THE ROLE OF PRODUCTIVITY IN SWEDISH DEINDUSTRIALIZATION OR MYTHS AND REALITY OF DEINDUSTRIALIZATION IN SWEDEN: THE ROLE OF PRODUCTIVITY*

di Daniel Lind

This article analyzes three possible hypotheses behind the deindustrialization in Sweden. The main conclusion is that deindustrialization is both a myth and a reality. There has been a decrease in manufacturing employment in both relative and absolute terms in the post-war period, and the share of nominal GDP has gone in the same direction. However, the high productivity growth in manufacturing has lead to an increase in its share of real GDP since the beginning of the 1990's. Using input-output analysis, it is shown that the loss of employed who work with satisfying final demand for manufactured goods is less pronounced than what is shown by official statistics. The explanation for this is a deeper interaction with the rest of the economy. This is particularly pronounced in relation to the knowledge intensive service sectors. Since the beginning of the 1990's this aspect has become even more important. The numbers of employed who, directly or indirectly, were involved in the production of manufactured goods did hardly decrease at all between 1995 and 2005. This period is actually the most manufacturing intensive since the 1960's. Some would define this as reindustrialization.

Questo articolo analizza tre possibili ipotesi riguardo alla deindustrializzazione in Svezia. La principale conclusione è che la deindustrializzazione è sia un mito sia una realtà. Si è effettivamente verificata una diminuzione di occupazione nella manifattura, sia in termini relativi sia in termini assoluti, che si rispecchia anche in una diminuzione in termini di PIL. Tuttavia, l'alta produttività ha condotto, a partire dagli anni Novanta, a una crescita in termini di percentuale di PIL reale. Usando l'analisi *input-output* si mostra che la perdita di occupati che lavorano a soddisfare la domanda di manufatti è meno pronunciata di quanto accade nelle statistiche ufficiali. La spiegazione è una più profonda interazione fra produzione industriale e il resto dell'economia, particolarmente pronunciata nel campo dei servizi ad alta intensità di conoscenza. Dal principio degli anni Novanta questo aspetto è cresciuto d'importanza. Il numero di occupati che, direttamente o indirettamente, erano coinvolti nella produzione manifatturiera, sono diminuiti appena fra il 1995 e il 2005. Questo periodo è in effetti quello a maggiore intensità di manifattura dagli anni Sessanta. Qualcuno potrebbe definirla una reindustrializzazione.

1. INTRODUCTION

In the last thirty years, the share of manufacturing in total world GDP has decreased. Simultaneously, there has been a fall in manufacturing employment in the Western world. This structural change is defined as deindustrialization and started in the US at the beginning

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of the 1960's[1]. Since then, almost all rich countries have developed in the same direction, although at different speeds and to different extents[2].

Sweden has been part of this. Despite deindustrialization being a well-known phenomenon, knowledge about its causes is still relatively limited. From a Swedish perspective, this article aims at critically analyzing three of the hypotheses usually emphasized as possible explanations for the deindustrialization[3]. These are: 1. demand for manufactured goods decreases as countries become richer; 2. differences in productivity between manufacturing and the service sector; 3. manufacturing has been focusing on its core activities and has deepened its interaction with other sectors in the economy.

The article is structured as follows. The next section presents an overview of the process of deindustrialization in Sweden. Then, there are three sections that analyze the three hypotheses. The article concludes with a summarizing discussion.

2. Swedish deindustrialization

Three indicators are usually used to identify and analyze deindustrialization: 1. the number of employed in manufacturing; 2. the share of manufacturing employment in relation to total employment; 3. the share of manufacturing in nominal GDP[4].

On the basis of these indicators, the Swedish industrialization- and deindustrialization process is summarized in FIG. 1. Industrialization became increasingly intensive in the latter part of the 19th century and continued over the World Wars until the 1950's, but then reached a plateau. After that, the phase of deindustrialization started. Both the sector's share of nominal GDP and relative employment reached their highest levels already in 1951, even if the level in the latter case was almost as high ten years later. In absolute terms, manufacturing employment reached its highest level in 1965 (1.263.000). After that there has been a gradual decrease and in 2007 it amounted to 722.000[5]. This means that the number of employed has returned to the same level as in the latter part of the 1920's and the first years of the 1930's. The downturn is even more pronounced in relative terms – we have to go back to the years around the previous turn of the century in order to find an equally low level of relative manufacturing employment.

Despite this considerable structural change, Palma (2004) argues that the development in Sweden – at least between 1960 and 1998 – follows an average pattern of deindustrialization that many other developed countries also have experienced[6].

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[1] See, for example, Rowthorn, Ramaswamy (1997), Rowthorn, Coutts (2004), Nickell *et al.* (2004) and Pilat *et al.* (2006).

[2] It is mainly in textiles and metal production manufacturing employment has decreased in the G7 countries since the 1970's.

[3] See, for example, Schettkat, Yocarini (2003). A fourth hypothesis is the increase in trade with low-cost countries. Rowthorn, Coutts (2004) estimate that about 5 million manufacturing jobs were lost in the Western world between 1992 and 2002 due to this trade.

[4] See, for example, *ibid.*, Nickell *et al.* (2004) and Palma (2004).

[5] Note that the series until 2000 are from Edvinsson (2005) and those after that from the national accounts of Statistics Sweden. For all three variables, the levels are higher in Edvinsson's statistics. Thus, the downturn since the beginning of the new millennium has been somewhat overestimated.

[6] Palma (2004) also shows that the inverted U-relation is not constant over time; countries that have been industrialized at a later stage than the Western world have reached their inflection point at an increasingly lower level of GDP per person.

Swedish deindustrialization is characterized by periods with favorable production and (labor) productivity growth, but also the opposite. This is summarized in FIG. 2. Average yearly production growth in manufacturing amounted to 3,9 percent between 1950 and 2007. With an average productivity growth of 4,6 percent, this means that the average decrease in hours worked was 0.7 percent per year. The first two decades are characterized by fast production growth at the same time as this demand was mainly met by an improved productivity, but also by a slight increase in employment[7]. The second – notorious – phase is characterized by weak demand and low productivity growth. In terms of employment and production, the 1970's is the worst decade since the 1950's and the 1980's the corresponding decade when it comes to productivity growth.

