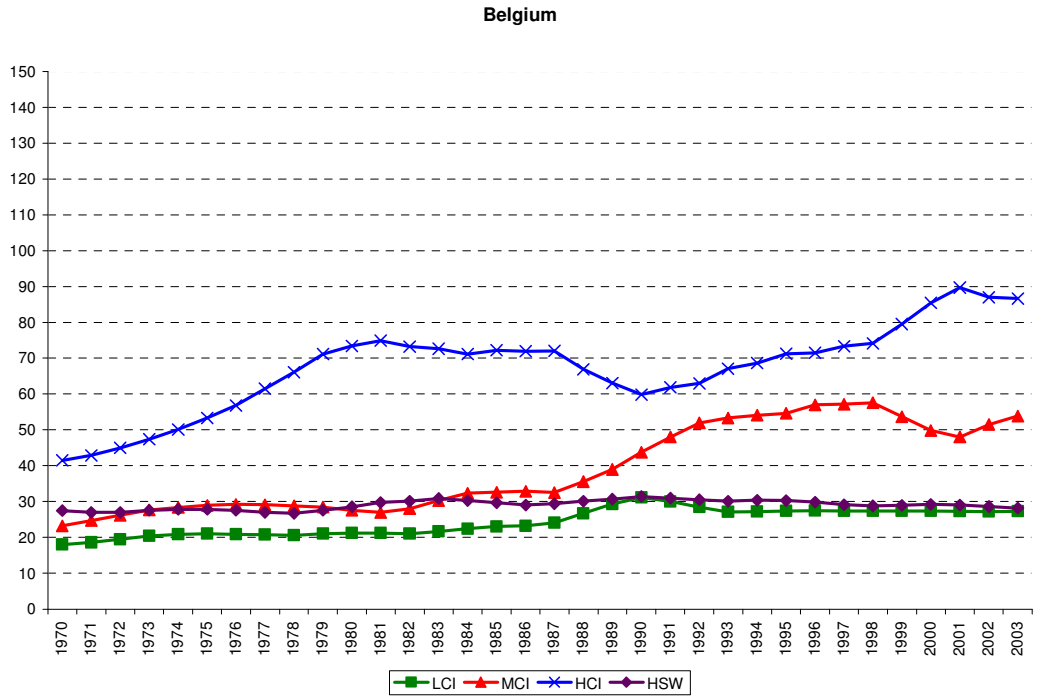




Note: Labour productivity is gross value added at constant prices per hour worked in national currencies with 1995 prices. The figures are three year averages.
Source: Authors' calculations based on EUKLEMS (2007).

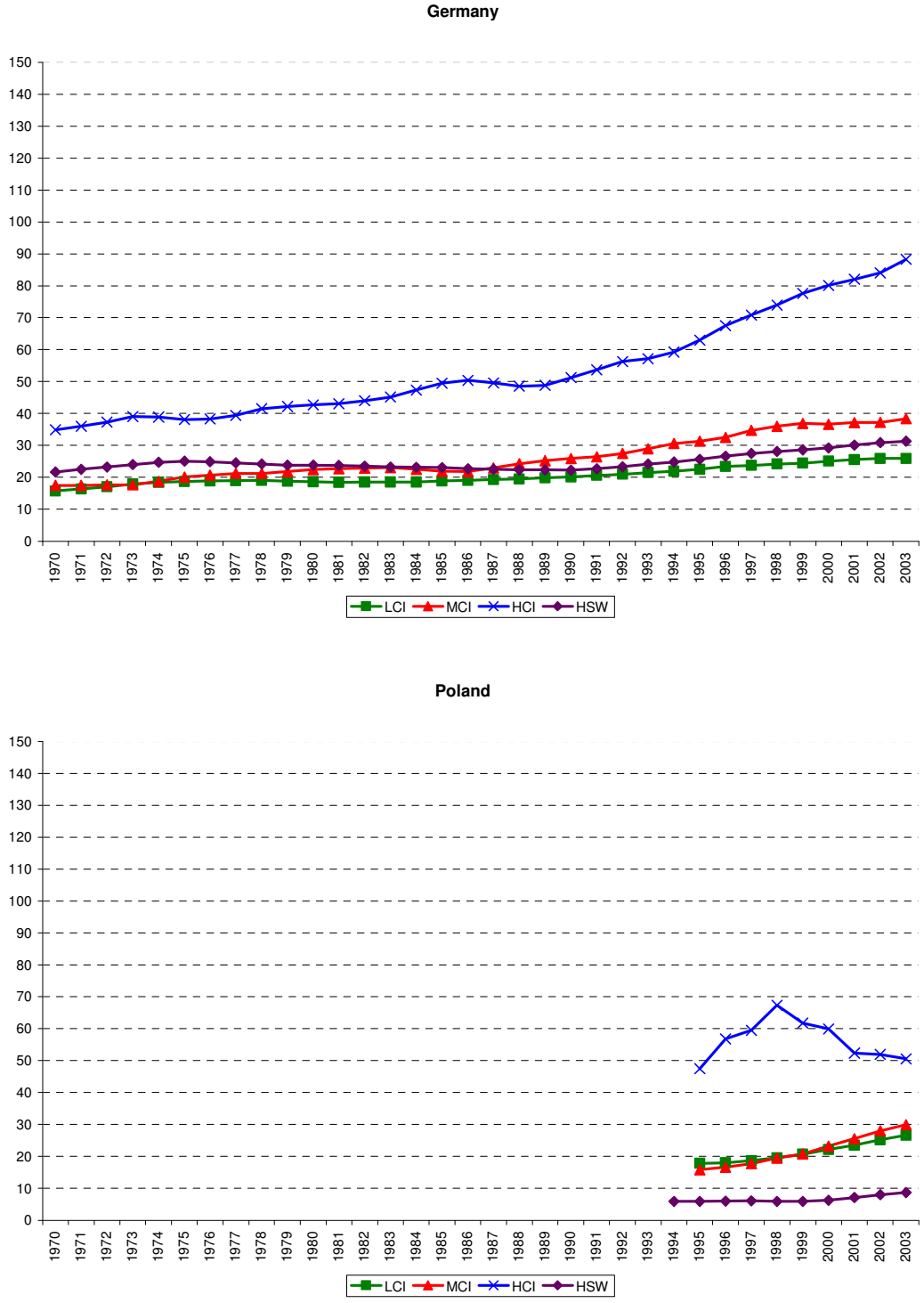
Appendix 2.d (cont.): Comparison of labour productivity in selected sectors with different capital intensive sectors: Health and social Work





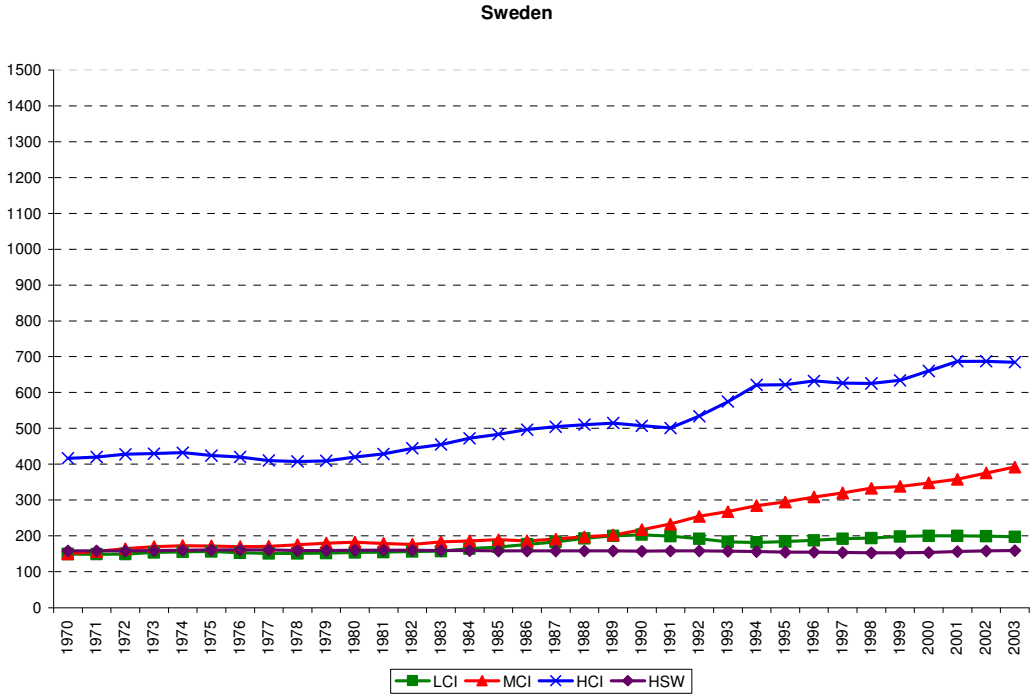
Note: Labour productivity is gross value added at constant prices per hour worked in national currencies with 1995 prices. The figures are three year averages.
Source: Authors' calculations based on EUKLEMS (2007).

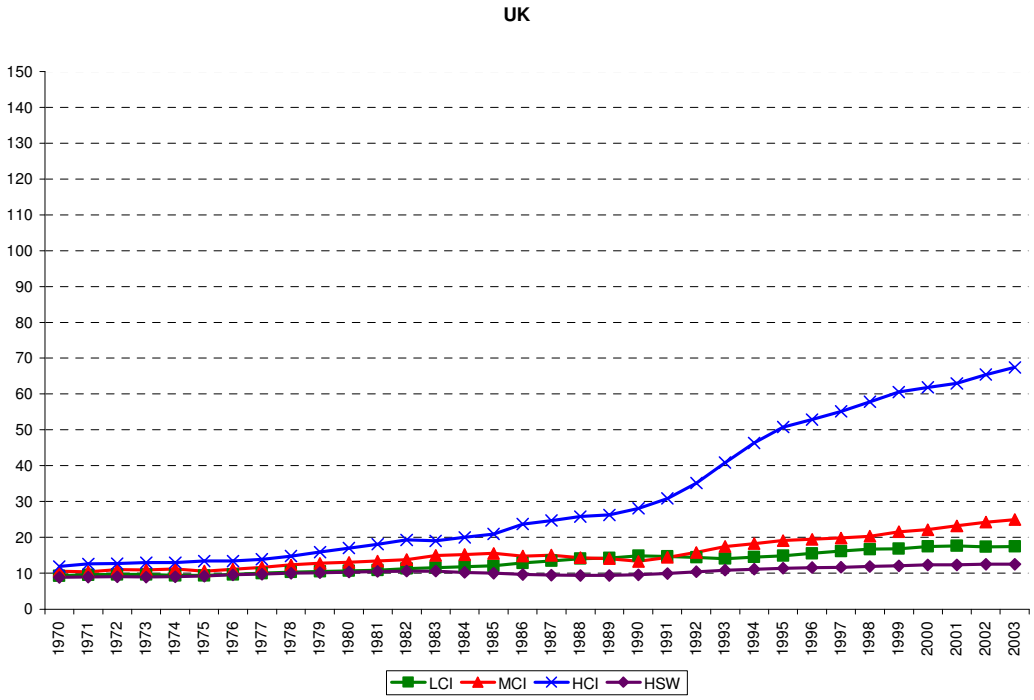
Appendix 2.d (cont.): Comparison of labour productivity in selected sectors with different capital intensive sectors: Health and social Work



Note: Labour productivity is gross value added at constant prices per hour worked in national currencies with 1995 prices. The figures are three year averages.
Source: Authors' calculations based on EUKLEMS (2007).

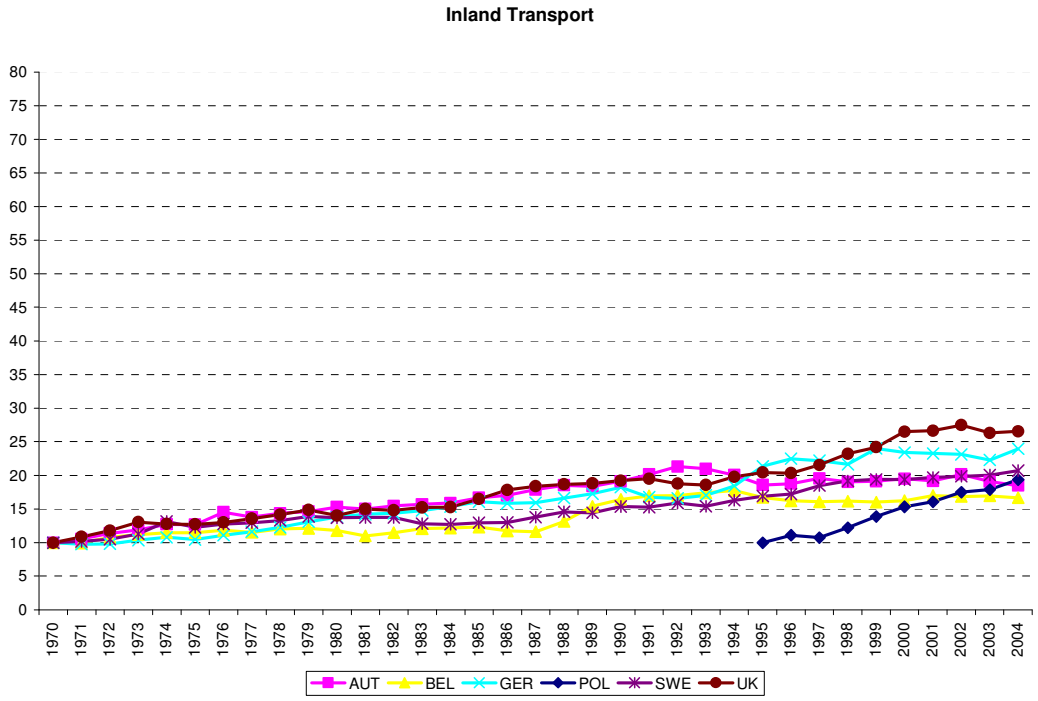
Appendix 2.d (cont.): Comparison of labour productivity in selected sectors with different capital intensive sectors: Health and social Work

