Does Sweden give away its TFP for free?

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Introduction

Almost 50 years ago Robert Solow[i] started up a new era in growth measurement by publishing his article on economic growth and technological development in the US economy. He used the technique of Growth Accounting to break down growth in US labour productivity into components. His results indicated that almost all growth in the US economy was due to technological developments and very little to capital deepening. This inspired Zwi Griliches and Dave W. Jorgensen[ii] to try to improve the capital measurements. Another important contribution was made by Denison[iii] who tried to incorporate a measurement of the improvement in labour quality. This period of rapid development of the neoclassical growth theory and use of the Growth Accounting technique lost momentum due to researchers' increasing interest in short term questions, a lack of adequate data and the fact that growth was treated as exogenous in the neoclassical world, so these theories could not explain growth in itself.

This changed drastically when Romer[iv] published his breakthrough article in 1986, where he finally incorporated endogenous growth in the model. This started up a new field of growth literature, which was called "new" or "endogenous" growth theory. But still the neoclassical growth theories have their supporters. Even if these theories cannot explain the driving forces behind different growth rates, they can still answer important questions, like if there is a tendency towards convergence (see among others Barro and Sala-i-Martin.[v]) The technique of decomposing economic growth by Growth Accounting has been widely used during the last decade with many important contributions, not least by Dale W. Jorgensen[vi] , who is still very active in this field.

An important trigger has been the improved growth performance of the US economy. It ceased to lose ground to the European economies around 1995, as had been the case since the Second World War, and outperformed them thereafter.

The new development in the research field together with the increasing importance of the European growth problem has also led the EU Commission together with Eurostat to act. They have commissioned a development and analysis of a comprehensive long time series for most European countries.

The OECD has always had economic growth on its agenda, and has recently created a productivity section on their website on growth accounting, with both methodological papers and a database. In the Nordic countries Statistics Denmark has led the way and has published multifactor productivity growth figures on a very detailed sector level as early as 2004.[vii].

What we want to achieve

At Statistics Sweden this kind of work is still on an experimental level, but two studies made by external researchers have already been published in this field. All this work inspired us to go on with our own experiments in the growth accounting field. This resulted in an in-house study[viii] which was published late 2005, where we tried to go beyond the value added and capital stock approach and used the KLEMS method. This means that growth of gross output is decomposed instead of growth in value added. In this attempt capital services were used as measurement of capital input instead of capital stock. The capital service concept is an important improvement since a stock concept is changed into a more appropriate flow concept. This concept also markedly appreciated the relative cost of ICT investments compared to other capital types, especially buildings, since the depreciation rate is much higher and its price developments are much lower. The other major difference is the use of the KLEMS concept which means that intermediate input also becomes an input variable. Compared to this study we have now calculated the TFP on a more disaggregated level, which allows us to create aggregates according to some interesting variables such as R&D intensity, ICT intensity and Human Capital level. This gives us some indications of what the driving forces are behind the TFP growth.

We have also tried to measure some of the effects of the globalisation through the mechanism of international specialisation. The specialisation leads to productivity increase which gives better rewards to producers, their employees and customers. This analysis has been done by comparing the

TFP and price changes for different industries to see if there is any relationship. We have also tried to calculate the export and import of TFP for Sweden even if this calculation is based on the rather dubious assumption that the imports of goods and services have produced in sectors with the same TFP developments as their Swedish counterparts.

TFP developments in the Swedish business sector

Our aim in this part of the study is to calculate total factor productivity, TFP, for 52 industries in the Swedish business sector. The calculations are carried out by the use of the KLEMS model. This means that we incorporate the input of capital as well as labour and intermediate consumption in the production function.

Further, we will use the calculated TFP for all the industries in order to calculate total factor productivity estimates for the total business sector and other major aggregates in the Swedish business sector.

All data on production, capital stocks, hours worked and intermediate consumption are collected from National Accounts, Statistics Sweden. The indicator on labour quality is based on data from a micro database with register data. See Appendix 1.

Using sectoral output as the measure on production we are netting out the production and consumption of intermediates produced within the industry. Input of intermediates is also the net of inputs produced within the industry.

$$S_i = Y_i - M_{ii} = K_i + L_i + M_{ij,j \neq i} \qquad (7.1)$$

S_i is sectoral output, Y_i is gross production and M_{ii} equals consumption of intermediate inputs produced within the industry. K_i and L_i represents input of capital and labour respectively and $M_{ij,j \neq i}$ is input of intermediates net of inputs produced within the industry.

The model consists of input of capital services of machinery exclusive ICT, transport equipment, ICT and structures. As a measure of labour input, worked hours is used together with a measure of labour quality. Intermediate input is divided in the input of energy, materials and services.