Figure 1. Manufacturing in Sweden, 1800-2007
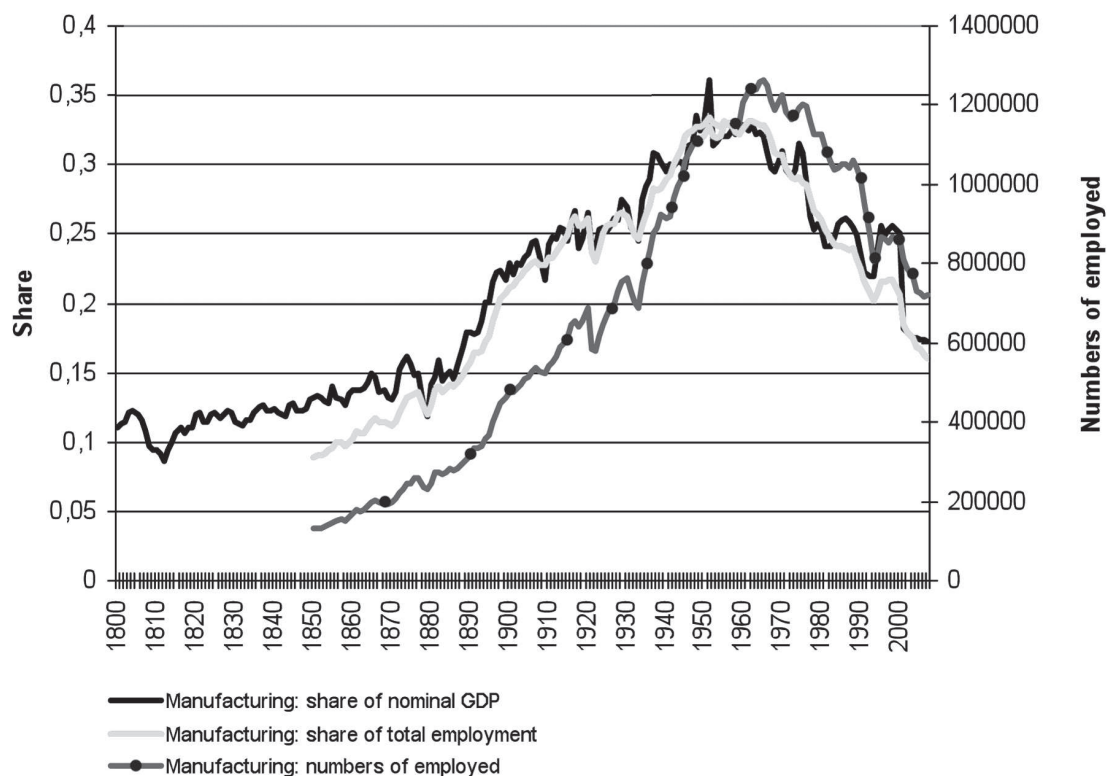
Source: Edvinsson (2005); Statistics Sweden; own calculations.

The third, more favorable phase of deindustrialization began with the crisis years at the beginning of the 1990's and lasted until the financial crisis in 2008. With an average yearly productivity growth of about six per cent per year since 1990, this means that production have to increase by more than that in order for the manufacturing employment to increase[8]. This has not been the case, and employment has continued to decrease.

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[7] More hours worked is of course translated into higher employment when the current staff can not work more hours.
[8] In this period, no other country in the Western world can show the same favorable production and productivity growth.

Figure 2. Manufacturing in Sweden: production growth and (labor) productivity growth, 1950-2007
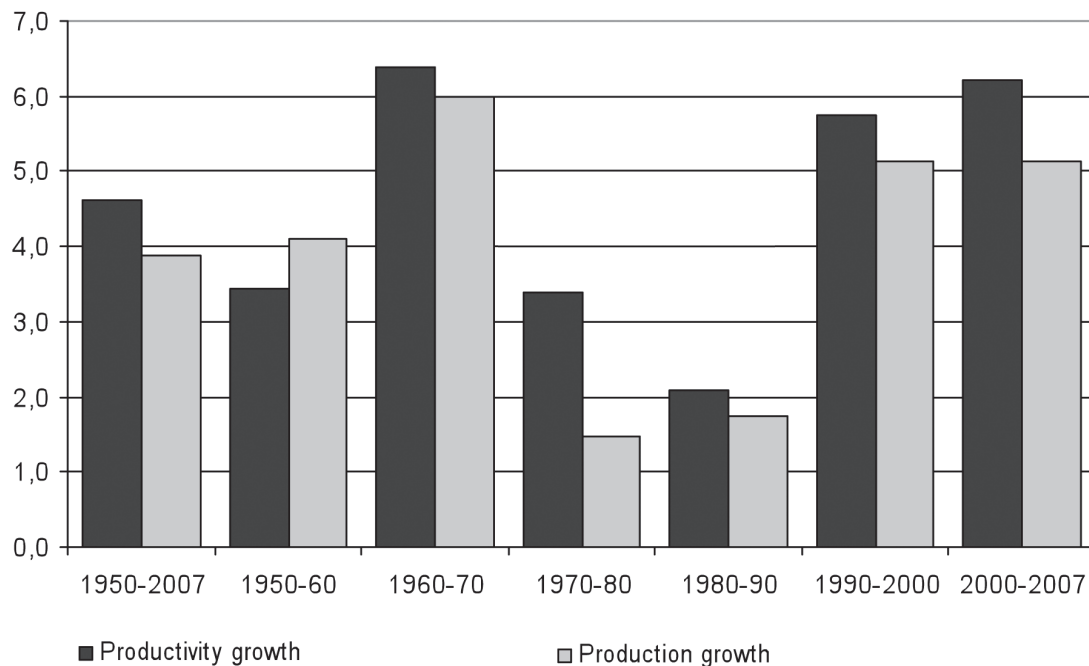
Source: BLS, own calculations.

Deindustrialization in Sweden is a fact – there has been a decrease in the manufacturing sector's share of nominal GDP and also in its relative and absolute employment. The question is: what can explain these developments?

3. CHANGES IN THE COMPOSITION OF DEMAND

Engel's law was established to describe how the relative consumption of food decreased when the Western world was industrialized. In the same way, the sociologist Daniel Bell (1976) has established the theory of the postindustrial society. This theory predicts a decrease in household demand for manufactured goods in favor of a larger share of services when GDP per person grows[9]. The theory of a growing service society thus takes its starting point in the hierarchy of needs that the human nature is assumed to have. When our basic material needs have been satisfied, an increasing share of our consumption is directed towards services which are assumed to increase our quality of life in a broader sense. As a consequence, there will be a decrease in manufacturing employment – in absolute and relative terms – and in the sector's share of nominal GDP.

[9] Expressed differently: the income elasticity for services is larger than one. Summers (1985) is an ambitious attempt at establishing the connection between demand for services and the level of development at the global level. Depending on what price deflators are used, he obtains different results.