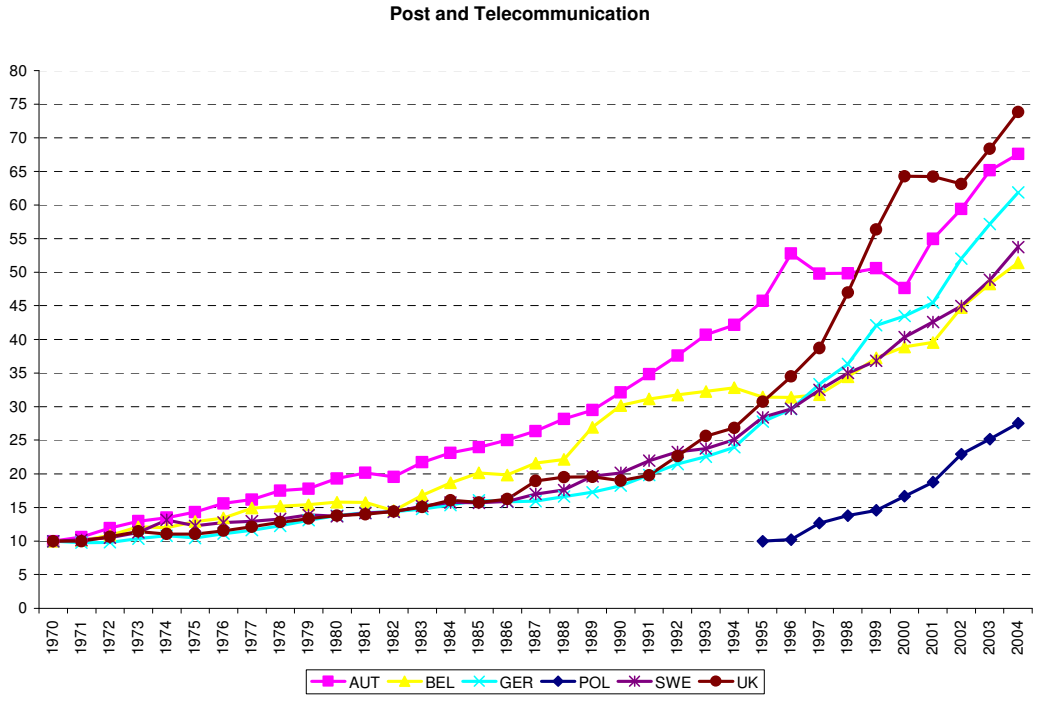




Note: Labour productivity is gross value added at constant prices per hour worked in national currencies with 1995 prices. The figures are three year averages.
Source: Authors' calculations based on EUKLEMS (2007).

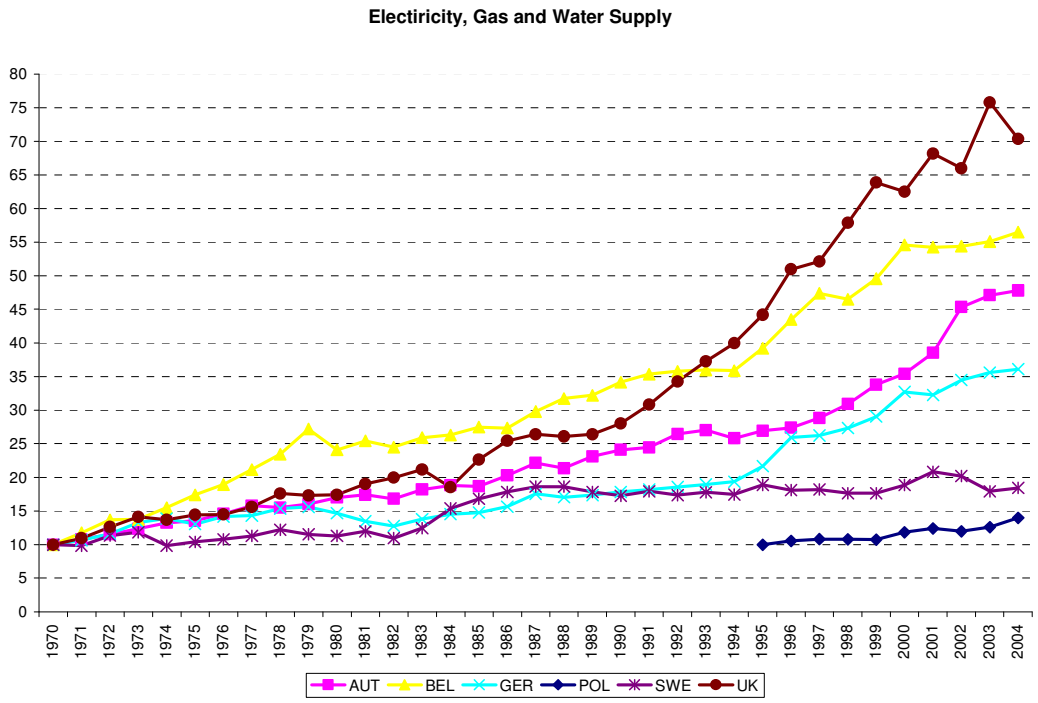
Appendix 3: Labour productivity differentials between countries

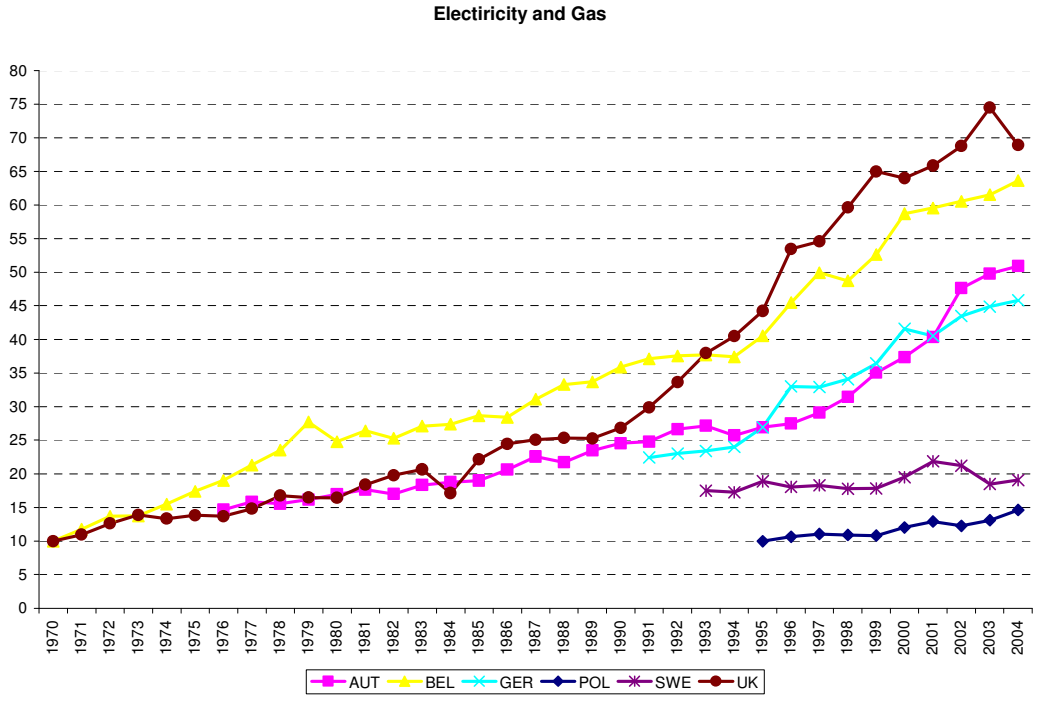




Legend: AUT= Austria, BEL= Belgium, GER=Germany, POL=Poland, SWE=Sweden, UK= The UK.
Source: Authors' calculations based on EUKLEMS (2007).

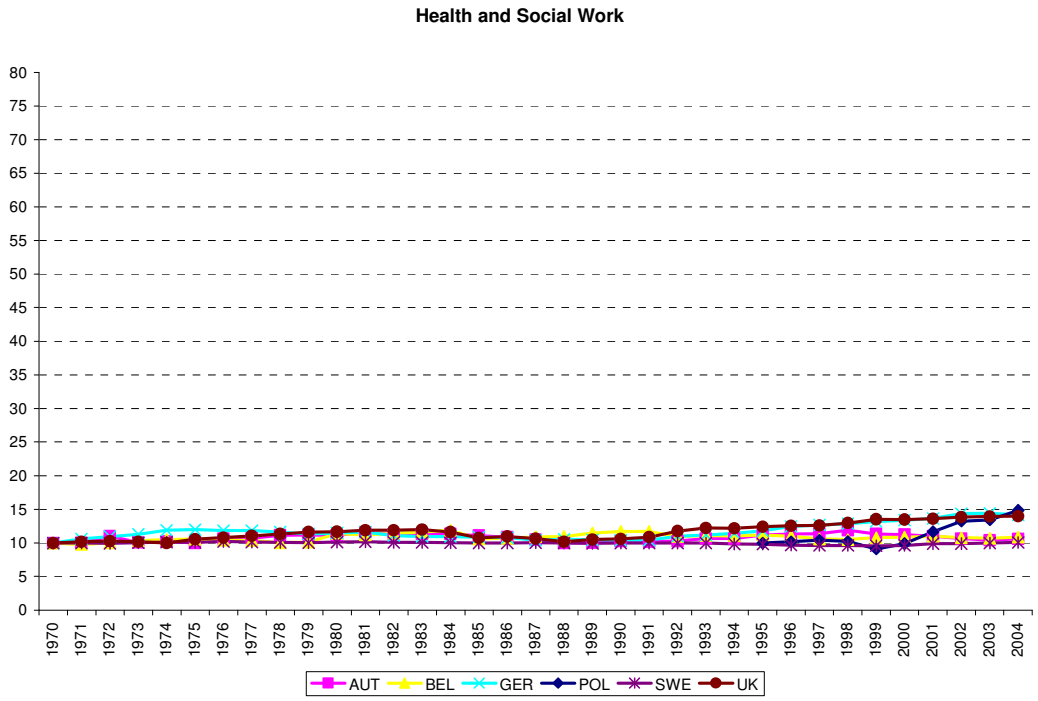
Appendix 3 (cont.): Labour productivity differentials between countries





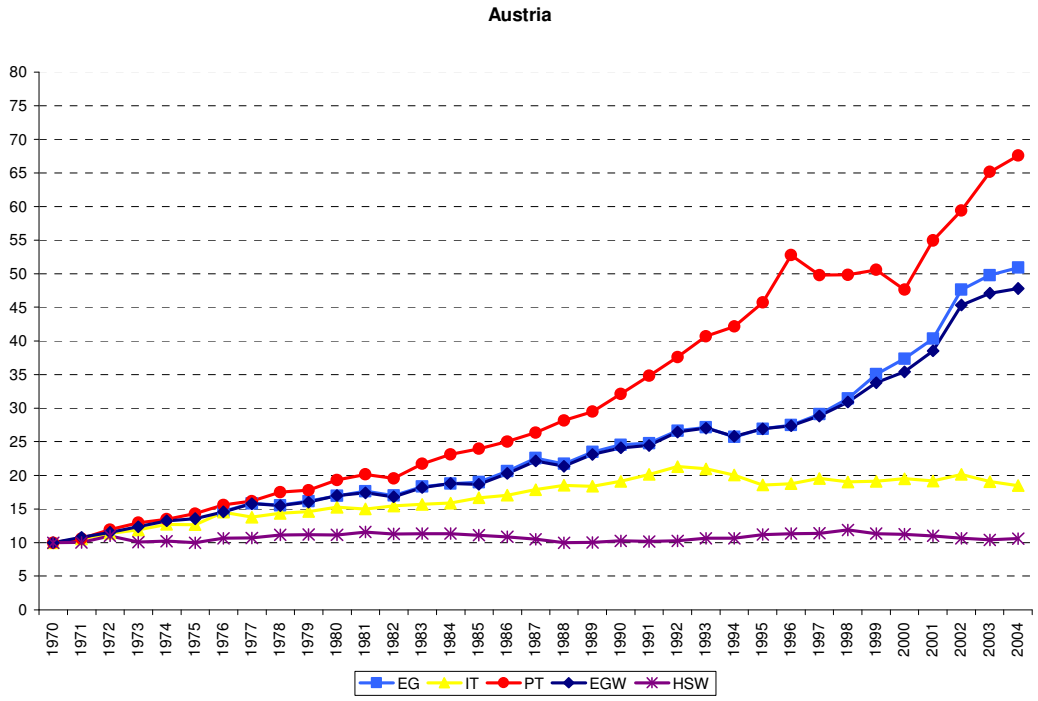
Legend: AUT= Austria, BEL= Belgium, GER=Germany, POL=Poland, SWE=Sweden, UK= The UK.
Source: Authors' calculations based on EUKLEMS (2007).