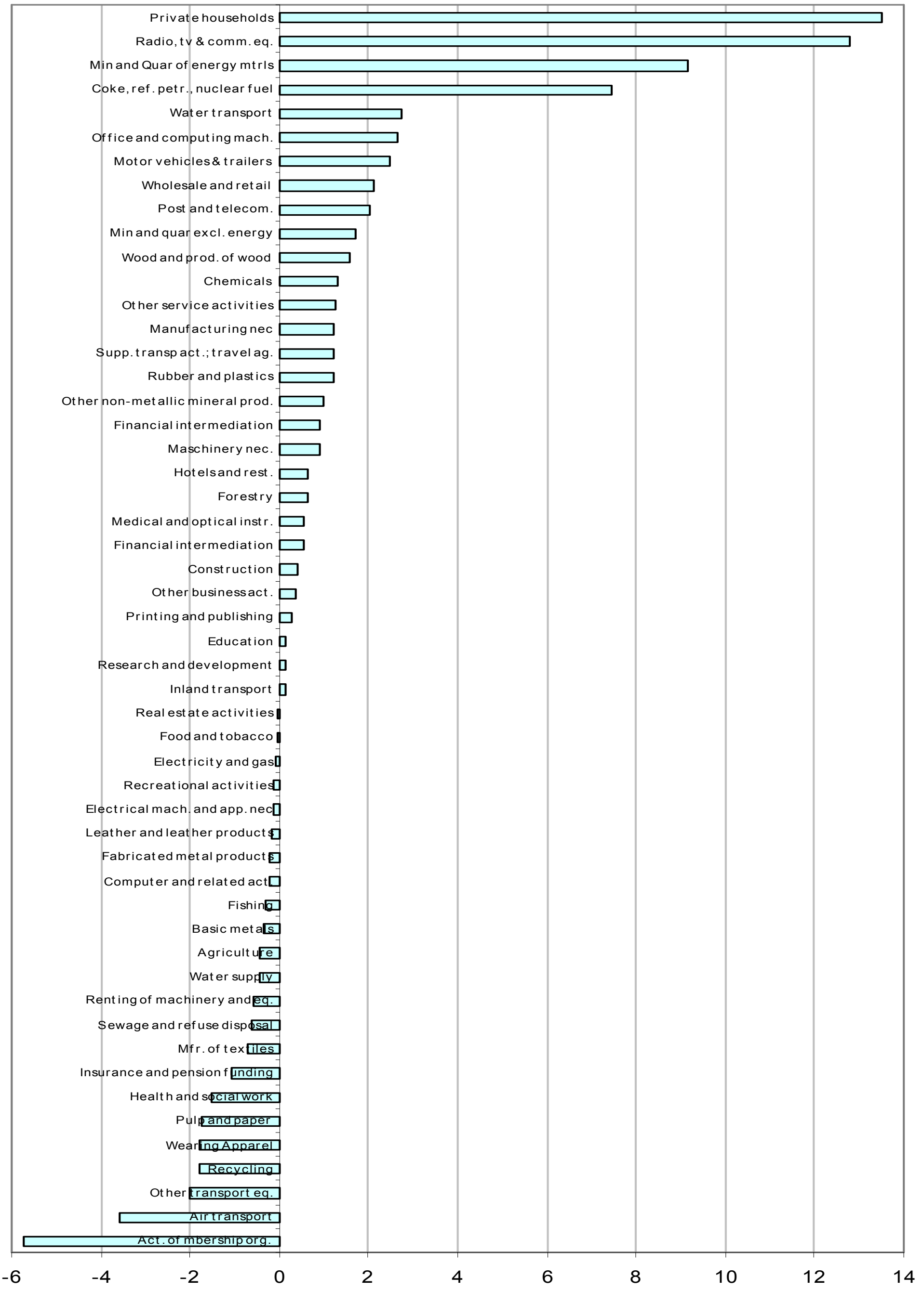
For the calculations of TFP we have chosen to work on a 2-digit ISIC level. The time period studied is 1994 to 2005 as a consequence of available data. Gross production has only been available until the year 2003. For the years 2004 and 2005 gross production has been estimated using the growth in value added for each industry. However, this method caused extreme estimates on the growth in the *telecom industry*. To correct for this we had to lower the growth by the relation between average growth of gross production and value added for the period 1994 to 2003. Still, even after reducing the growth from 120 percent to 26 percent in 2004 the growth in production is very large leading to a high estimate on TFP for that same year.

Figure 7.1 displays the calculated average TFP for the 52 industries in our study. The average TFP for all industries ranges from -5.7 percent for *membership organisations nec*, to 13.5 percent for *private households*. The result of *Private households* depends heavily on the growth in output during 1994 and 1995. Due to no estimations on output in 1993 this observation had to be modelled. Also, the growth in output in 1995 was dramatic. Further, there are no inputs of capital or intermediates in this industry. The conclusion is that a comparison between *Private households* and the other industries are hardly meaningful.

The same is also true for the industry *Membership organisations for the business sector nec*. A major change in their roll has led to a dramatic decrease in their production. That is, it seems that they no longer sell so many different services to their members but instead depend on their membership fees. This means that they nowadays have a wage cost that is more than twice their value added in current prices. This, in combination with a constant input of labour has caused the low estimate on average TFP.

The result of the calculations is that 29 industries had positive growth in average TFP during 1994-2005, leaving 23 industries with a negative average TFP. Looking at figure 7.1, four groups of industries are identified. First there are four industries with very high TFP growth. Belonging to this group are *Private Households*, *Telecom*, *Mining and Quarrying of Energy Materials* and *Refined Petroleum and Nuclear fuel*. For this group TFP ranges from 7.5 percent to 13.5 percent. For the majority, 46 industries, TFP ranges from -2.0 percent to 2.7 percent. Of them 25 industries had positive growth in TFP and 21 industries hade a negative growth rate. The last group, with very low estimates on TFP growth, includes *Air Transport* at -3.6 percent and *Membership organisations nec.* at -5.7 percent.

Figure 7.1. **Average TFP for the total business sector 1994-2005**



Source: Statistics Sweden

TFP at intermediate level

To study productivity at a more aggregated level, the TFP calculated at industry level is aggregated using *Domar* weights. *Domar* weights are normally used in aggregating to the total business sector. In this study, aggregating to an intermediate level, we used a different method calculating the *Domar* weights.

The idea behind *Domar* weights is to take into account both the productivity growth within individual industries and the indirect effects of productivity streaming upwards when industries benefit from more efficiently produced intermediate inputs. These cumulative gains in productivity are accounted for by the fact that the sum of the *Domar* weights exceeds unity. When aggregating to the total economy *Domar*-weights are calculated as

$$\delta_i = Y_i / \Sigma V_i \qquad (7.2)$$

Where δ_i is the *Domar* weight, Y_i is gross production and ΣV_i is sum of value added for the total business sector.

Our set of *Domar* weights, when aggregating to intermediate levels, is calculated for each of the industries as

$$\delta_i = Y_i / \Sigma V_i \qquad (7.3)$$

Where ΣV_i is sum of value added for a particular business sector.

In this study the industry TFP is aggregated into six intermediate aggregates and the total business sector. The result for the *Construction* sector will also be displayed (even though no aggregation is necessary in this case).