Table 1. Indicators of the composition of demand in the Swedish economy

A. Production growth in the Swedish economy, 1980-2007

	1980-2007	1980-90	1990-2000	2000-07	1995-2005
Total economy	2,4	2,2	2,1	3,2	3,2
Private sector	3,1	2,5	3,1	4,1	4,2
Manufacturing	4,2	1,9	5,4	5,5	7,0
Service sector	3,0	2,8	2,9	3,8	3,5

Source: Statistics Sweden; own calculations.

B. Household consumption, 1980-2007

Share of nominal consumption	1980-2007	1980-90	1990-2000	2000-07	1995-2005
Goods	0,54	0,61	0,50	0,49	0,49
Services	0,46	0,39	0,50	0,51	0,51
Durable goods	0,09	0,10	0,08	0,10	0,09

Source: Statistics Sweden; own calculations.

Share of real consumption	1980-2007	1980-90	1990-2000	2000-07	1995-2005
Goods	0,50	0,52	0,48	0,49	0,49
Services	0,50	0,48	0,52	0,51	0,51
Durable goods	0,09	0,07	0,07	0,12	0,10

C. Nominal demand for manufactured goods, shares, 1995-2005

	1995	2000	2005
Domestic economy: household demand	0,15	0,14	0,12
Domestic economy: final demand	0,33	0,34	0,32
Domestic economy: total demand	0,32	0,31	0,29
Total economy: household demand	0,22	0,23	0,22
Total economy: final demand	0,38	0,39	0,37
Total economy: total demand	0,38	0,38	0,38

Source: IO-tables from Statistics Sweden; own calculations.

Has there been a decrease in demand for manufactured goods in favor of more services during the process of Swedish deindustrialization?

The question can be answered from several indicators. The most important of them are presented in TAB. 1. From this table, it appears, from (A), that the production growth of manufactured goods has been higher than for services since 1980 and that this is explained by a favorable relative – and absolute – growth since the beginning of the 1990's. It thus follows that there is no indication that the structure of demand is becoming more service oriented. In the last 15 years, with an intensified globalization and even higher competitive pressure in the manufacturing sector, the development of production has in this sense gone in the opposite direction. The question is, however, to what extent this strong production growth is due to an increasing need in the surrounding world for imports of manufactured goods produced in Sweden.

As appears from (B), there has been a decrease in the share of goods in nominal, domestic consumption since 1980, even if the trend has largely remained unchanged since 1990. In the same way, there has been an increase in the relative consumption of services. However, the picture is not unambiguous. When it comes to nominal consumption of durable goods, the share has been constant since 1980.

In real, inflation-adjusted terms, the share of consumption of goods of total consumption has largely remained unchanged since 1980, and for durable goods the increase is considerable since the mid 1990's. The explanation for this is that the falling relative prices for goods mean that households can consume as much goods as before, but at the same time still have money left to increase their consumption of more (and relatively more expensive) services[10]. Since the 1980's, there has not been any decrease in the number of manufactured goods for which there is a demand by Swedish households, but the shift in relative prices has resulted in a decrease in the share of goods in nominal terms, in particular after the 1980's[11].

An additional indicator of the consumption structure is obtained by studying the input-output-tables of Statistics Sweden. When imports and exports are excluded, the first line in (C) shows that there has been an decrease in nominal household demand for manufactured goods between 1995 and 2005 – from 15 to 12 percent. A similar pattern emerges from the other domestic indicators: the share of manufactured goods in final and total demand (intermediate and final demand).

However, the last three lines show that the pattern is somewhat different if the trade with the outside world is included. Household demand for manufactured goods has remained unchanged in nominal terms if it is taken into account that imports of manufactured goods that target household demand are larger than the corresponding demand for services. The same also applies for final and total demand: the share of manufactured goods in final and total demand has remained unchanged since 1995 if trade with the surrounding world is included. Considering that there has been a fall in relative prices for manufactured goods between 1995 and 2005, this means that there has probably been an increase rather than a decrease in their share of total household real aggregate demand and of final and total demand since the mid 1990's.

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[10] Since 1990, there has been a decrease in the prices for household consumption of durable goods. Between 1990 and 2007, prices fell by about three percent per year. This considerable change in relative prices probably explains why household demand for durable goods has grown about three times as quickly as household consumption of services since the beginning of the 1990's.

[11] Jansson (2008) has a similar line of reasoning.

Altogether, TAB. 1 indicates that the deindustrialization – at least since 1980 – cannot be explained by a weaker demand for manufactured goods; in some (but not all) respects, there has been a decrease in nominal demand, but there are no indications of this having been the case in real terms. Swedish deindustrialization must have another explanation[12].

4. PRODUCTIVITY DIFFERENCES BETWEEN MANUFACTURING AND SERVICES

Baumol and Bowen (1966) established what later came to be called Baumol's cost disease within artistic activities. In the following year, in Baumol (1967), the arguments were generalized and they were further developed in Baumol *et al.* (1985), Baumol and Wolff (1989) and Baumol (2001). One of Baumol's basic assumptions is that in real terms, the demand for services is independent of the level of income and, as a consequence, the share of services in real GDP is constant over time. But the assumption of a higher productivity growth in manufacturing than in services means – along with an approximately similar increase in wages in all parts of the economy – that there is a decrease over time in manufacturing's share of nominal GDP and of total employment over time. The falling nominal share of GDP is explained by productivity driven changes in relative prices, and in order to keep an even pace with the production growth within manufacturing, there must be a gradual increase in employment in the service sector[13]. These developments are not explained by a change in the patterns of demand, however; rather, it is the result of changes in supply conditions. Deindustrialization can thus occur despite relative demand for manufactured goods remaining unchanged.

Let us study Baumol's explanations for a shrinking manufacturing sector. From FIG. 3, it is clear that the productivity level – in contrast to Baumol's theory – on average is not lower in the service sector than in manufacturing. What is shown in the figure is rather that Swedish post-war history is about manufacturing – thanks to a higher average productivity growth – having caught up with the service sector. By the financial crisis in 2008, this period of catching up had been completed.

But as also appears from FIG. 3, the finance- and real estate sectors explain a non-negligible part of the high productivity level in the service sector, but even without these manufacturing did not catch up with the service sector until around the turn of the millennium. In particular, the real estate business, with a productivity level of SEK 1.100 per hour in 2007, substantially contributes to the average in the service sector, but the same argument can be used for certain parts of manufacturing. In the same year, the production of chemical products showed a productivity level of slightly more than SEK 4.100 per hour and electronics and telecom a similar level of slightly more than SEK 3.000 per hour. It is an incorrect statement that the productivity level in the service sector on average is lower than in manufacturing[14].

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[12] The total indicator of the total economy in (C) in table 1 shows that these shares are considerably larger than the corresponding ones in FIG. 1. Depending on whether the production or the user side of the economy is studied, there are different conclusions about the importance of the manufacturing sector; in 2005, 38 percent of total demand is due to manufactured goods, while the employment share only amounted to 17 percent.