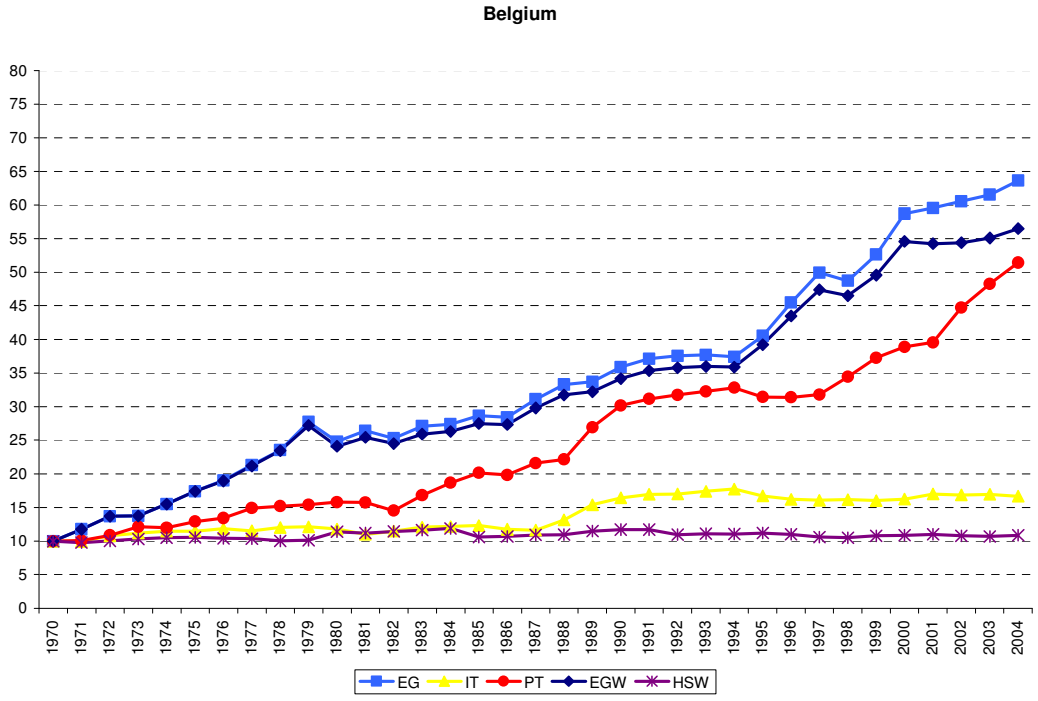
Appendix 3 (cont.): Labour productivity differentials between countries



Legend: AUT= Austria, BEL= Belgium, GER=Germany, POL=Poland, SWE=Sweden, UK= The UK.
Source: Authors' calculations based on EUKLEMS (2007).

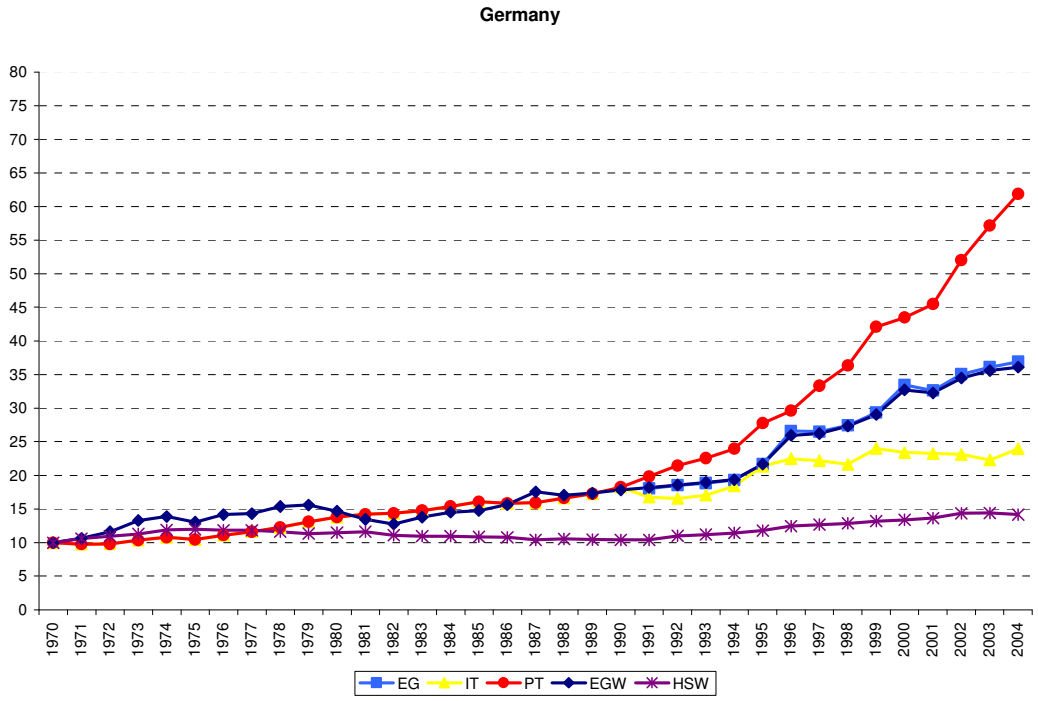
Appendix 4: Labour productivity by sectors

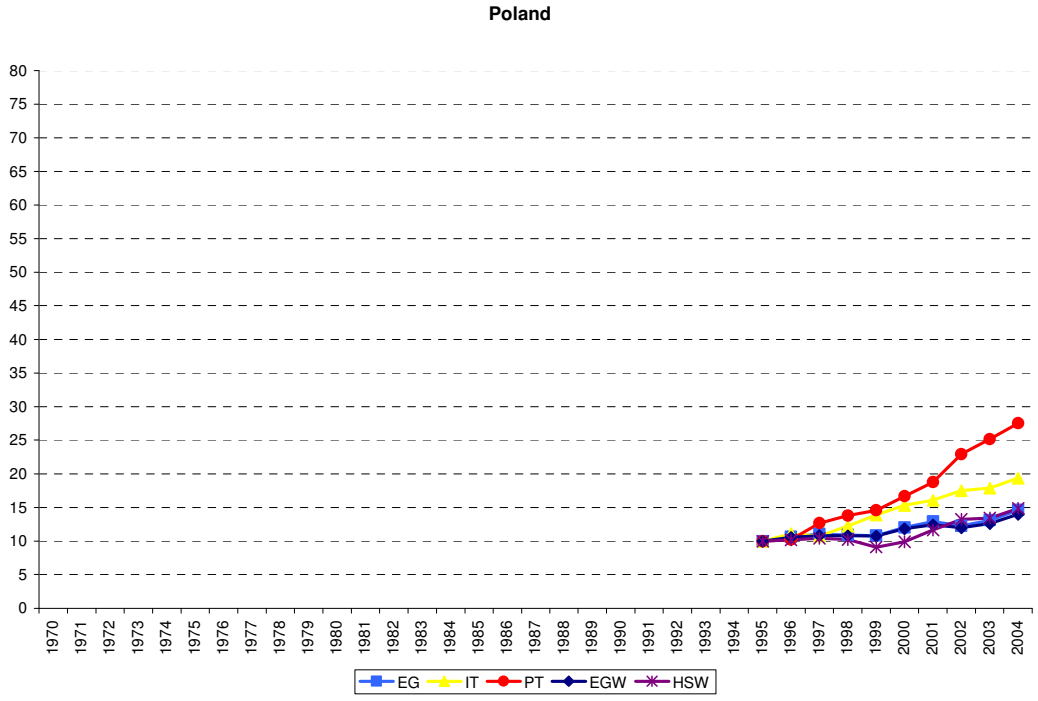




Industries: EG= Electricity and Gas, IT= Inland Transport, PT= Post and Telecommunication, EG= Electricity, Gas and Water Supply, NSW= Health and Social Work.
Source: Authors' calculations based on EUKLEMS (2007).

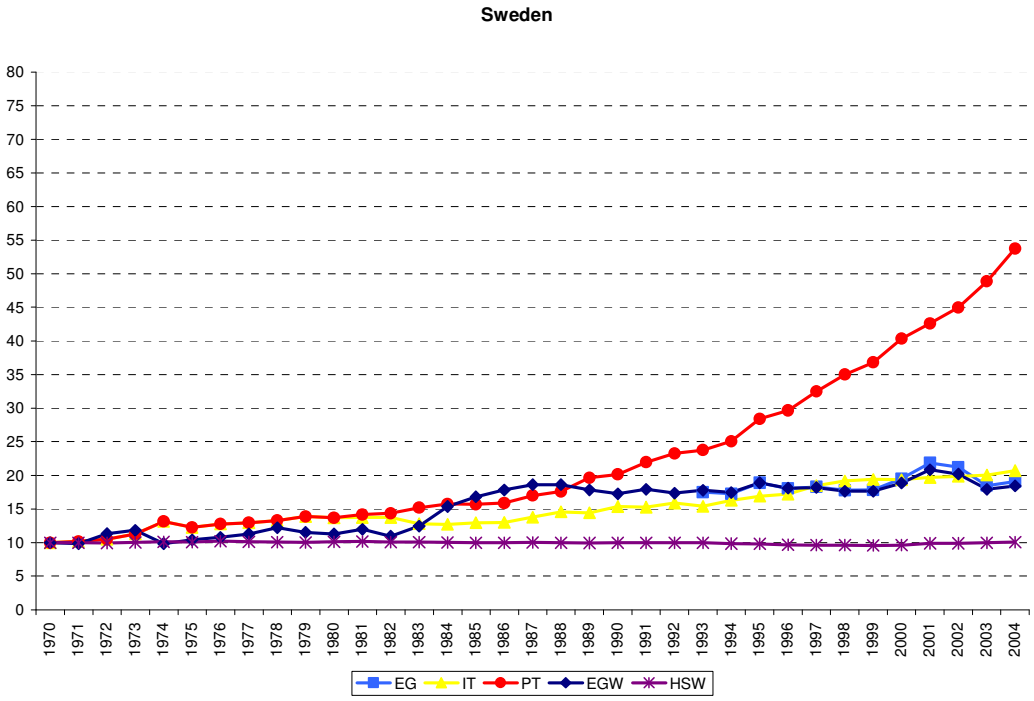
Appendix 4 (cont.): Labour productivity by sectors

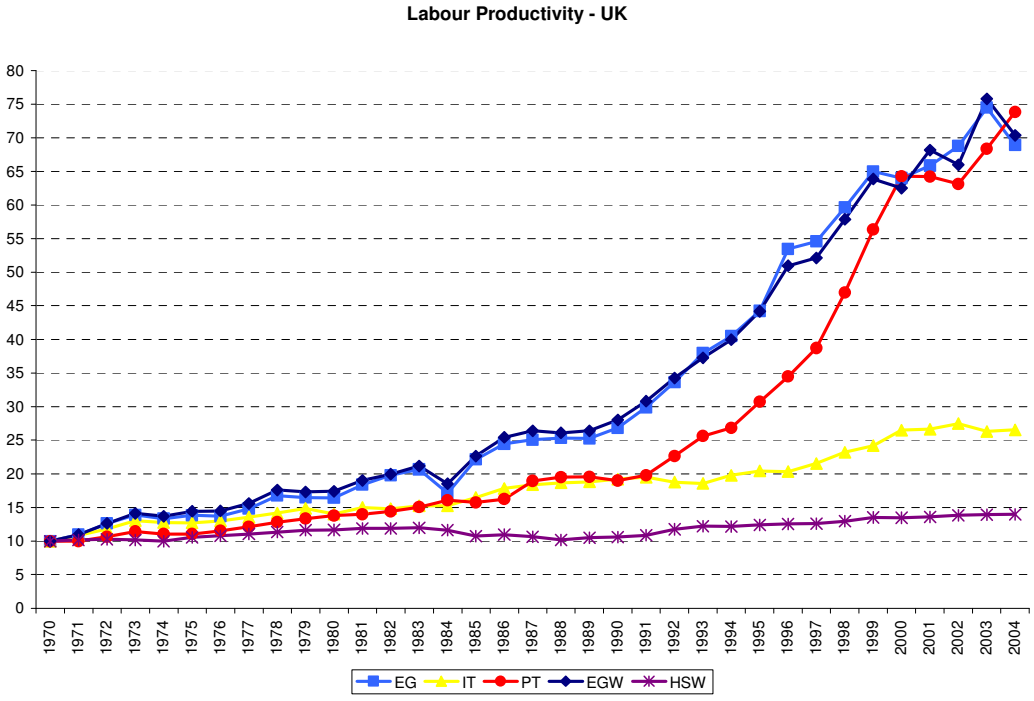




Industries: EG= Electricity and Gas, IT= Inland Transport, PT= Post and Telecommunication, EG= Electricity, Gas and Water Supply, NSW= Health and Social Work.
Source: Authors' calculations based on EUKLEMS (2007).