Using our methodology one has to bear in mind that the effects of some industries on aggregated TFP is likely to vary between aggregating at an intermediate level and at the total level. This will be true if one industry totally dominates an aggregate in combination with a high average TFP for that particular industry. This results in comparisons between the intermediate levels and the total level that are probably not meaningful. Nevertheless, comparisons between intermediate aggregates such as the *Goods* Sector and the *Service* Sector should be both possible and meaningful.

The results would then anyway be useful in order to observe trends in TFP growth in respective sector. Further, the results would also be useful as an indicator of which sectors that have played important roles on the growth in TFP at the total business sector level.

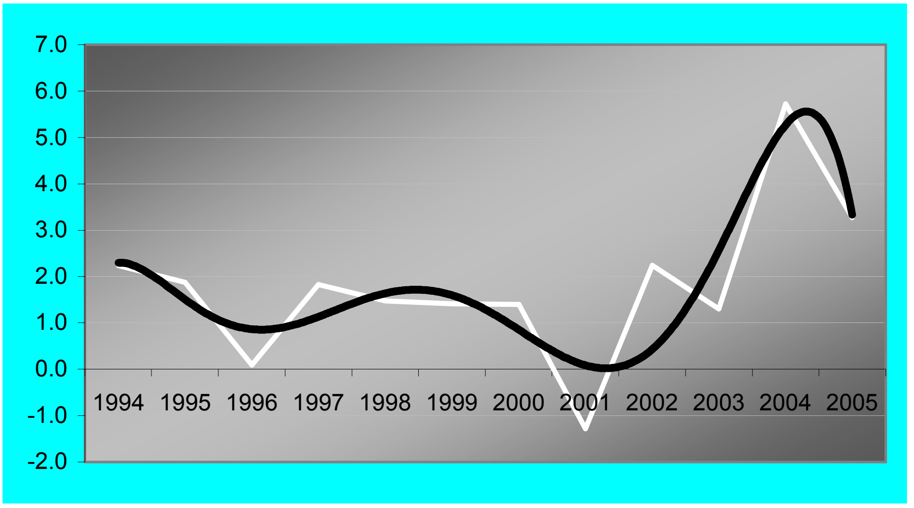
Table 7.1 displays the aggregates for which the calculations is been made.

Table 7.1. Definition of aggregates

Total Business Sector	ISIC 01-95
Goods Sector	ISIC 01-45
Service Sector	ISIC 50-95
Manufacturing Sector	ISIC 15-37
Construction Sector	ISIC 45
Distribution Sector	ISIC 50-52, 60-64
Financial and Business Service Sector	ISIC 65-67, 70-71, 73-74
Other Services Sector	ISIC 55, 80-95

With the exception of the year 1996, the growth in productivity in the total business sector was very stable and at a reasonably high level from 1994 to 2000 (figure 7.2 with the actual observation in white and smoothed with a six period polynom in black). In 2001, a year marked by the crisis in the telecom and the ICT sector, the growth rate became negative. This is also the only year with a negative productivity growth for the total business sector during our estimation period. After 2001, there is quite a dramatic upsurge in the growth rate during the years 2002 to 2004. At the end of the period in 2005, productivity growth falls back to still a very high 3.5 percent.

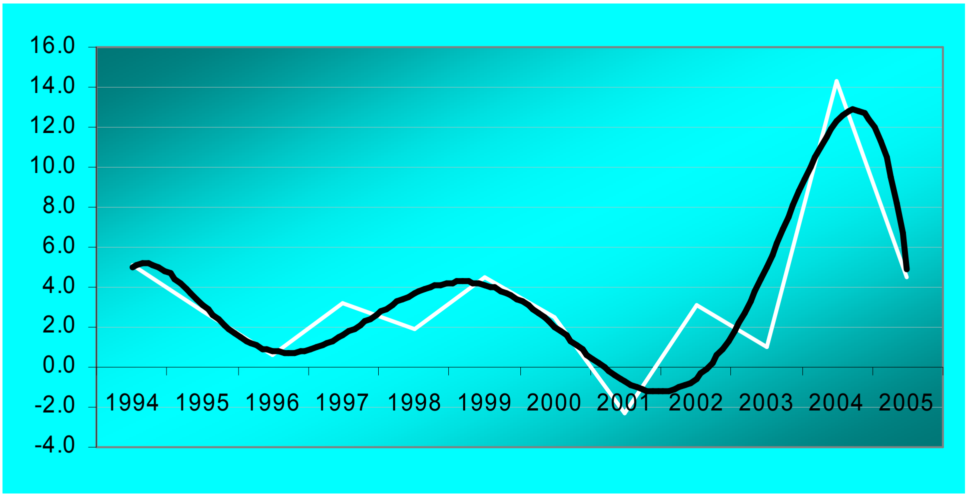
Figure 7.2. TFP for the Total Business Sector 1994-2005



Source: Statistics Sweden

The major difference between the Goods Sector and the Total Business Sector is the level of the growth rate. During almost every year the Goods Sector shows a higher growth in productivity.

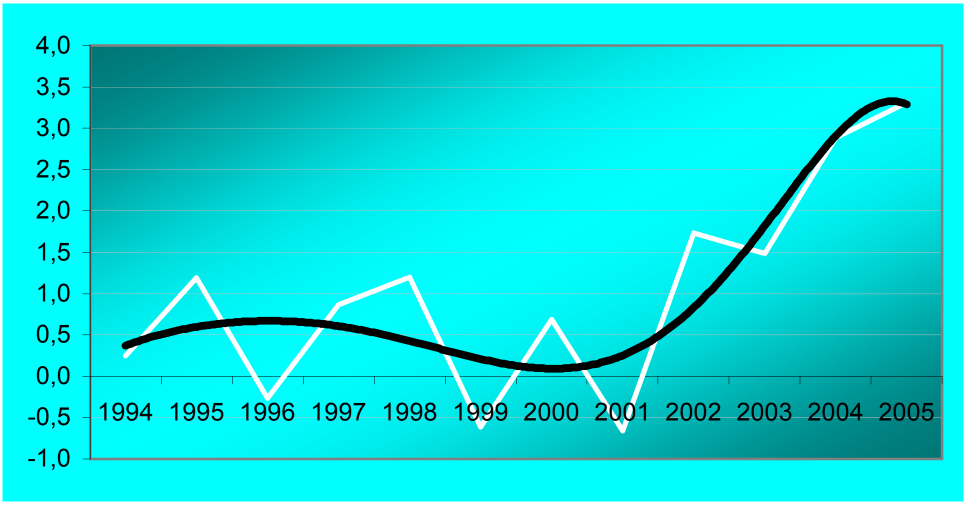
Figure 7.3. TFP for the Goods Sector 1994-2005