[13] Asymptotically, this means that productivity growth in the economy is in the end entirely determined by the service sector since this is where everyone will be employed.

[14] See ITPS (2008) for an analysis of the characteristics of different types of service industries, where some have qualities that are more similar to those of manufacturing.

Figure 3. Productivity levels, 1980-2007
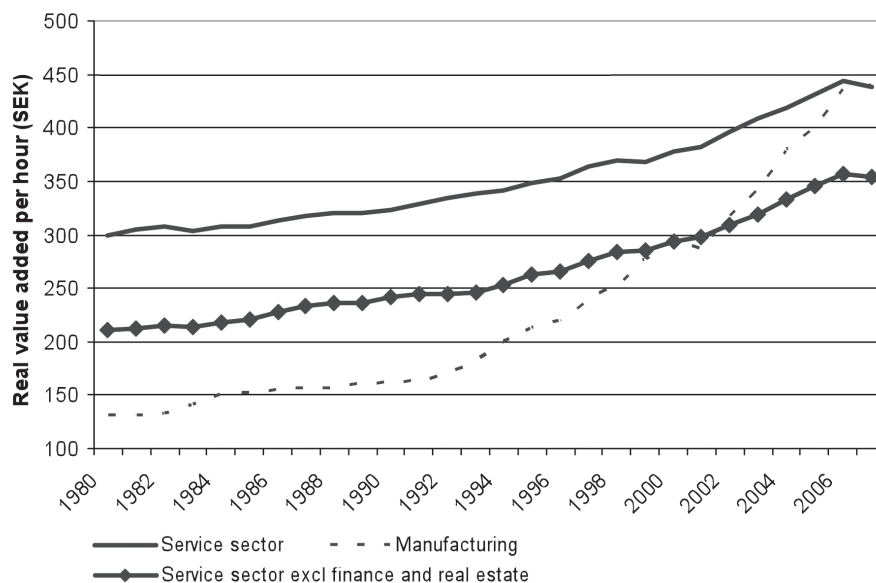
Source: Statistics Sweden; own calculations.

Since 1980, Baumol is, from this perspective, both right and wrong: the productivity level is not higher in manufacturing but productivity growth has been considerably higher in this period, in particular since the 1990's. The question is how this has affected the development of the nominal and real share of GDP.

Baumol's hypothesis is that the difference in productivity growth between manufacturing and the service sector results in a decrease in the relative prices of manufactured goods. According to FIG. 4, this is also what has happened since 1980. When the differences in productivity growth between manufacturing and the service sector were smaller, their prices increased at approximately the same rate. But as – absolute and relative – productivity growth took off in manufacturing, there has not only been an increased difference in relative prices, but also average prices within manufacturing have fallen in absolute terms since the mid 1990's. This is partly explained by an increased share of telecom products in total manufacturing production, but also in other parts of the sector has the price increase come to a halt since the mid 1990's.

The mirror image of the changed price trend in manufacturing – most likely not only an effect of an impressive productivity growth but also of an intensified globalization and an increased import of intermediate goods – is that there has been an increase in its share of real GDP in the same period. At the same time as there has been a slight decrease in its nominal share since 1980 (even if not to any remarkable extent), the weakly falling trend until the beginning of the 1990's has, in accordance with FIG. 5, turned into a period where there has been a non-negligible increase in the share of manufacturing in real GDP since the mid 1990's[15]. This

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[15] However, real shares should be handled with caution. This is certainly the case with chain-aggregated data. One reason for this is that the non-additivity, which follows from the chain method and its yearly updated price weights, means that the real aggregate of sector X and Y is not the arithmetic sum of the real series for X and Y. This implies that real shares will not necessarily sum to hundred when different sectors are related to total GDP. Hence, the real share in FIG. 5 should not be seen as a "true" share. See Whelan (2002) for a more thorough discussion.

means that in terms of the number of units produced, in the last 15 years manufacturing increased its share of the economy by almost 70 percent and since 1980 by slightly more than 50 percent. At the same time, there has been a decrease in manufacturing employment by more than 30 percent and there has been a fall in the sectors share of nominal GDP. In this latter perspective, deindustrialization is entirely about changes in relative prices driven by differences in productivity growth between manufacturing and the service sector. In terms of units produced, the period since 1980 has instead been characterized by a clear reindustrialization.

Figure 4. Value added price development, manufacturing and the service sector, 1980-2007
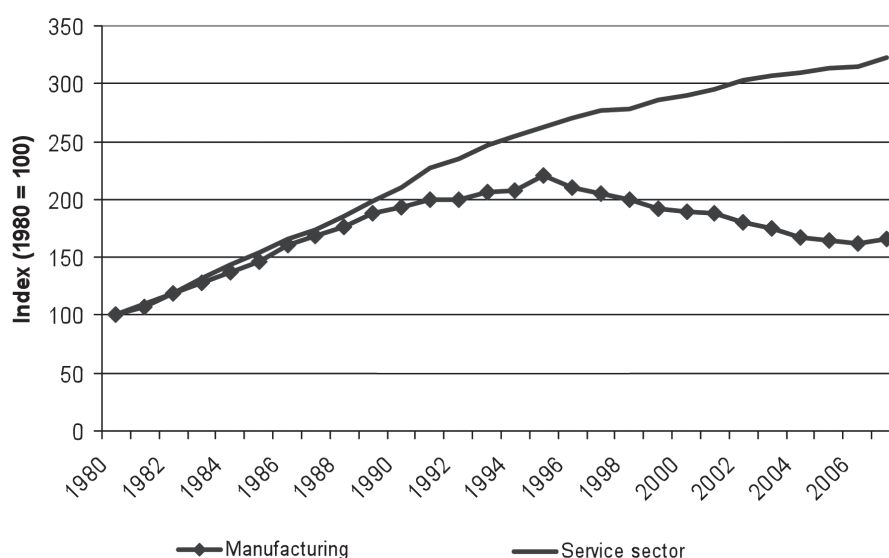
Source: Statistics Sweden; own calculations.