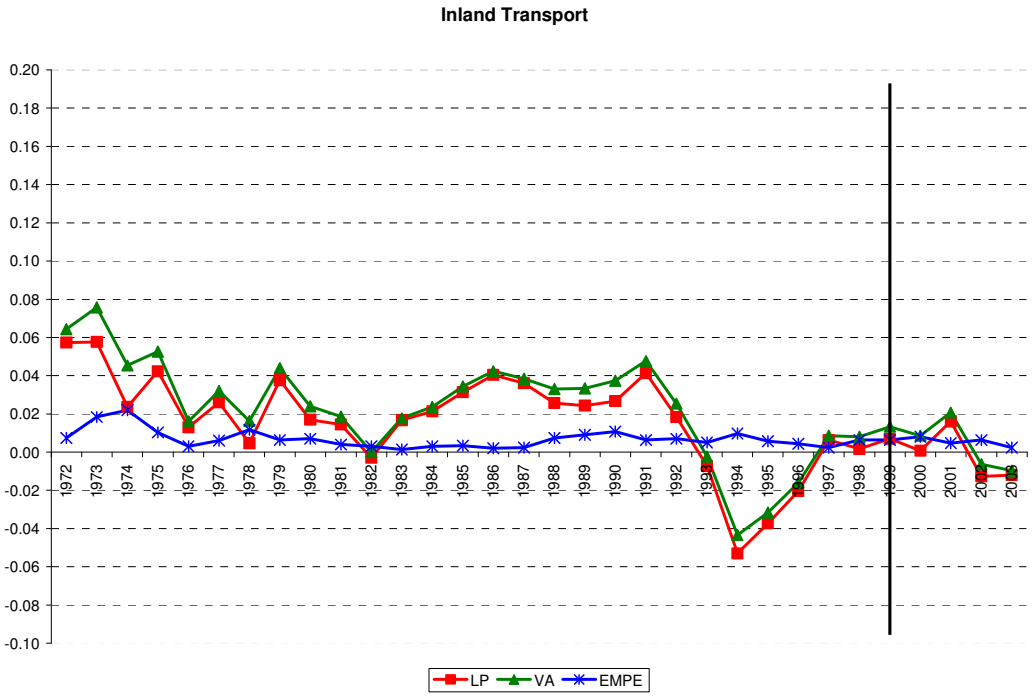
Appendix 4 (cont.): Labour productivity by sectors

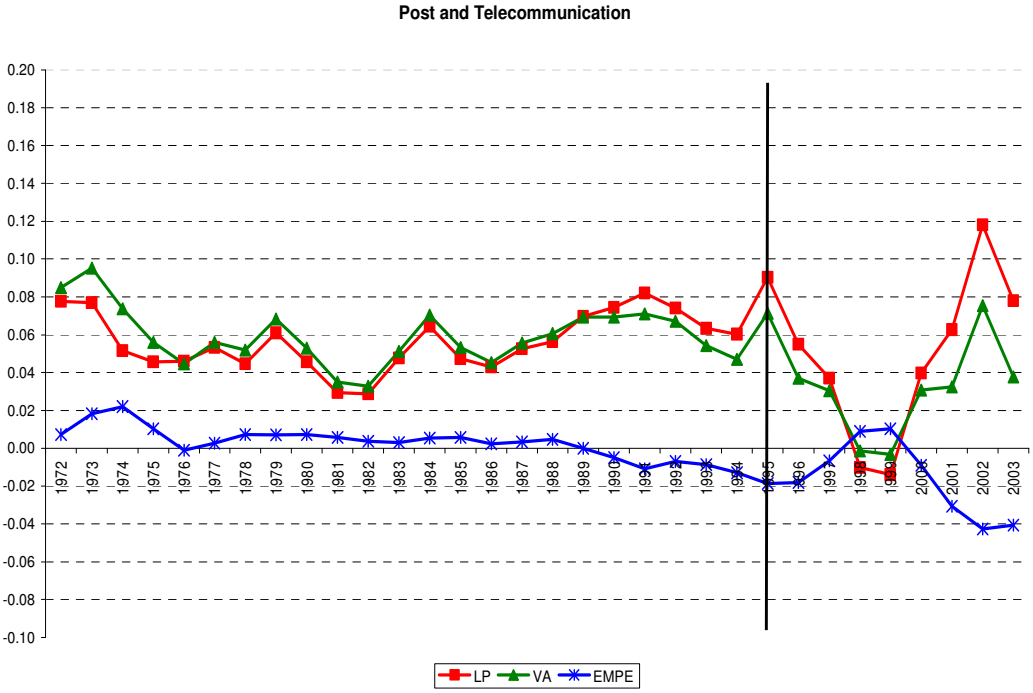




Industries: EG= Electricity and Gas, IT= Inland Transport, PT= Post and Telecommunication, EG= Electricity, Gas and Water Supply, NSW= Health and Social Work.
Source: Authors' calculations based on EUKLEMS (2007).

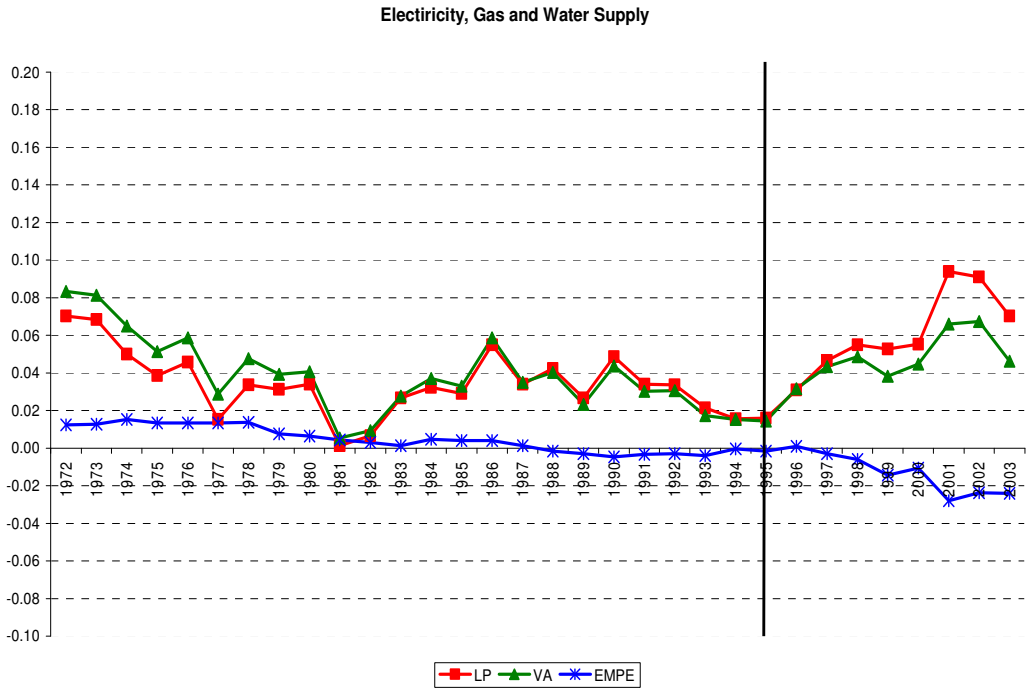
Appendix 6: Labour productivity decomposition, Austria.

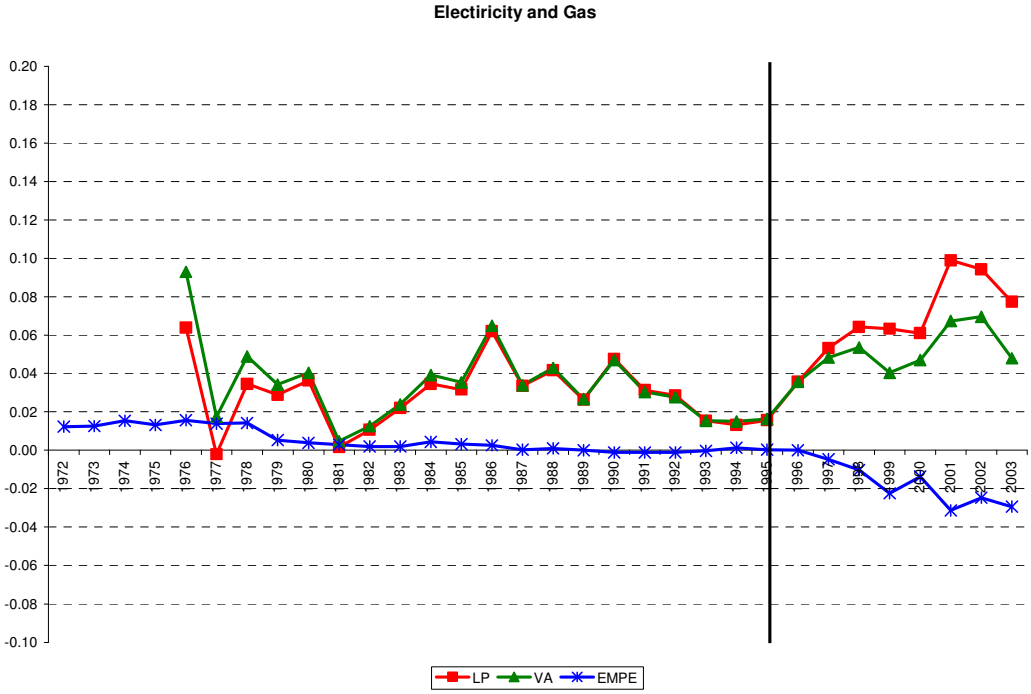




Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

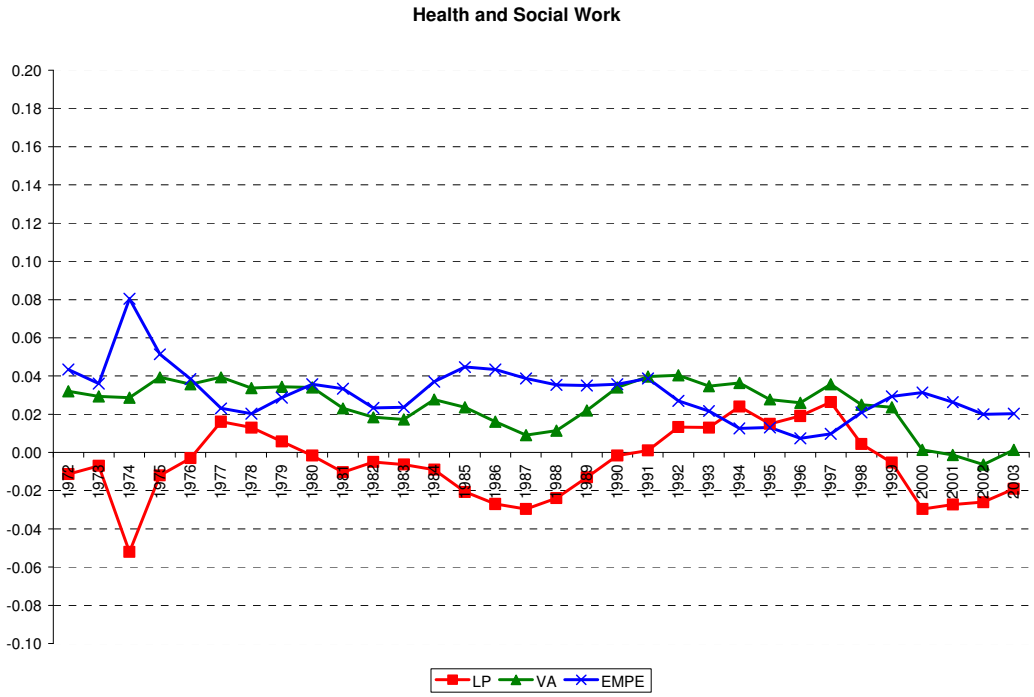
Appendix 5 (cont.): Labour productivity decomposition, Austria.





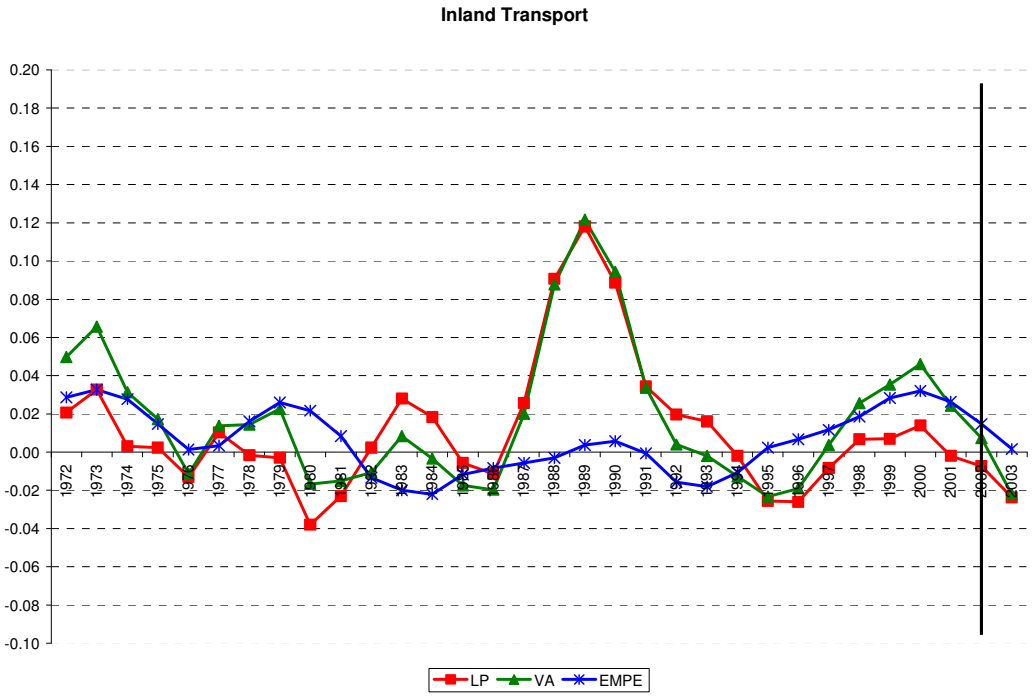
Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

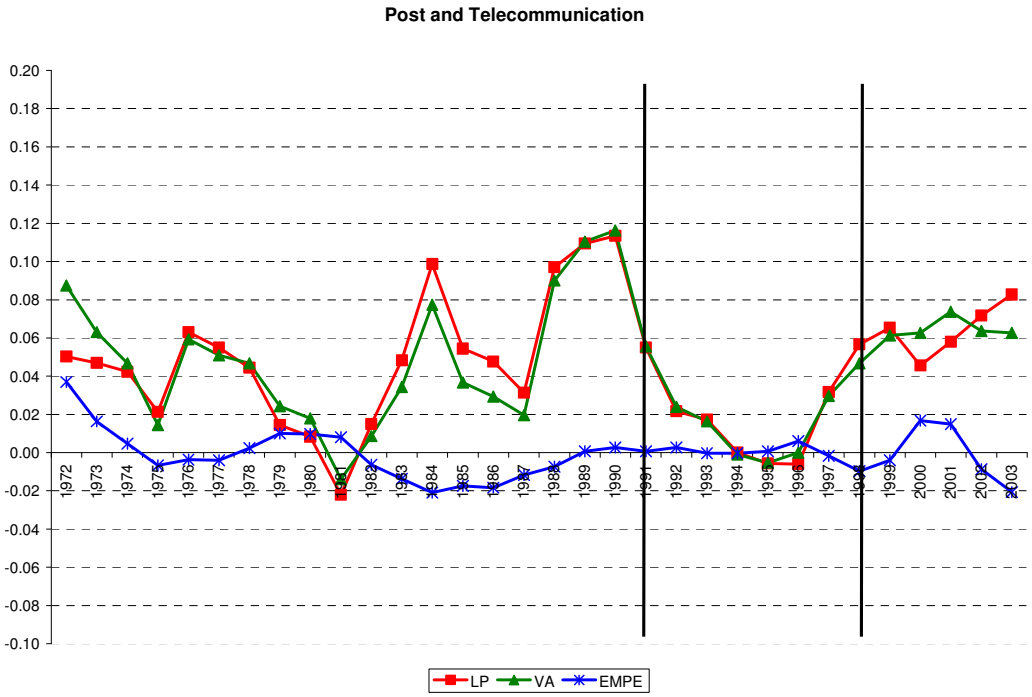
Appendix 5 (cont.): Labour productivity decomposition, Austria.



Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

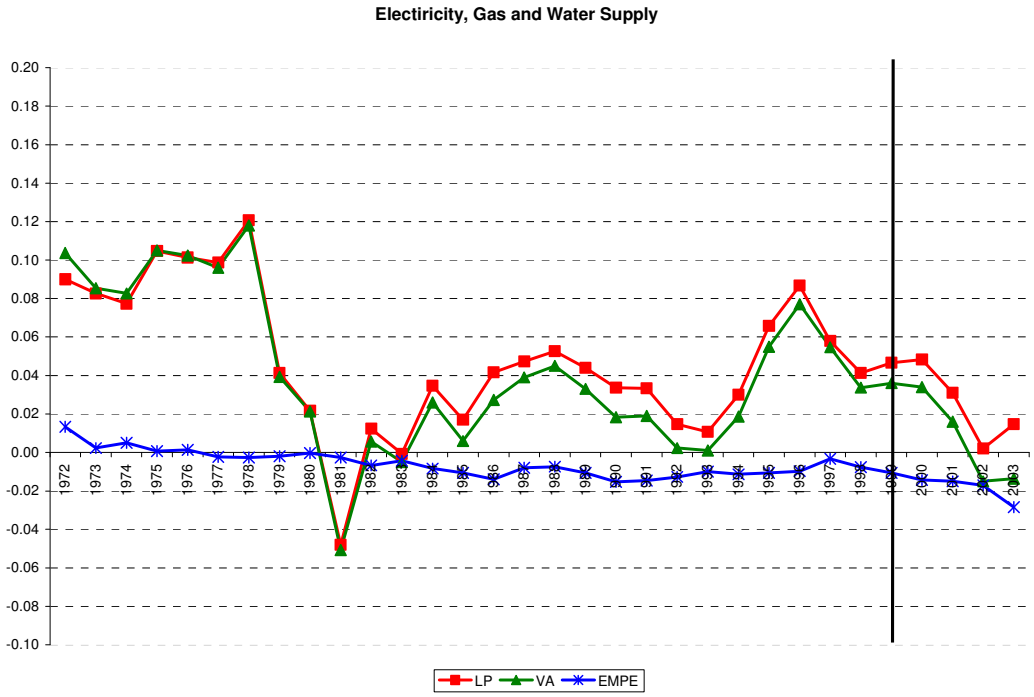
Appendix 6: Labour productivity decomposition, Belgium.

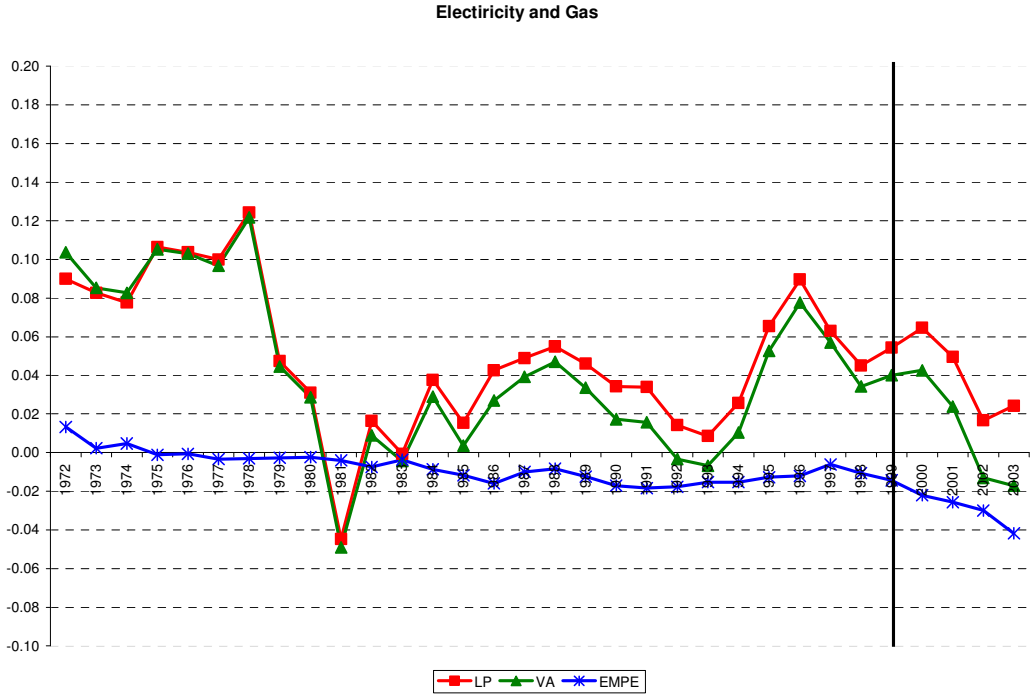




Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

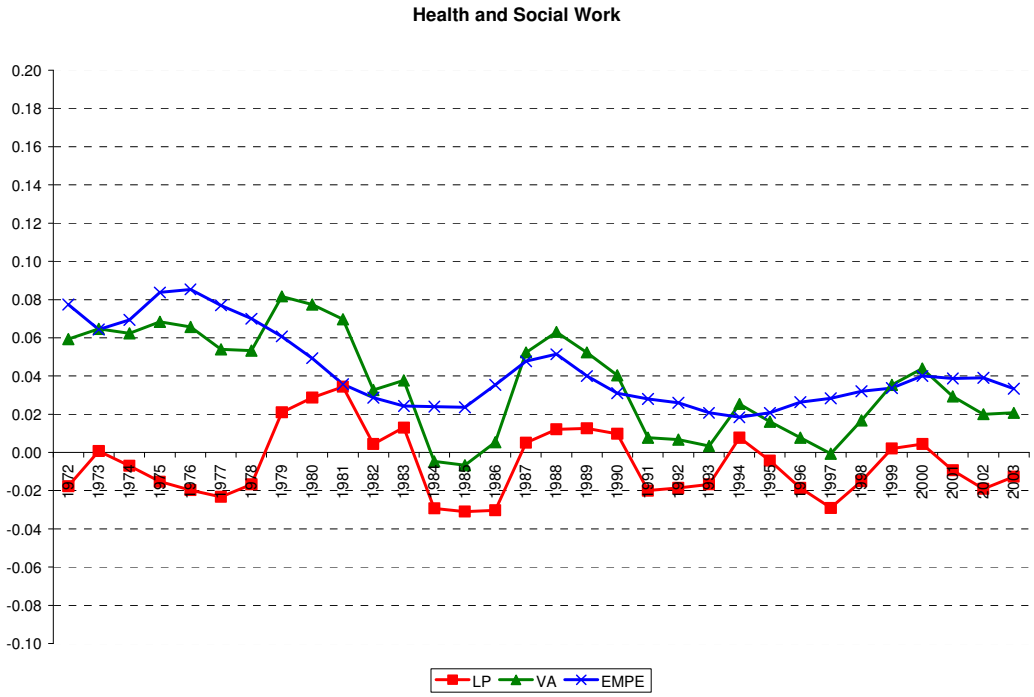
Appendix 5 (cont.): Labour productivity decomposition, Belgium.





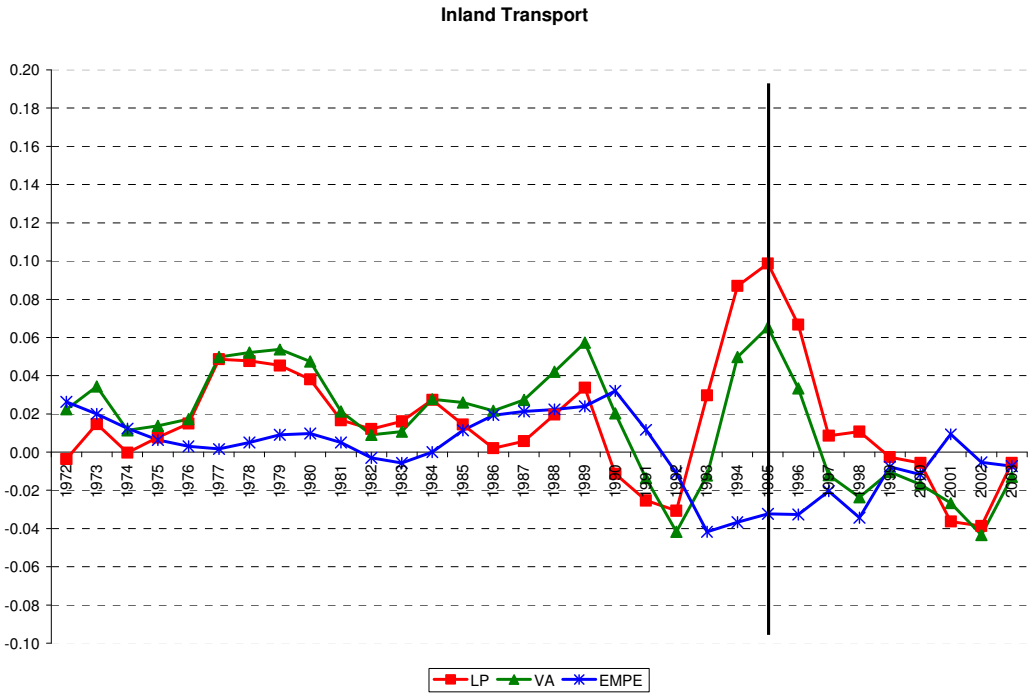
Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

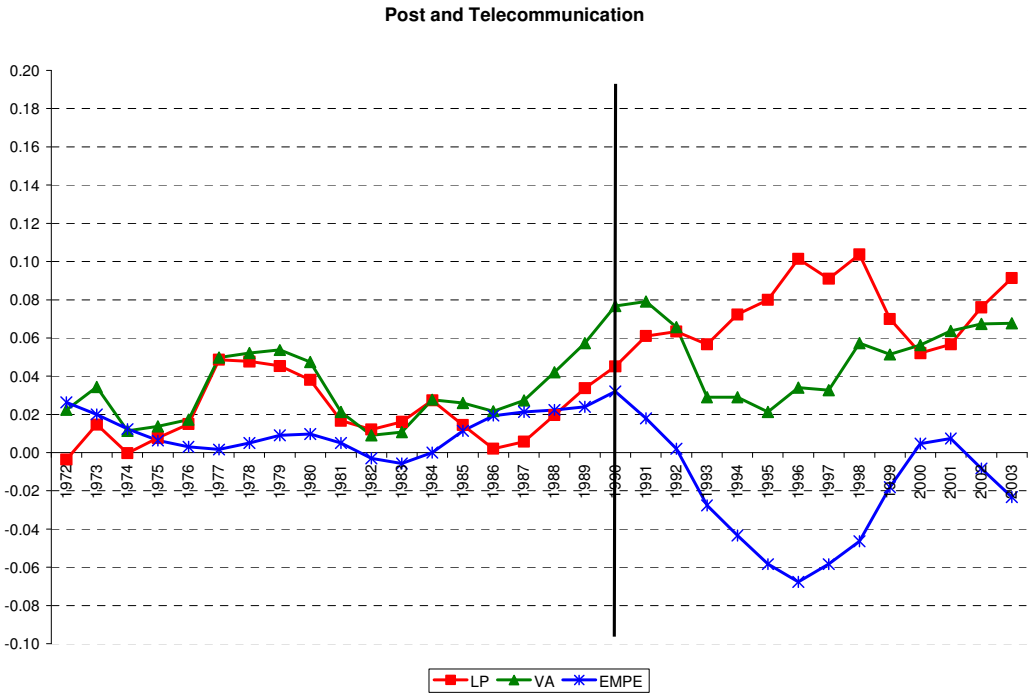
Appendix 5 (cont.): Labour productivity decomposition, Belgium.



Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

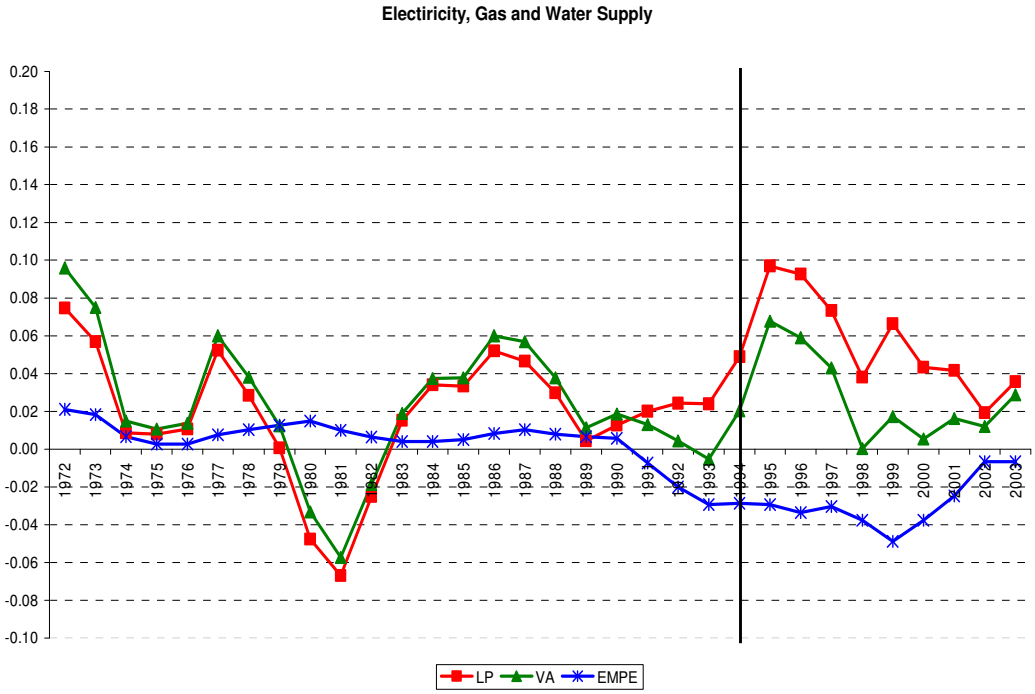
Appendix 6: Labour productivity decomposition, Germany.

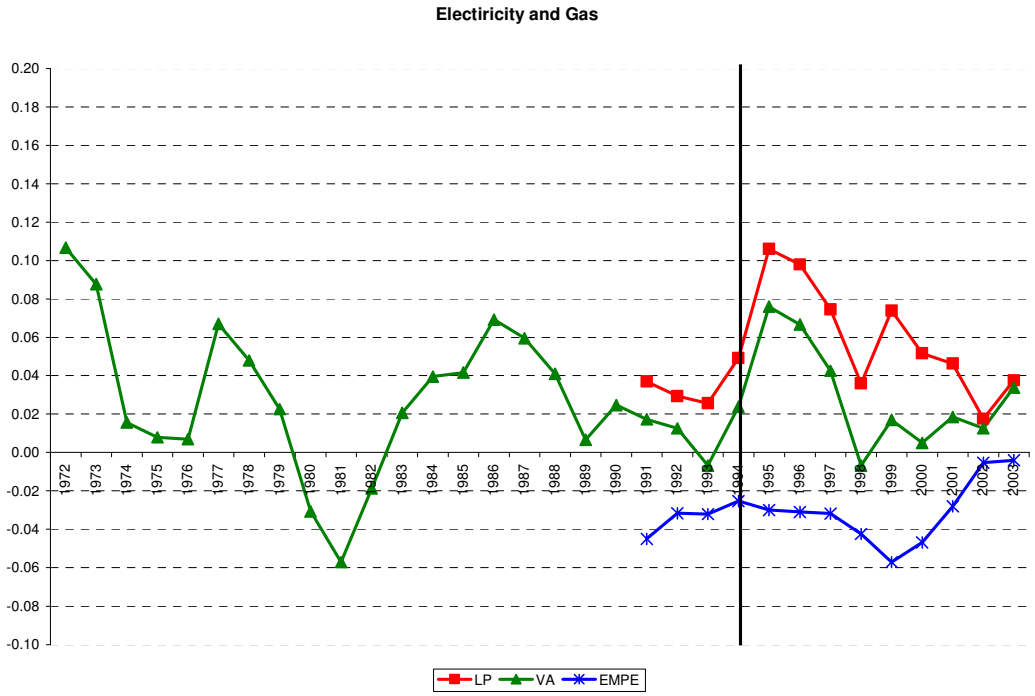




Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

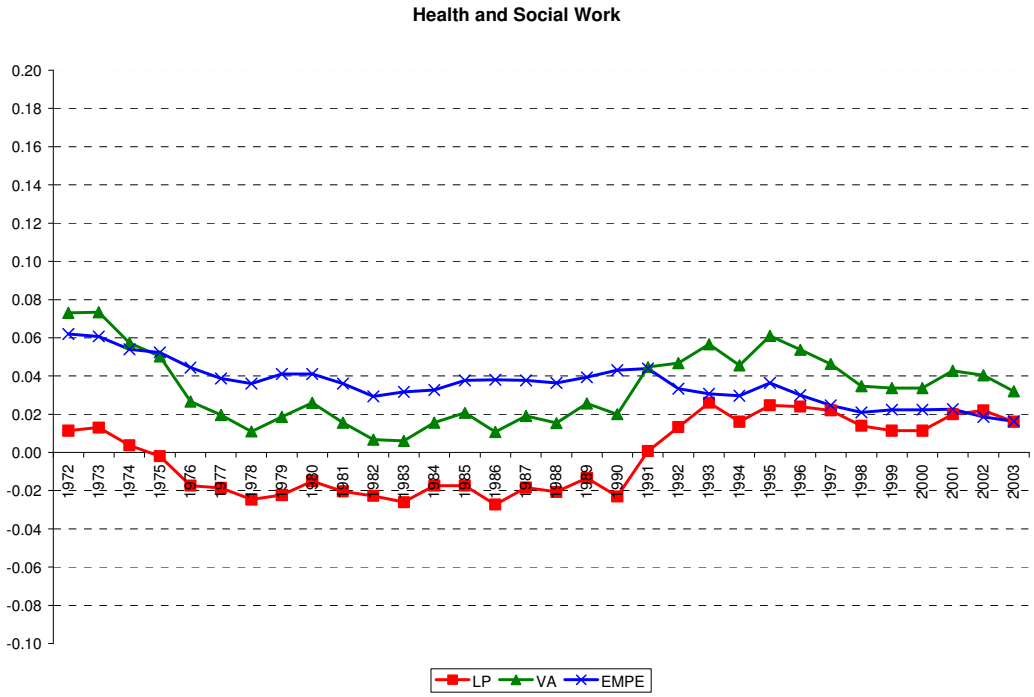
Appendix 5 (cont.): Labour productivity decomposition, Germany.





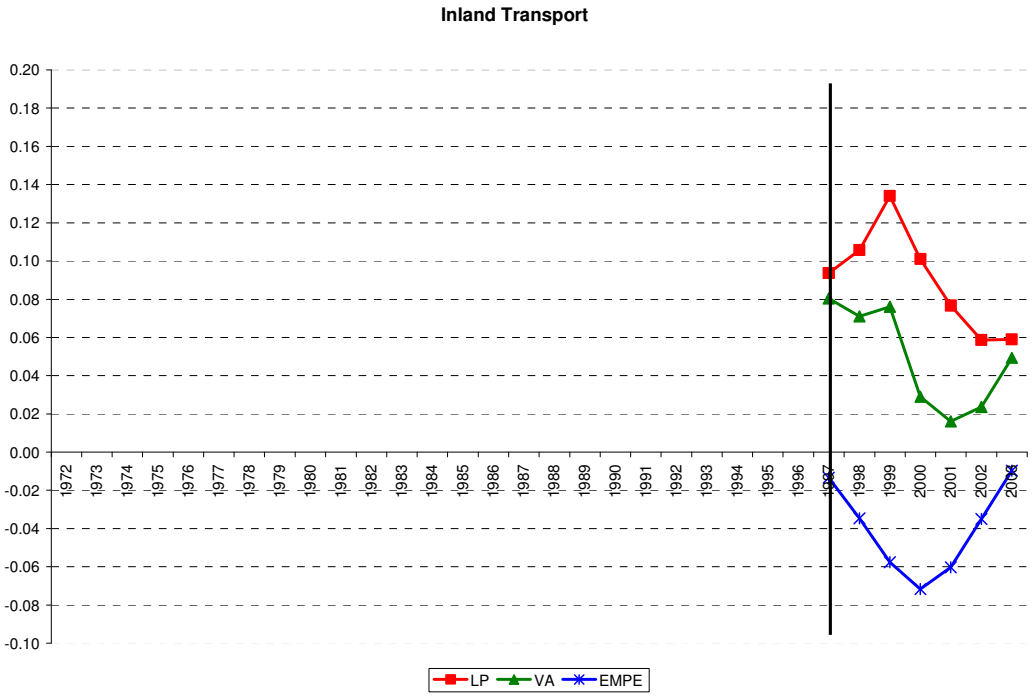
Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

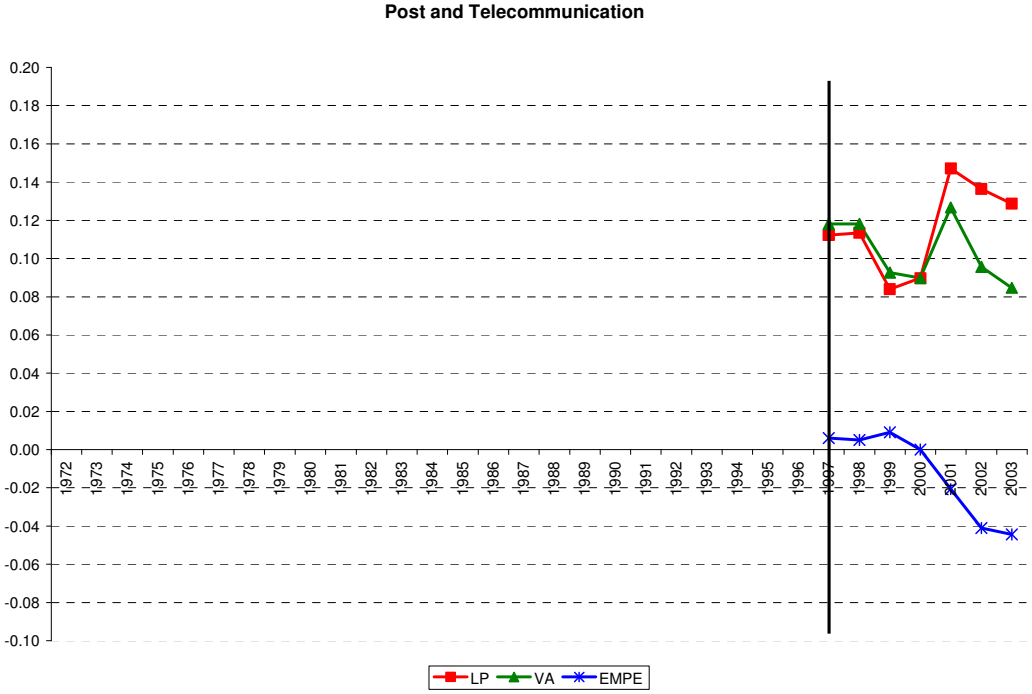
Appendix 5 (cont.): Labour productivity decomposition, Germany.



Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

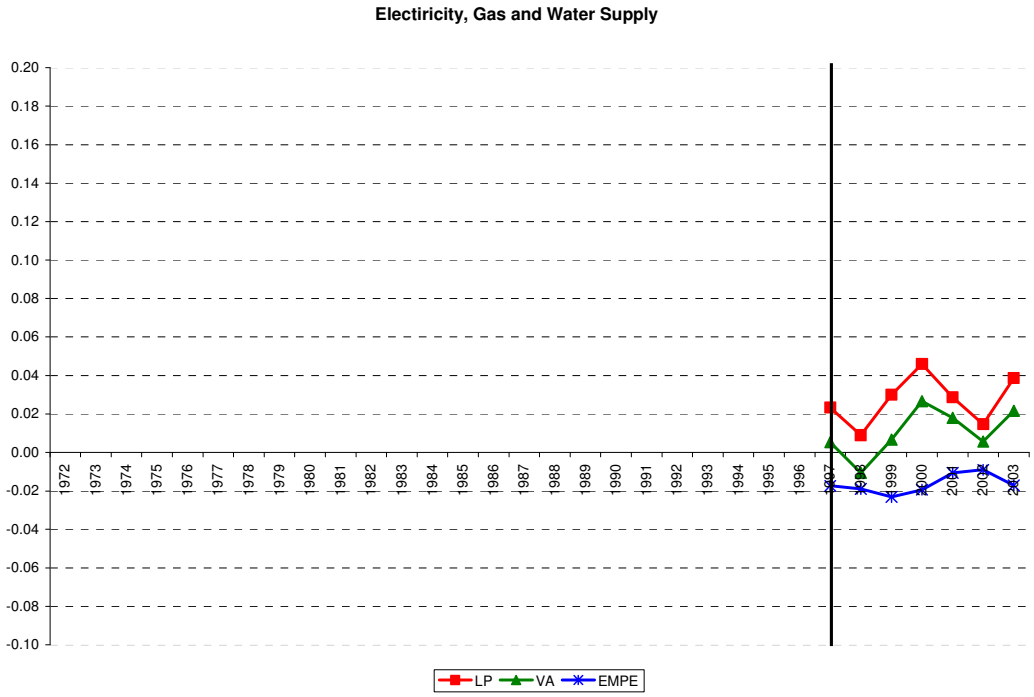
Appendix 6: Labour productivity decomposition, Poland.