Source: Statistics Sweden

It is interesting to see that this is also the case in absolute values in the 2001 due to, probably, the larger impact of the telecom sector in the Goods Sector.

Figure 7.4. TFP for the Service Sector 1994-2005

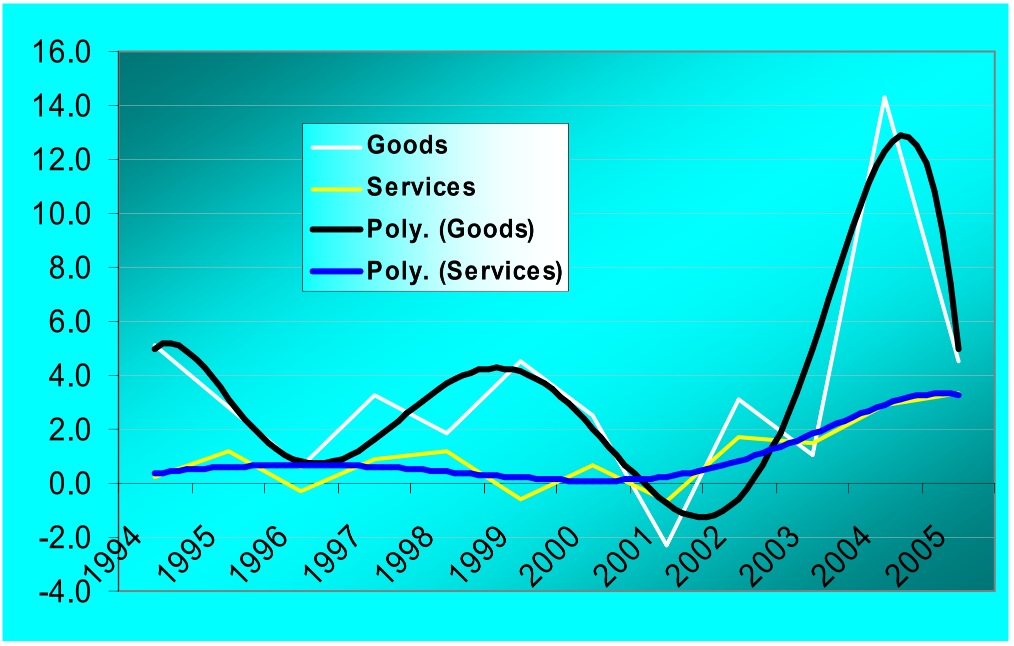


Source: Statistics Sweden

The level of the TFP growth in the Service Sector is low during the beginning of the period until the year 2002. The average level is significantly lower than in the Goods Sector. This is probably the case in reality as well, but the result may be distorted by the lack of relevant indices for the Service Sector. Due to this lack of relevant indices, wage indices have been used for deflating gross production. Rising wages in the service sector have then led to a possible underestimation of the productivity growth. In this sector productivity growth is negative for three years. During the last four years work on creating producer price indices for the Service industries has led to a marked difference in the measures of development of the production of services. This is a process that is still ongoing. From the year 2002 the Service Sector follows the same pattern as for the Total Business Sector and the Goods sector with a strong resurgence in TFP growth.

In order to get a better view of the differences in the development of the Goods Sector and the Service Sector they have been incorporated in the same figure, namely 7.5. It is obvious that they have had very different development both in level and in their growth patterns.

Figure 7.5. TFP for the Goods and the Service Sector 1994-2005

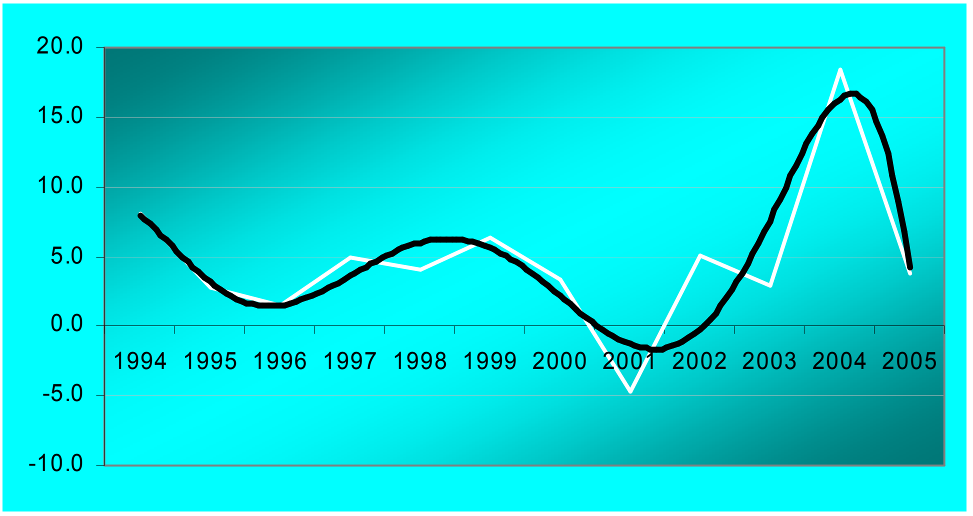


Source: Statistics Sweden

The growth in TFP in the Manufacturing Sector is of natural causes very similar to the growth in the Goods Sector, since it constitutes a very large part of it.