Figure 5. Shares of GDP, 1980-2007, the reference year is 2000 for the real share
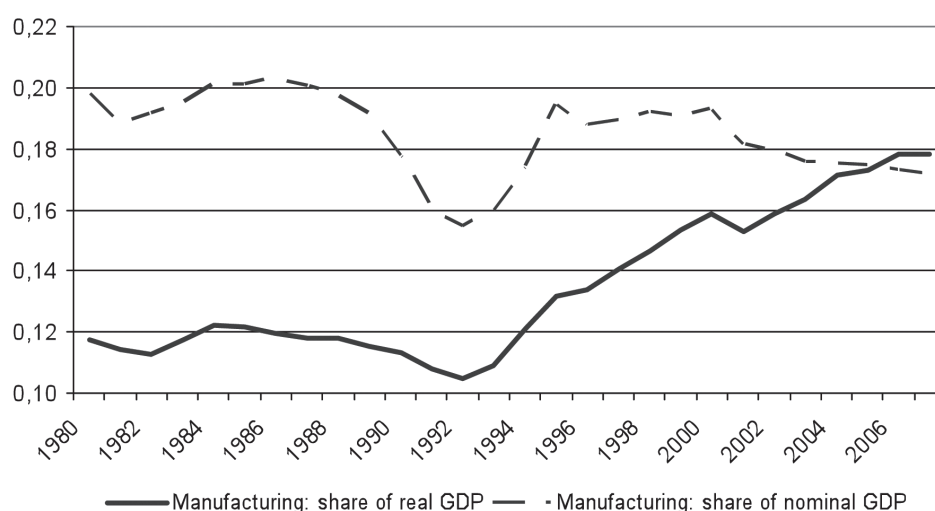
Source: Statistics Sweden; own calculations.

The growing difference in productivity growth between manufacturing services – which in the last 15 years has increased from an average of 1,5 to almost to four percentage points a year – also means that, at a given level of relative demand, deindustrialization has been intensified in terms of employment. But production growth in manufacturing has in fact since 1990 been about twice as high per year as in the service sector. This is the reason why the share of manufacturing employment in total employment has not fallen more than what has actually been the case.

In absolute terms, the high productivity growth in manufacturing during the entire post-war era means that there has been a decrease in employment. With an average yearly productivity growth of six percent in the last 15 years, this means that there must have been a much higher production growth for manufactured goods today than in the 1970's and the 1980's for not causing a fall in manufacturing employment. Given no effect on demand, a productivity growth in the last 15 years on par with the development in the 1980's, would have led to an increase in manufacturing employment by 2,5-3 percent per year[16].

Altogether, this means that productivity growth in manufacturing is an important explanation behind the reduced employment in this sector – in both relative and absolute terms – despite the fact that demand having grown considerably faster than GDP in the last 25 years. This is also the explanation for deindustrialization in terms of nominal GDP since 1980 and the reindustrialization in real terms during the same period.

5. DEEPER INTERACTION BETWEEN MANUFACTURING AND THE REST OF THE ECONOMY

Another supply-oriented explanation for the deindustrialization is that firms increasingly buy the intermediate goods that were previously produced in-house. Due to technological development and globalization, firms have greater possibilities – both at the national and the global level – to increase their degree of specialization and separate parts of the production process[17]. Not the least for many manufacturing firms does this apply for services in general and business services in particular. Another aspect that points in the same direction is that many manufacturing firms today include an increasing number of services in their work at developing, producing, selling and marketing their products[18]. This might concern anything from R&D, IT-services, publicity and financial services to logistics, legal advice, and training/education. A manufactured good is to a smaller degree a "product" and increasingly a carrier of "services" that create extra value added.

Deindustrialization in this sense is thus about statistical reallocations of businesses and the fact that more services are required to deliver a manufactured good, rather than about a smaller number of employees in manufacturing[19]. A broader definition of the sector would include

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[16] Arithmetics also say that the decrease in manufacturing employment in the 1970's and 1980's would have been much more significant if productivity growth in this period had reached the levels of the 1990's and 2000's (at a given demand).

[17] The interaction between industries can be expressed in several ways. See, for example, Wölfl (2006) for a theoretical survey.

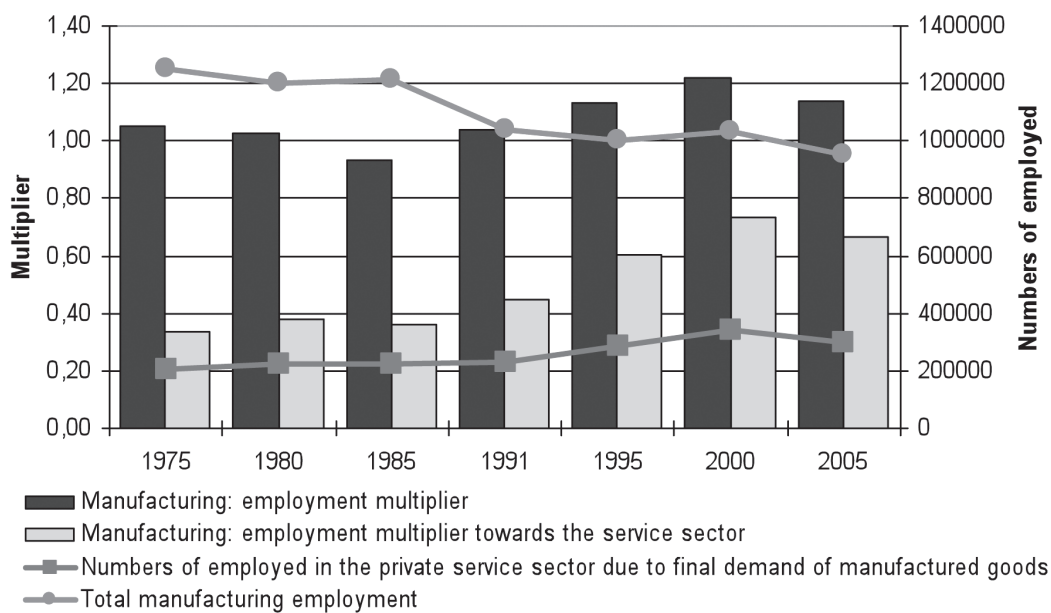[18] See, for example, National Board of Trade (2010).

[19] In the official statistics, firms and workplaces are classified according to their main business. This means that a firm belongs to manufacturing if its main task is to produce manufactured goods. The effect of this is that small changes in the business might mean that firms are reclassified and, thus, the employees will also belong to a new sector. Statistics Sweden (2010) shows that reclassifications are relatively common, but that the net flow between manufacturing and the service sector cannot explain the fall in manufacturing employment in the period 1990-2007.

those intermediate goods that are required in order to meet final demand for manufactured goods and what was formerly included in manufacturing in the national accounts.

Input-output-analysis (IO) is an often used method for studying how the interaction between manufacturing and the rest of the economy looks like and how it has developed over time[20]. The starting point is to study the flow of intermediate goods between sectors and from this – using linear algebra – calculate how much production/employment increases in the whole economy, including at all levels of subcontractors, when there is an increase in final demand in individual sectors[21]. Taking this as the starting point, one can calculate the total number of employees who work with production of manufactured goods, independently of where in the economy they are employed.