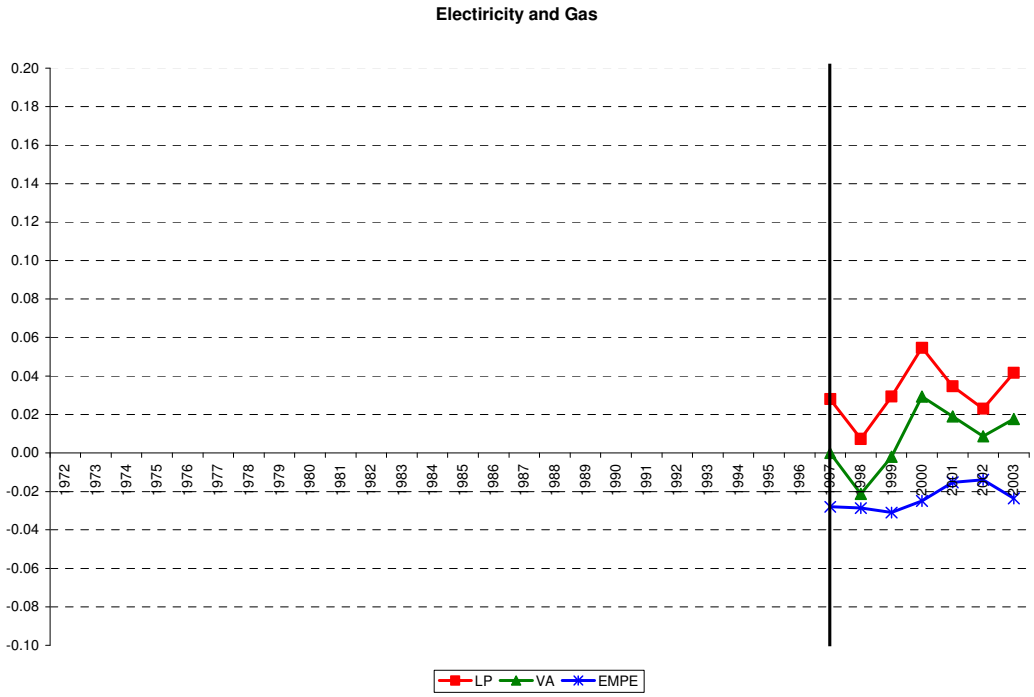




Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

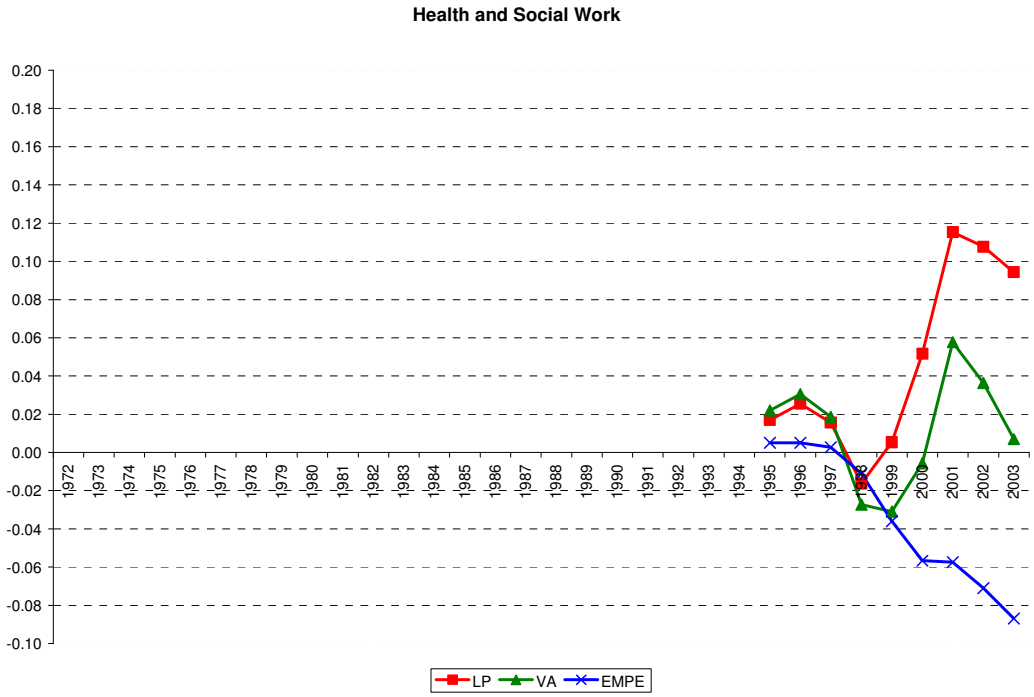
Appendix 6: Labour productivity decomposition, Poland.





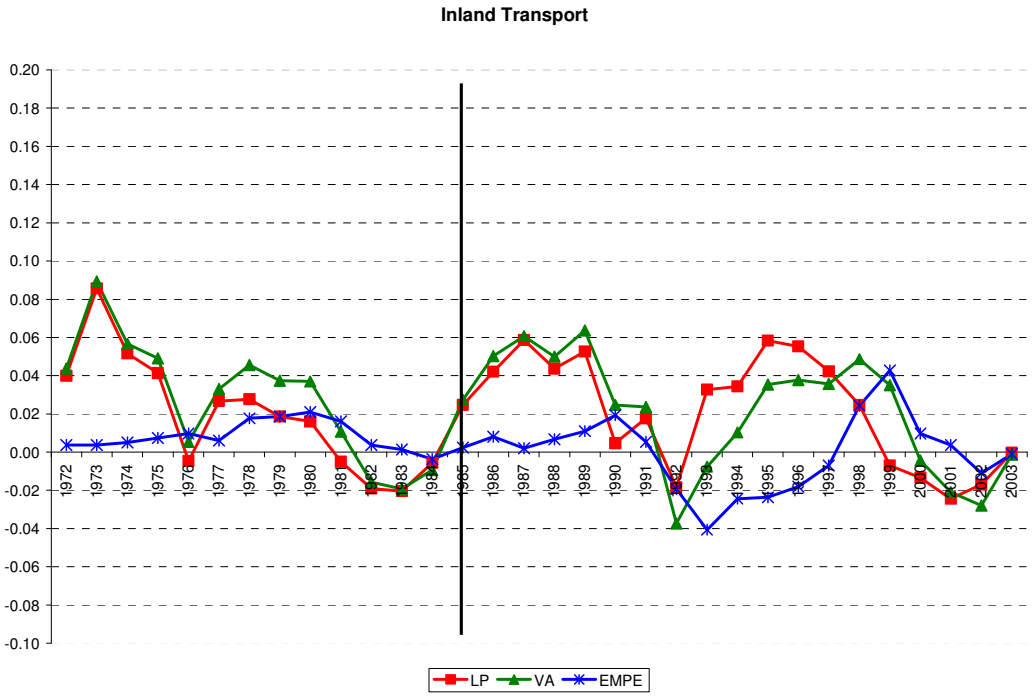
Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

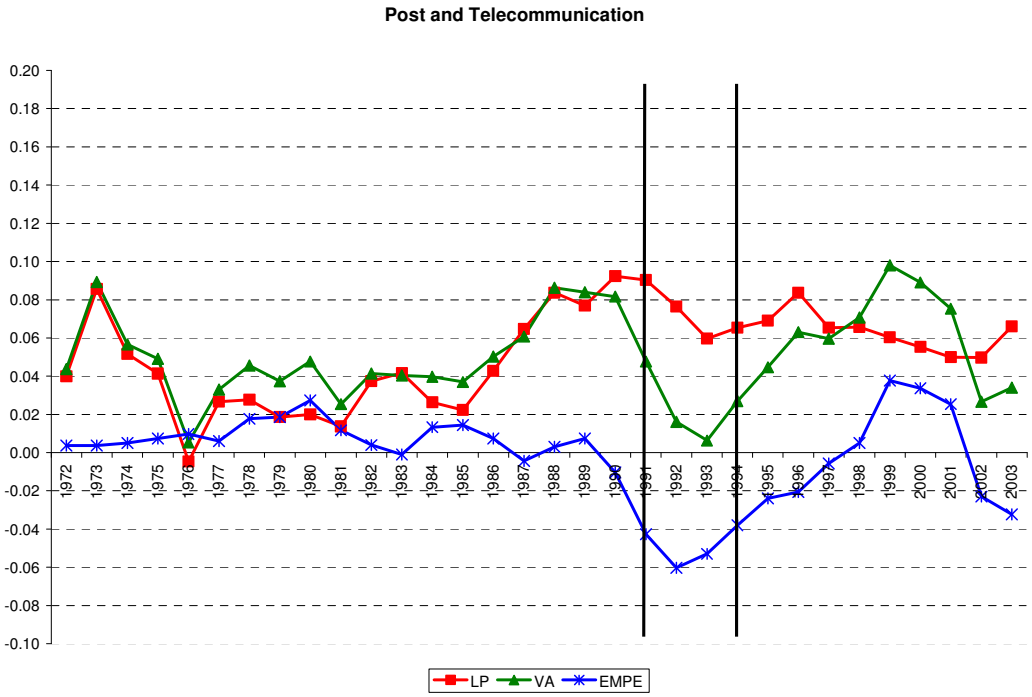
Appendix 5 (cont.): Labour productivity decomposition, Poland.



Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

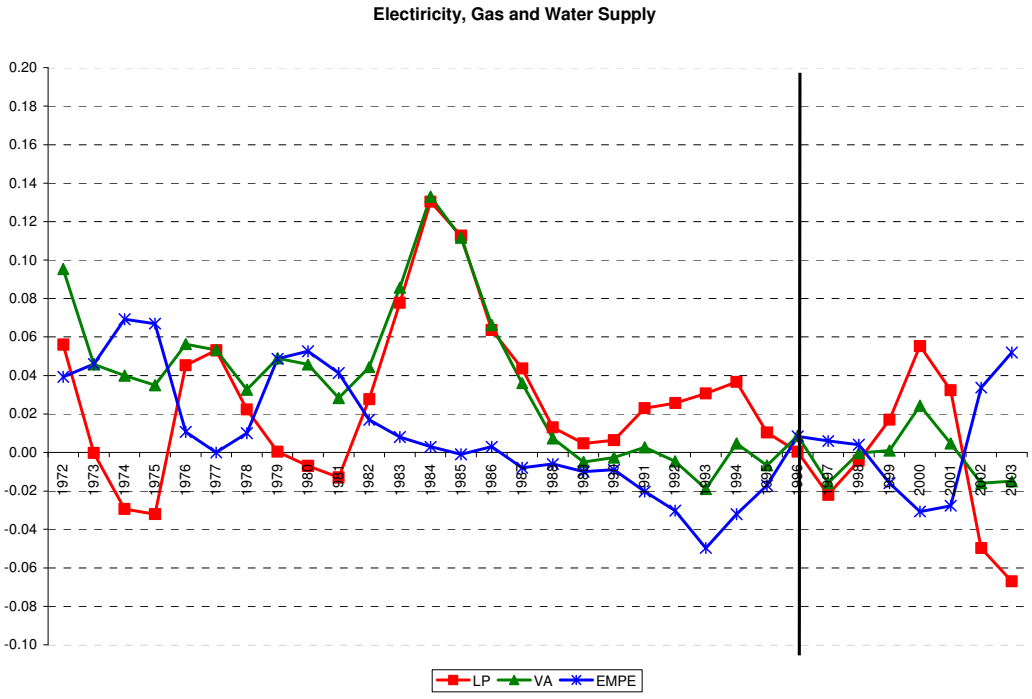
Appendix 6: Labour productivity decomposition, Sweden.

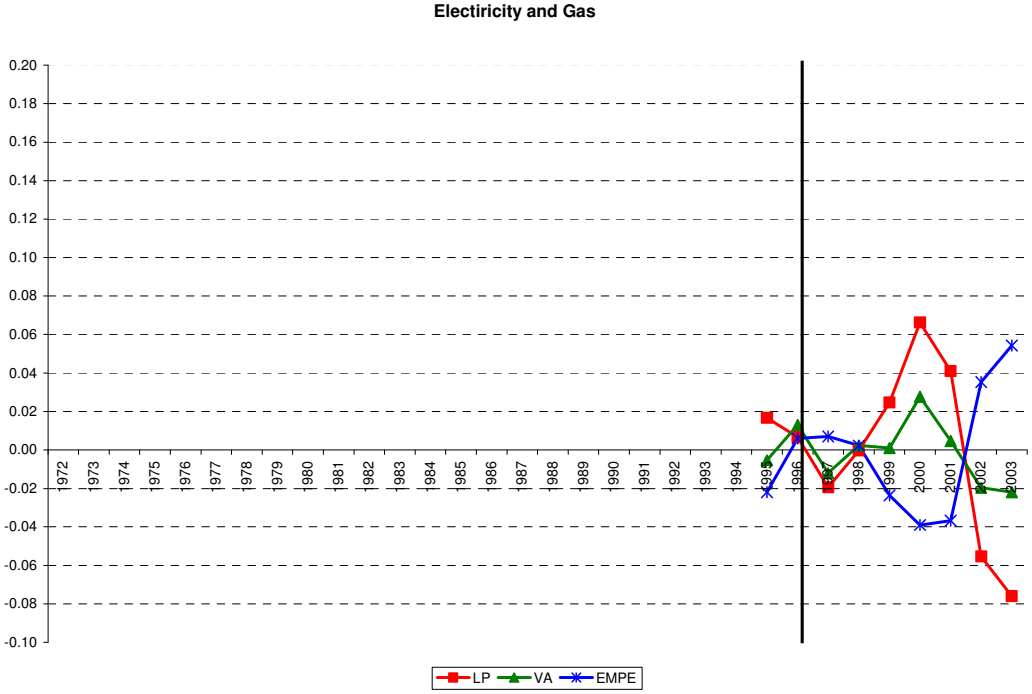




Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

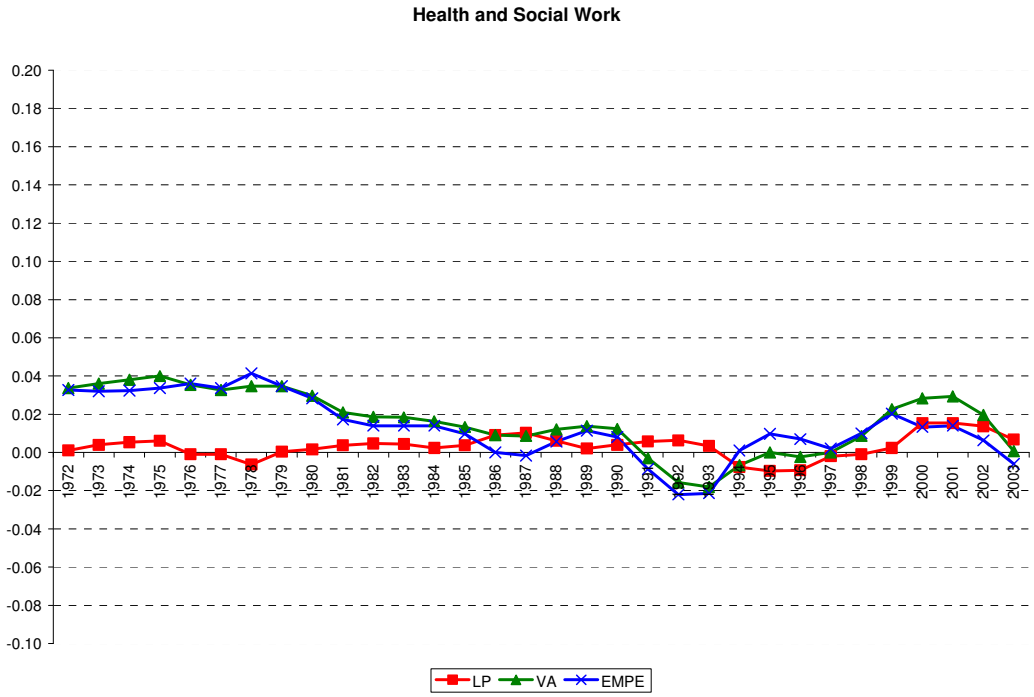
Appendix 5 (cont.): Labour productivity decomposition, Sweden.