However, one has to bear in mind that the *Telecom* Sector is rewarded with a large *Domar* weight in this aggregate. In combination with high average TFP growth this large *Domar* weight of *Telecom* causes a possible overestimation of the TFP growth for the whole sector. Again, we see the significant rise in TFP growth from the 2002 onwards.

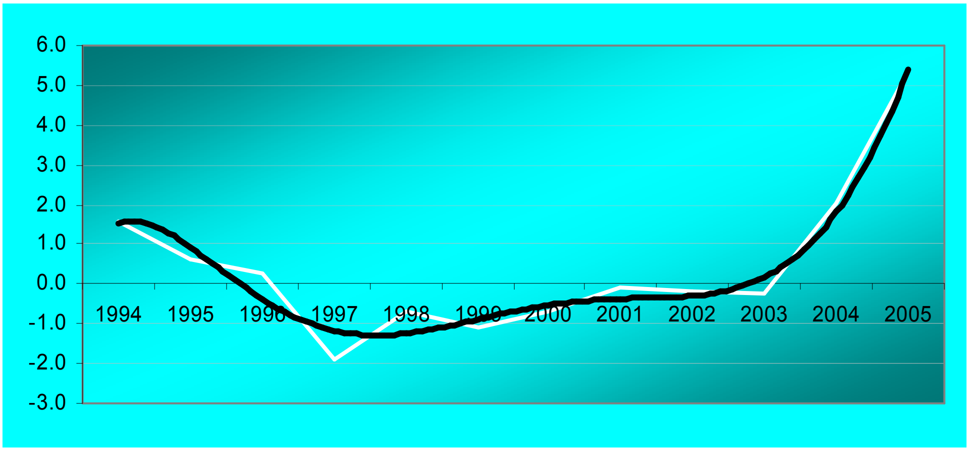
Figure 7.6. TFP for the Manufacturing Sector 1994-2005



Source: Statistics Sweden

In the Construction Sector the growth in productivity has been negative for several years. This is probably the effect of both low competition and a low level of activity in this sector. Starting with positive but diminishing growth in 1994 to 1996 growth in TFP has picked up dramatically in 2004 and 2005.

Figure 7.7. TFP for the Construction Sector 1994-2005

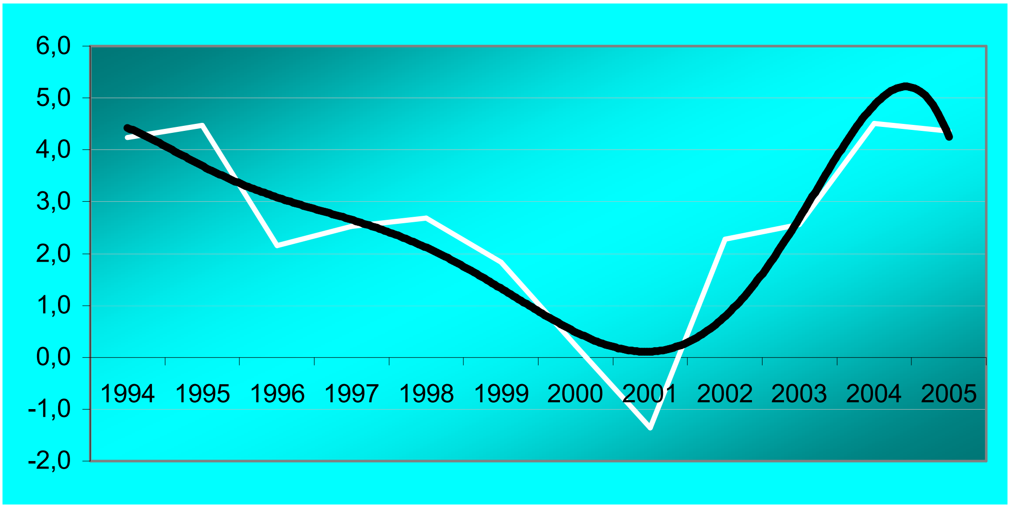


Source: Statistics Sweden

This rise in TFP growth during the last years probably also reflects the boom, driven by low interest rates which together with some other factors have resulted in high demand on both dwellings and office buildings the *Construction* sector in Sweden has expired .

Starting at high but diminishing rates of productivity growth the Distribution Sector hit bottom in 2001. From that time on productivity rates grew higher during the following three years. The growth rate in 2005 is according to the result still on a high level though at a fraction lower than in 2004. The good TFP growth in the distribution industry is in accordance with the US and Canadian experience even if it has a different pattern with productivity improvements in the existing forms and not so much from new players as in for example Canada[ix]

Figure 7.8. TFP for the Distribution Sector 1994-2005

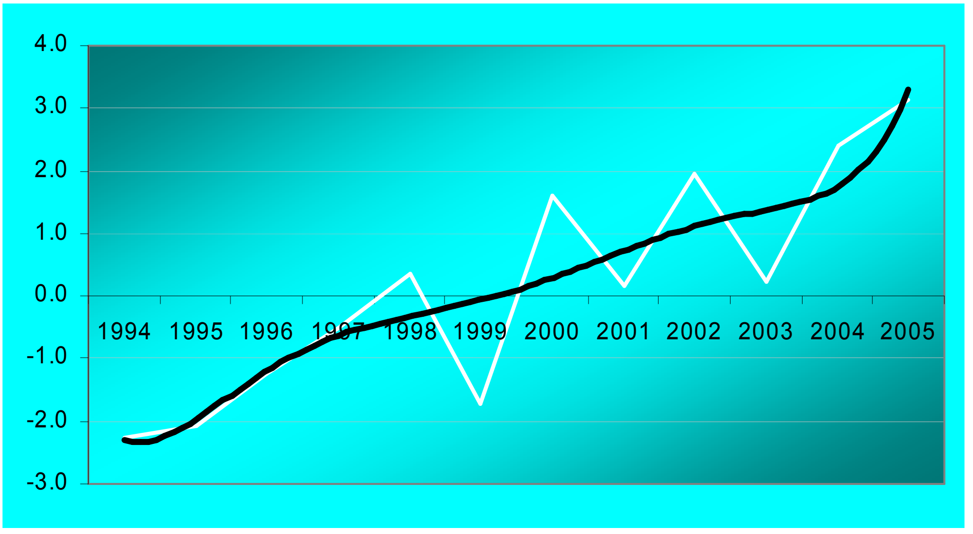


Source: Statistics Sweden

In the Finance and Business Service Sector the trend in TFP growth is significantly strong and positive.