From FIG. 6, it is clear that there has been an increase in the number of employed in the private service sector who work with meeting final demand for manufactured goods from somewhat more than 200.000 in 1975 to almost 300.000 30 years later – an increase of almost 50 percent[22]. It also appears that the contribution of manufacturing to employment in the service sector was at its highest during the boom year of 2000. Five years later, the number had been reduced by more than 40.000 individuals.

Figure 6. Manufacturing and its interaction with the service sector, 1975-2005

Source: Statistic Sweden; own calculations.

The National Board of Trade (2010) shows, according to the same line of reasoning, that the manufacturing share of employment and GDP has not fallen as quickly between 1997 and 2006 if company group data is taken as the starting point. The explanation for this is that those firms that belong to the service sector are then included in the group of manufacturing companies.

[20] See, for example, Schettkat, Yocarini (2003).

[21] See, for example, Dietzenbacher, Lahr (2004) and Ten Raa (2005) for an introduction of the method and Wölfl (2006) and Pilat *et al*. (2006) for some recent international applications. Hagman, Lind (2008) and Lind (2009, 2010) have in later years used the method in a Swedish context.

[22] Note that these calculations are based on statistics for the private sector. The reason for this is that this is the only way of extending the comparison as far back as until 1975. In the remainder of this section, the focus will be on the entire economy and the period 1995-2005. This means that the analysis from FIG. 6 should not be confused with the rest of the analysis in the section, even if the differences in practice are almost negligible.

When it comes to the employment multiplier of manufacturing – which shows how much additional employment that is on average generated by each manufacturing employee – this fell somewhat up until 1985. Then, it took off, and finally it fell somewhat between 2000 and 2005. Each manufacturing employee generated an average of 1,14 indirectly employed in the private sector (including manufacturing) in 2005. Through the combination of a decrease in manufacturing employment and a fast increase in the indirectly employed in the private service sector, there has been a fast increase in the employment multiplier for the service sector since 1985. 30 years ago, each manufacturing employee generated an average of 0,34 indirectly employed in the service sector. In 2005, the number of employed had doubled to 0,67.

Manufacturing employment has decreased by more than 450.000 in the official statistics since 1975, but a deeper interaction between manufacturing and the private sector in general and the service sector in particular has meant that in terms of final demand the fall in employment has been limited to about 300.000 – from 1.250.000 to 950.000[23]. Hence, the deeper interaction can explain a non-negligible part of the Swedish deindustrialization, but since the mid 1970's there has been a decrease in the total number of employed who, directly or indirectly, work with production of manufactured goods.

What does the period 1995 and onwards look like? The number of employed in the Swedish economy who either directly or indirectly work with production of manufactured goods can be calculated by adding up three categories of employed. First, we have those who are directly employed in manufacturing through final demand for manufactured goods. Second, we have those who at all subcontracting levels are indirectly employed by final demand for manufactured goods (also in their own sector). Finally, we have those who are indirectly employed in manufacturing due to final demand for other products in the economy[24].

Figure 7. Total manufacturing employment, 1995-2005
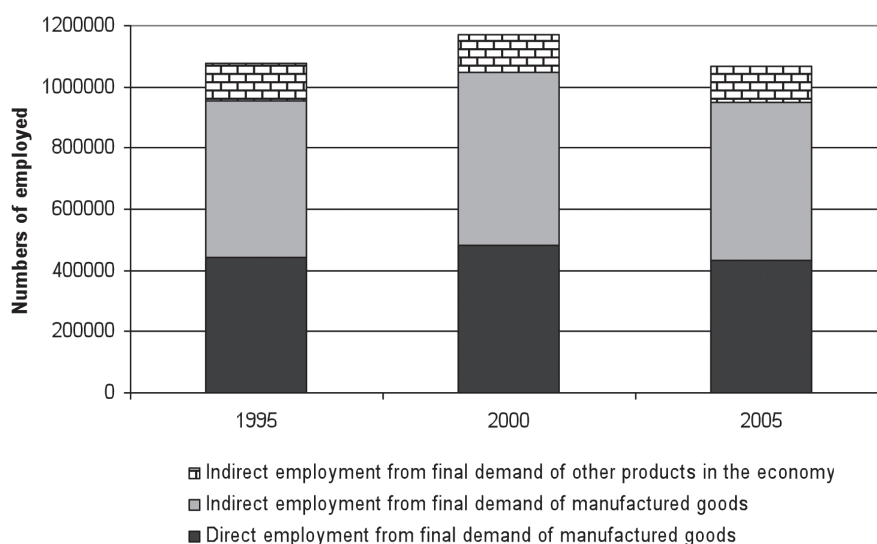
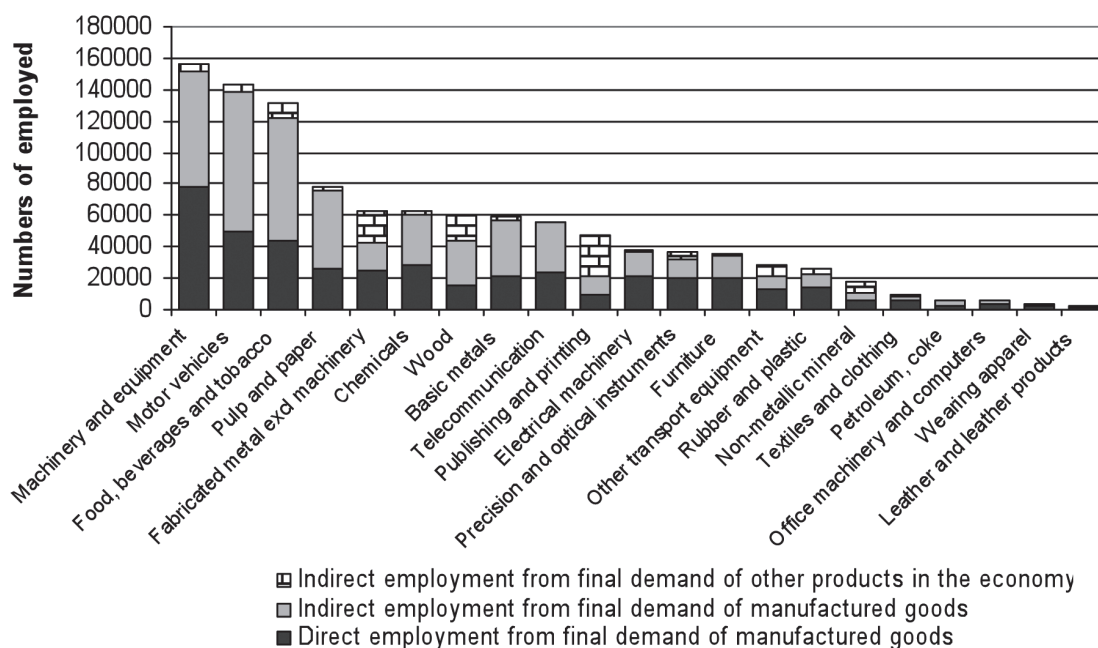*Source*: Statistic Sweden; own calculations.