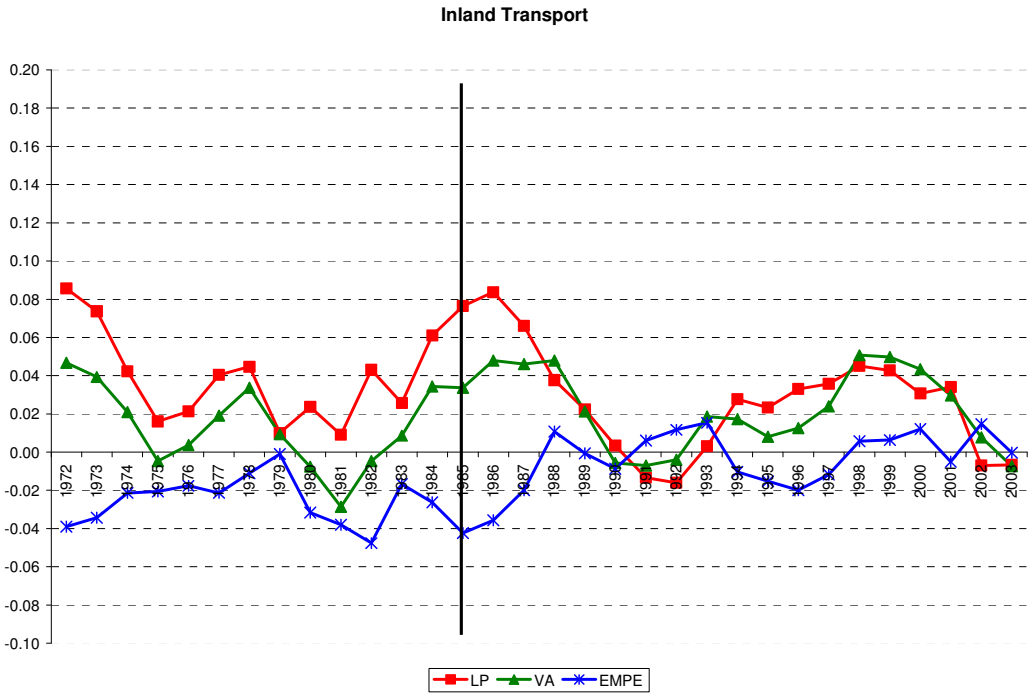
Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

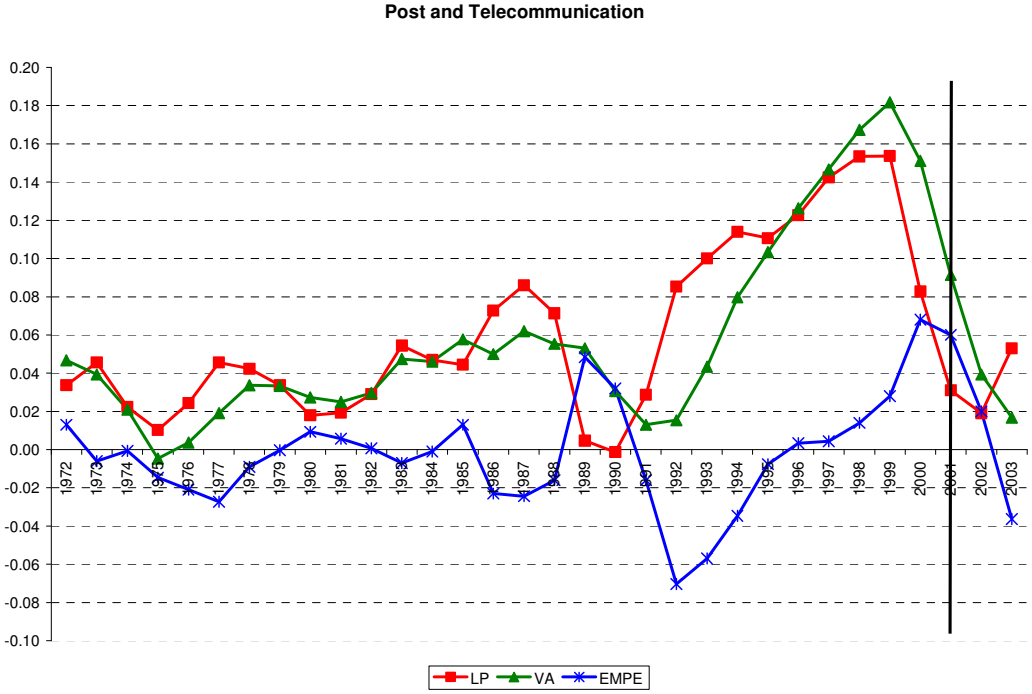
Appendix 5 (cont.): Labour productivity decomposition, Sweden.



Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

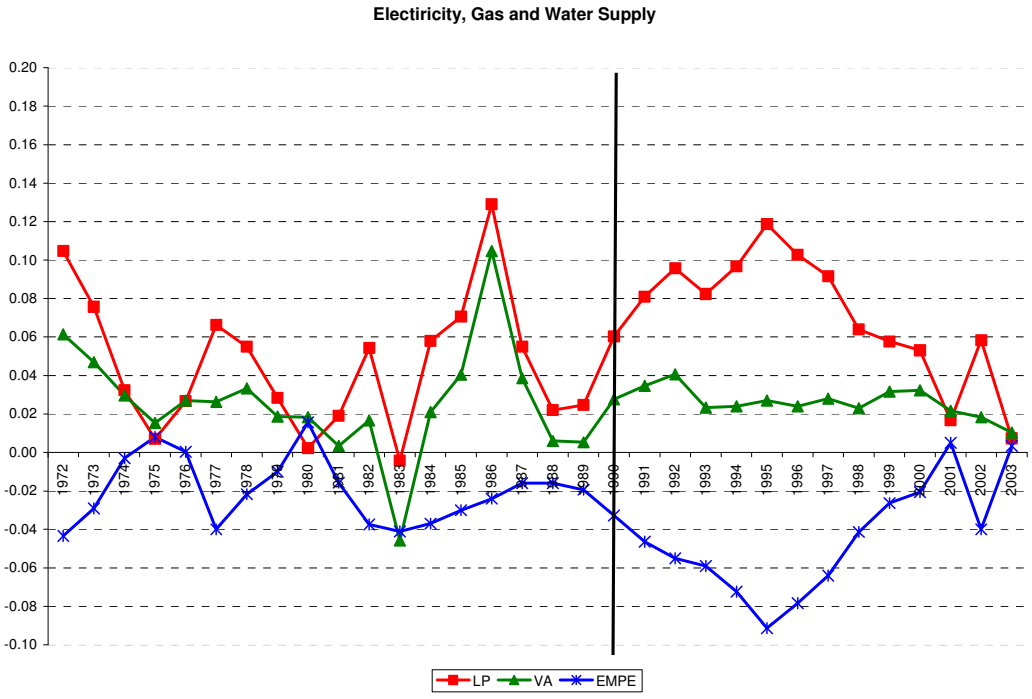
Appendix 6: Labour productivity decomposition, UK.

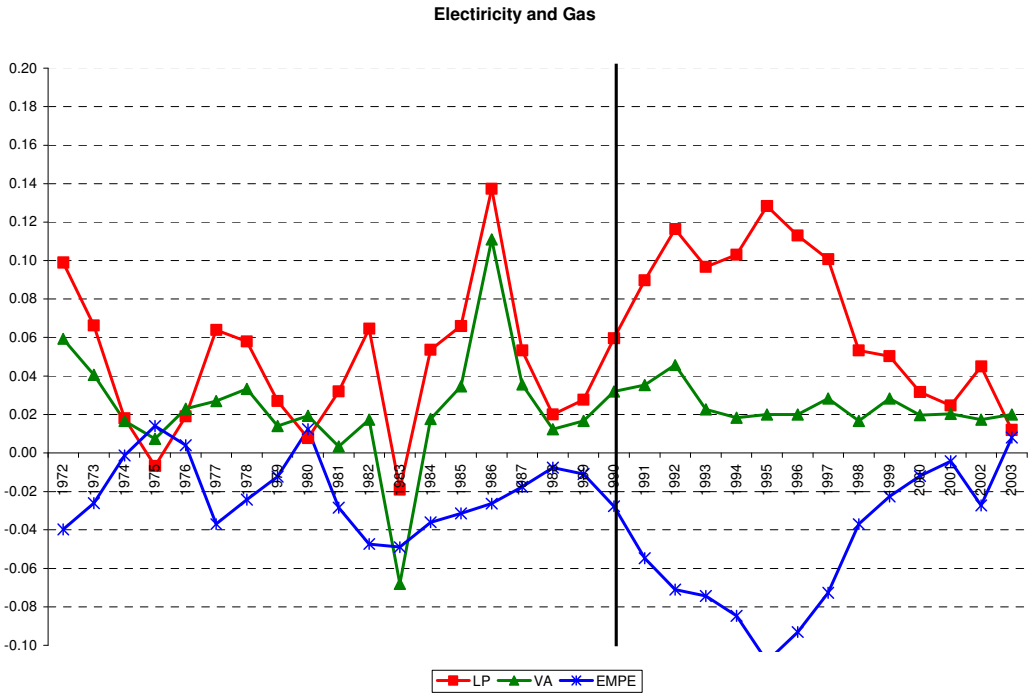




Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

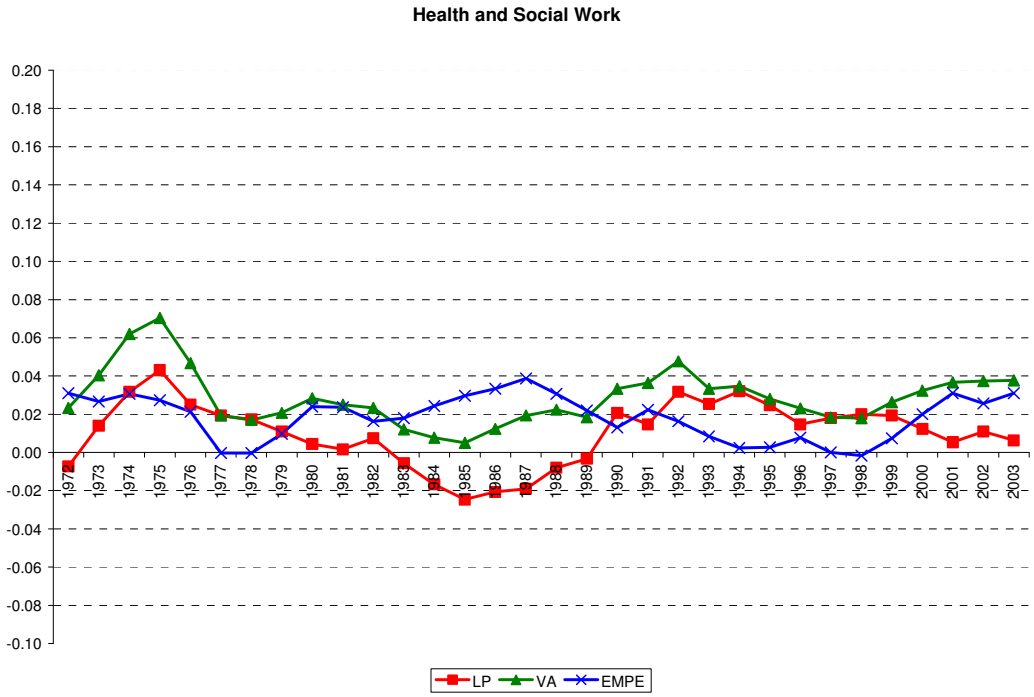
Appendix 5 (cont.): Labour productivity decomposition, UK.





Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).

Appendix 5 (cont.): Labour productivity decomposition, UK.



Note: Percentage growth rates, three-year averages.
Legend: LP=Labour productivity, VA=Value added, EMPE=Employment
Source: Authors' calculations based on EUKLEMS (2007).