During the late 1990s, except in 1998, the growth in productivity was negative but ascending. From the year 2000 the productivity rates have been positive, though a bit jumpy, keeping a strong upward trend.

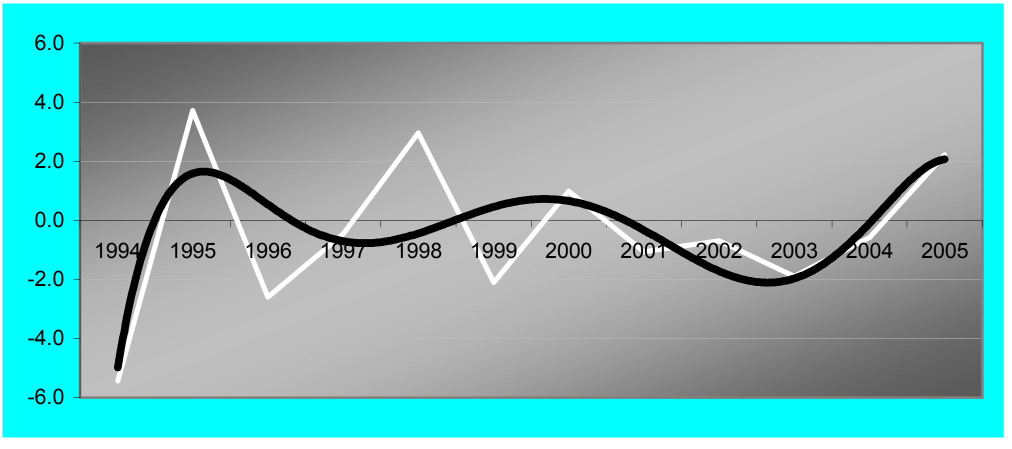
Figure 7.9. TFP for the Finance and Business Services Sector 1994-2005



Source: Statistics Sweden

The fall in prices of real estate and the banking crisis in the beginning of the 1990s are, with most certainty, reflected in the low and negative TFP growth during that same period. In recent years profits have gone up dramatically, especially in the banking sector. With less input of personnel the rates of productivity have been growing ever since.

Figure 7.10. TFP for Other Services 1994-2005



Source: Statistics Sweden

The growth rate of productivity in the sector of *Other services* has been very volatile during this period. Several years has displayed negative rates of productivity growth. During the years with positive growth, the rates have still been quite low. There is also no sign of a trend in the TFP growth. These industries are very important as intermediates in most other industries and their low productivity developments have thus a major impact on these. However their productivity increases are probably underestimated due to high price deflators especially during the period up to the very last years, when better deflators have been introduced successively.

Overall, our results show a strong resurgence in the productivity growth from the low point in 2001 in all of the main sectors. In comparison with our earlier study this new set of TFP estimates coincides very well at the intermediate level, according to trends and relative levels of average growth in productivity between the major sectors. However, one should recognise the fact that these new estimates are at a considerably higher level due to the use of weighting individual industries' TFP with *Domar* weights.

What is behind the TFP development?

In order to further analyse the concept of total factor productivity we studied the relationships between TFP and ICT intensity, labour quality and investments in research and development, R&D, respectively.

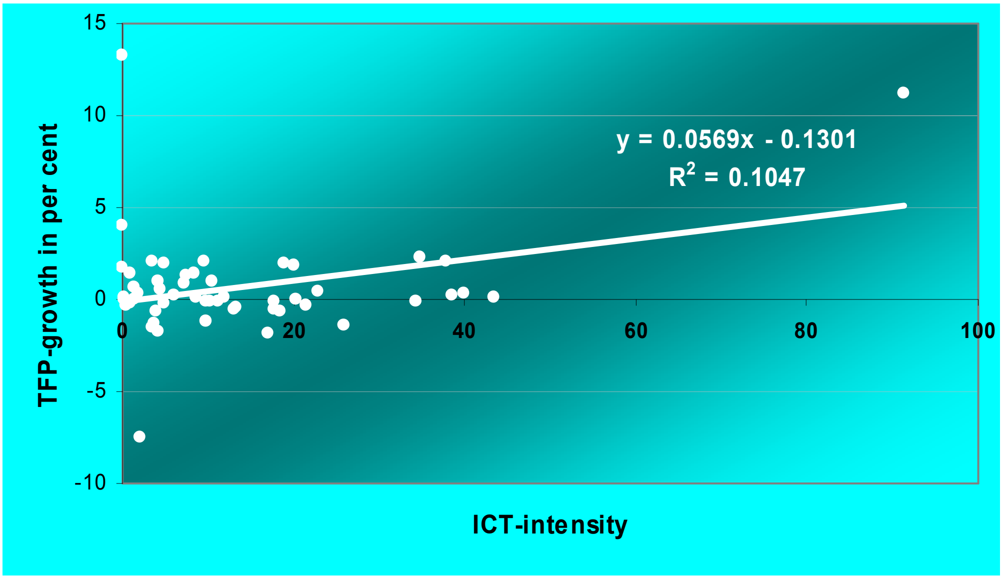
ICT intensity

To evaluate the impact of ICT on TFP we first constructed an indicator of ICT intensity. This indicator was estimated by dividing the stock of ICT capital by value added for each industry using values for the year 2003.