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[23] Note that this total number of manufacturing employees does not include those people in the manufacturing sector who work at meeting final demand of other industries (see FIG. 7).

[24] For example, final demand for agricultural goods and IT-services means that these sectors must buy intermediate goods from manufacturing in order to satisfy the demand that they meet.

If these three categories are added up, FIG. 7 shows that manufacturing employment has largely remained unchanged between 1995 and 2005 – the decrease only amounts to 9.200 people. This lead to a change of –0,9 percent[25], which is to be compared with a ten percent decrease in the official statistics during the same period.

How is this total manufacturing employment distributed between the manufacturing industries? As appears from FIG. 8, machinery was the industry that employed the largest number of people in 2005 – more than 156.000. 77.000 of these were directly employed in the own industry through meeting final demand, 73.000 were indirectly employed as a result of final demand and 6.000 people were employed due to final demand of products in other industries[26]. Two other manufacturing industries of great importance for total manufacturing employment are motor vehicles (143.000) and food products and beverages (132.000). At the other end of the *spectrum*, there are four industries that employ less than 6.000 people each.

Figure 8. Total manufacturing employment distributed between manufacturing industries, 2005

Source: Statistic Sweden.

A great deal of the research on deindustrialization is focused on the interaction between manufacturing and the knowledge intensive service sector and how this has developed

[25] With this method, a total of 1.068.380 people were in 2005 somehow employed in the production of manufactured goods. These constituted slightly more than 24 percent of the total number of employed in the economy – a decrease by two percentage points since 1995.

[26] The highest employment multipliers are found in pulp, paper and paper products (1,9), wood and products of wood and cork (1,8), motor vehicles (1,8) and food products and beverages (1,8).

over time[27]. Obviously, defining knowledge intensive services can be problematic, but on the basis of the definition of the EU-Commission, it is clear from FIG. 9 that there has been an increase in the number of employed in these industries who work at meeting final demand for manufactured goods since the mid 1990's – from 130.000 to 177.000[28]. This corresponds to an increase by more than 35 percent. An important explanation for this is that the number of employed who work indirectly in manufacturing production in business service industries has increased from slightly more than 80.000 to more than 115.000 during the same period.

FIG. 7 made it clear that due to final demand for manufactured goods, the total number of indirectly employed increased by more than 10.000 between 1995 and 2005. This means that the share of business services in indirect manufacturing employment has increased from 16 to 22 percent; a non-negligible increase in a ten-year period[29]. For knowledge intensive service industries, their share increased from 25 to 34 percent.

Figure 9. Employment in knowledge intensive services and in business services due to final demand for manufactured goods, 1995-2005
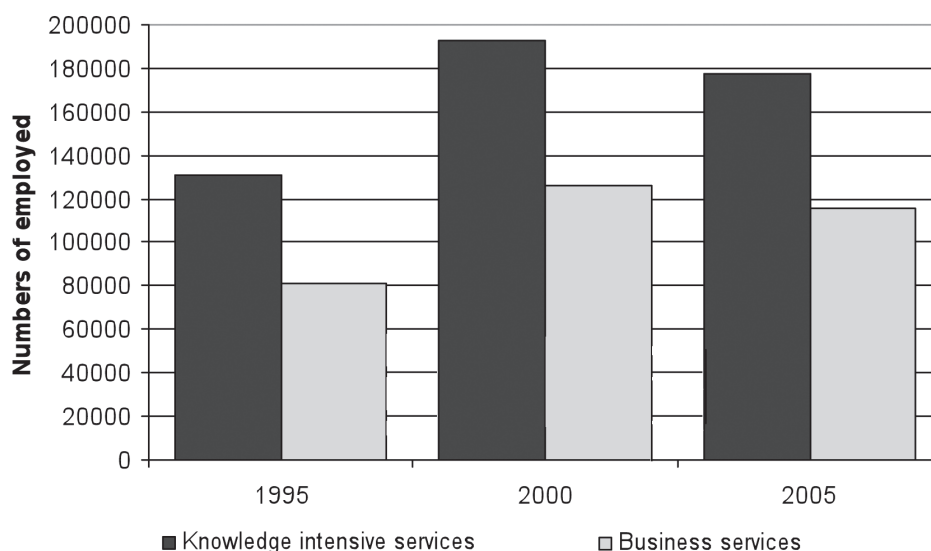
Source: Statistic Sweden; own calculations.

How many indirectly employed in business services are generated by the industries in manufacturing and how has this developed over time? Out of the 21 industries, the number
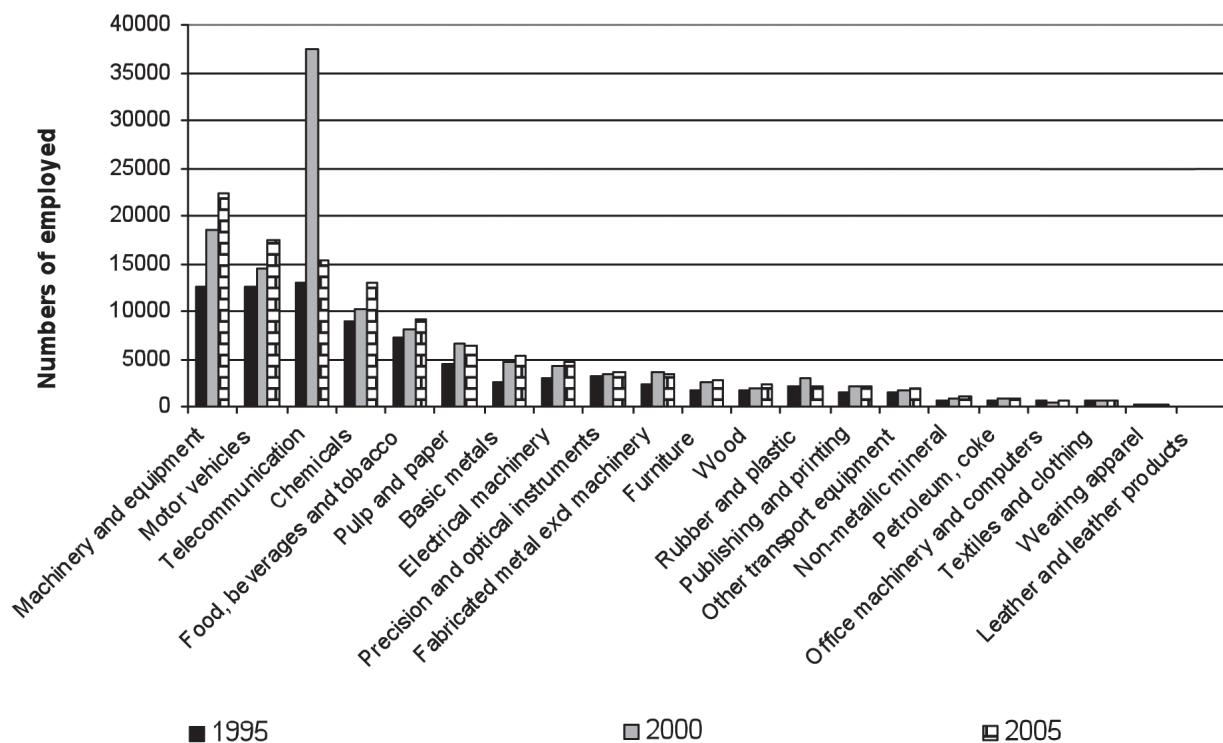
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[27] See, for example, EU-Commission (2004), Kox, Rubalcaba (2007) and OECD (2007).