In order to evaluate the strength of the relationship between ICT intensity and TFP, average TFP for the period 1994-2003 for each of the 52 sectors was plotted against our measure of ICT intensity. The result is displayed in figure 7.11.

What we find is a weak but significant and positive relation which shows that if the ICT intensity is raised 10 percentage point, average TFP is raised 0.57 percentage points. The R-square is 0.105 which indicates a low level of explanation.

Figure 7.11. Average TFP 1994-2003 and ICT intensity 2003. In percent

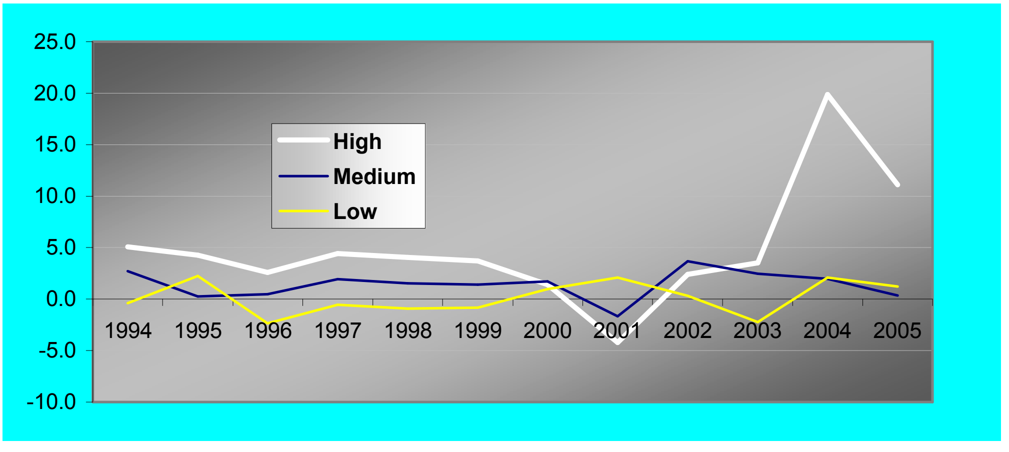


Source: Statistics Sweden

Next, all industries were ranked according to this ICT intensity measure and divided into three equally large groups referring to high, medium and low ICT intensity.

Figure 7.12. Average TFP for the period 1994-2005

Industries divided according to ICT-intensity



Source: Statistics Sweden

Average TFP for each group was then compared against each other over the period 1994-2005. The results are displayed in figure 7.12.

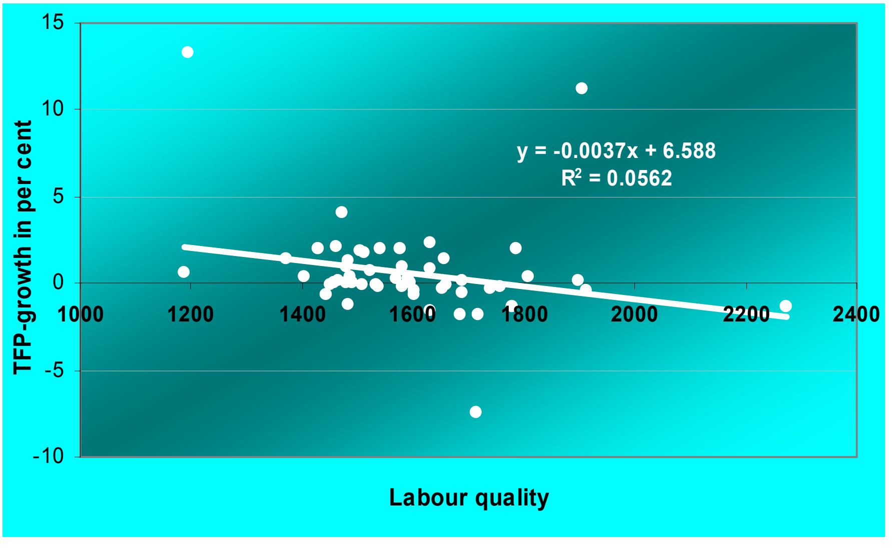
The result clearly indicates that industries with high ICT intensity also have been more successful in raising their productivity. During almost the entire period the group with the highest ICT intensity shows higher rates of productivity. We also see that the group with the lowest ICT intensity shows the lowest rates of productivity. The years 2001 and 2004 are clearly marked by events in the telecommunication sector.

Labour quality

We also studied the relation between labour quality and TFP. Our measurement is based on how the market values different education orientations and levels as well as age and ethnicity. Se Appendix 1.

Figure 7.12 describes the relation between labour quality and average TFP. On the Y-axis we have average TFP for the period 1994-2003 and on the X-axis we have labour quality for the year 2003. Our estimations indicate a negative relationship between labour quality and TFP, contrary what is to be expected. Most of the observations are very concentrated and the relation is clearly affected by a few extreme values.

Figure 7.13. Average TFP 1994-2003 and Labour Quality 2003

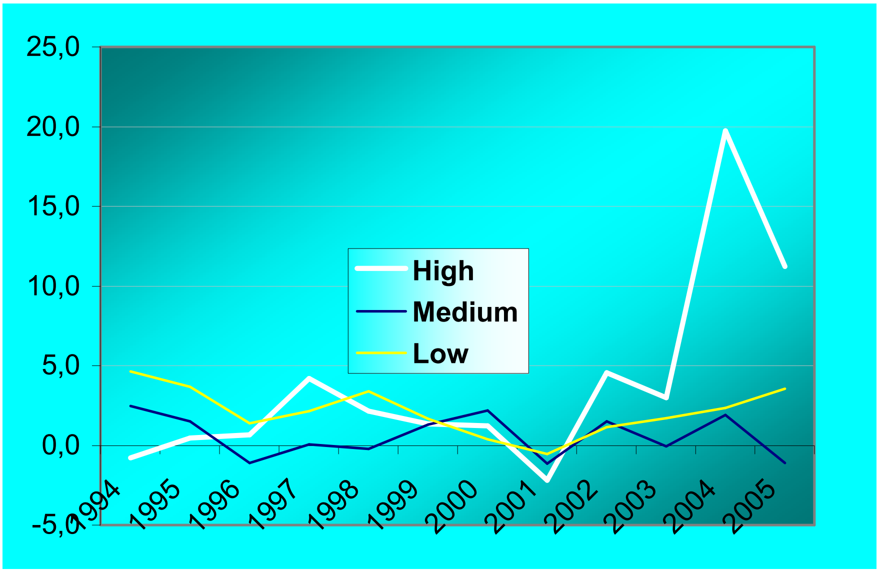


Source: Statistics Sweden

This is probably also affected by the problem with price indices for some of the service industries with a highly educated staff. If one neglects the effects of the two extremes, *Research and Development* and *Private Households,* the relation changes a bit. In this case we get a positive relation between labour quality and average TFP. However, the R-square is in this case very low and not significant.