[28] The knowledge intensive service industries are defined in terms of SNA as water transport services (61), air transport services (62), post and telecommunication services (64), financial intermediation services and insurance funding services (65-67), real estate services, renting services and other business services (70-74), education services (80), health and social work services (85) and recreational, cultural and sporting services (92). The business service industries are defined as computer and related services (72), R&D (73) and other business services (74). See, for example, OECD (2007) for a discussion of business services, what they contain and how they are to be identified. See Baker (2007) and Camacho, Rodriguez (2007) for examples of how IO-analysis can be applied to the knowledge intensive service industries.

[29] About 80 percent of indirect manufacturing employment in the business service industries can be referred to other business services, 15 percent to computer services and 5 to R&D.

of indirectly employed has, according to FIG. 10, increased in 19 industries between 1995 and 2005; in the two industries where there has been a decrease, this amounts to less than a total of 100 employees. The increase in demand for intermediate goods from business services is thus widely established in the entire manufacturing sector. In the vehicle industry, indirect employment increased by almost 10.000 employees, which corresponds to an increase of almost 80 percent. Other industries that employ a large number of people in business services are machinery, telecom products and chemistry[30].

Figure 10. Employment in business services due to final demand for manufactured goods

In summary, this section has shown that there has been a decrease in the number of employed who either directly or indirectly works with manufacturing production between 1975 and 2005, but the decrease has been considerably smaller than what is shown in the official statistics. The explanation for this is the deepened interaction between manufacturing and the rest of the economy, in particular in relation to the service sector. But another picture has been emerging since the mid 1990's. Total manufacturing employment has largely remained unchanged between 1995 and 2005, mainly due to an increase in the indirect employment in the knowledge intensive service sector in general and in business services in particular. In this sense, deindustrialization is conspicuous by its absence.

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[30] Note also that there is a considerable difference between different industries in how large a share of indirect employment that is due to business services. In the industry for telecom products, the share is as high as 50 percent and in chemistry, it is more than 40 percent. For wood and products of wood and cork and food products and beverages, the corresponding share amounts to about ten percent.

6. Concluding discussion

Is Sweden being deindustrialized? There has been a decrease in manufacturing employment in both relative and absolute terms in the post-war period and there has been a gradual decrease in its share of nominal GDP in the same period. But at the same time, manufacturing production has grown faster than GDP and there has been no decrease in domestic demand for manufactured goods over time.

However, the high productivity growth in manufacturing – which means that the productivity level today is on par with the service sector – has lead to a fall in the relative prices of manufactured goods over time. This has not only resulted in a fall in relative employment, but there has also been an increase in the share of real GDP since 1980. In terms of number of units produced, we have at least since 1980 been in a period of reindustrialization; the falling share of nominal GDP is entirely explained by the change in relative prices; not by a decrease in the demand for manufactured goods. The price effect has been stronger than the income effect.

Despite this, there has been a decrease in the number of employed who work with satisfying final demand for manufactured goods since 1975, even if the loss is less pronounced than what is shown by official statistics. The explanation for this is the increased indirect manufacturing employment caused by a deeper interaction with the rest of the economy; each manufacturing employee generates more indirect employment than before. This intensified interaction is particularly pronounced in relation to the service sector in general and its knowledge intensive part in particular.

This aspect has been of particular importance since the crisis years at the beginning of the 1990's. The number of employed who were in some way involved in the production of manufactured goods did only decrease by slightly more than 9.000 between 1995 and 2005, and the share of total employment did only decrease from 26 to 24 percent. In the same period, production growth was twice as high as in the service sector, productivity growth was on average about seven percent per year and the share of real GDP increased by 70 percent. In fact, more than half of the productivity growth in the private sector can be explained by the fast improvement in manufacturing in this period, and the jobless growth after the turn of the millennium was caused by a large global demand for Swedish manufactured goods which was met by increasing the production per hour, not by increasing the numbers of employed. Thus, this is the reason for the extended lag between GDP growth and a reduced unemployment, at the same time as it explains the falling wage share within manufacturing.

The period since the 1990's has been the most manufacturing intensive since the 1960's. Considering that the number of employed who were in any way involved in the production of manufactured goods and that the share of nominal GDP did after all decrease somewhat, some people would call this positive deindustrialization, but in terms of production, productivity and the share of real GDP, others would claim that this is rather a case of reindustrialization.

Notwithstanding which interpretation seems most reasonable, the picture is considerably more complicated than what is too often being expressed in the public debate. Deindustrialization is both a myth and a reality. A more service oriented Swedish economy is a fact and a competitive manufacturing sector is an important component of that.

In many ways this discussion should also be relevant to other countries in the developed world. It is becoming more unlikely that plants within the some company in different

Western countries systematically will differ in its productivity improvements. Of course, an important part of the Swedish story is the telecom sector and its extremely fast technological achievements, but the competitive pressure that follows from the intensified globalization is a truly global force. We have also seen the knowledge intensive service sector grow fast in many countries. It is a general trend that the indirect employment created by manufacturing production has increased over the last decades. An increasing number of people employed in manufacturing also work with service related tasks.

In the light of the enormous effects of the financial crisis on production, it is crucial to create the best possible conditions for manufacturing to return to full capacity utilization. But in a longer perspective this concerns – besides the direct effects on GDP and employment – the fact that we play a highly risky game as concerns continued technological development and future progress in research. A growth policy based on the needs of manufacturing contributes to the growing number of knowledge intensive service firms that many experts consider to be the future employment engine, and creates the necessary condition for improved living standards in the Western world.

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