Following the method described above the 52 industries were again ranked according to our measure of labour quality. The data set was divided into three groups reflecting the status of the labour force in each group. The average TFP for each group was then compared against each other over the period 1994-2005. The result is displayed in figure 7.14.

Figure 7.14. Average TFP for the period 1994-2005



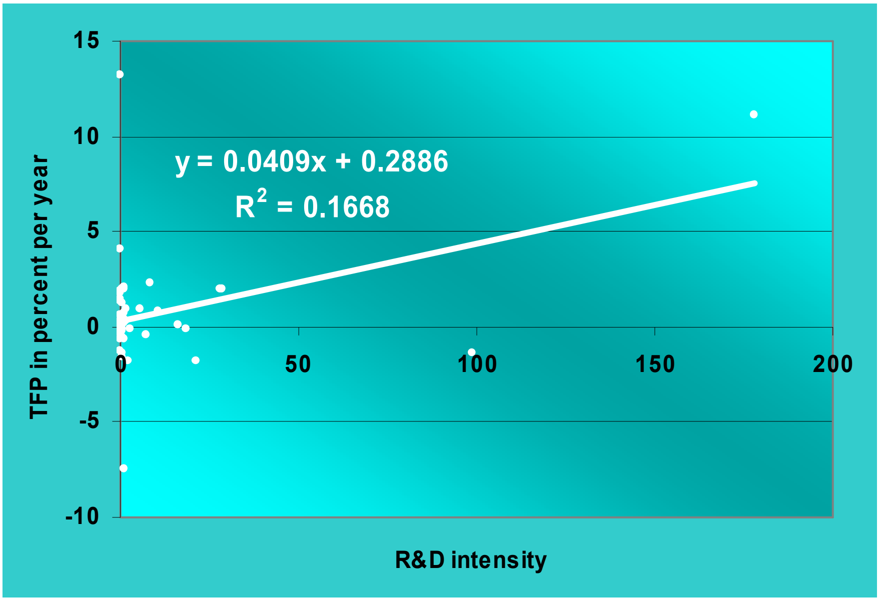
Source: Statistics Sweden

During this period we see that the group including the highest rewarded employees, for most of the years shows the largest average TFP. This is especially true during the years 2002 to 2005. In six of the years this group shows the highest rates of TFP. The average TFP for the three groups is 3.3 percent, 0.3 and 2.0 percent respectively. Obviously, the relative high TFP in the year 2004, has a large effect on the average TFP for the whole period for the group with the more productive employees. One reason why the industries with rather low qualified personal beat the medium group in TFP-development is that it includes more manufacturing industries.

Research & Development

Finally we constructed a measure of research and development intensity for all industries according to their investments in R&D relative to their value added. Again, the relationship between average TFP for all 52 industries during 1994-2003 and the share of investments in R&D was examined.

Figure7.15 Average TFP 1994-2003 and R&D intensity 2003



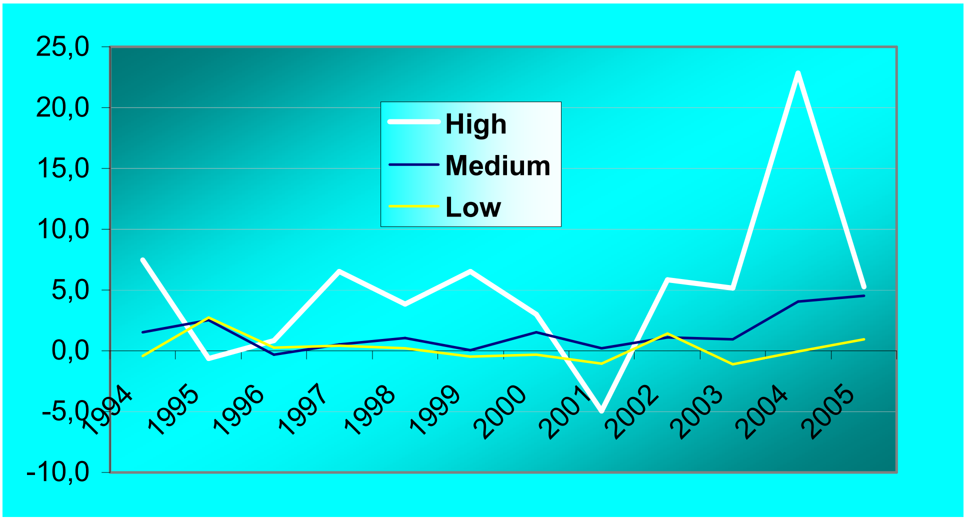
Source: Statistics Sweden

According to our results there is a weak but significant and positive relationship. The result is obviously affected by the extreme value of the telecom sector.

Finally, three groups were formed according to each industry's investments in R&D relative to their value added. Figure 7.16 displays the comparison of the three groups average TFP over the period 1994-2005.

Also in this case, the group with the highest ranked industries has been more successful in raising productivity. In almost all years this group raises productivity more than the other two groups. The medium group also beats the industries with the least research and developments most years.

Figure 7.16. Average TFP for the period 1994-2005



Source: Statistics Sweden

So far the influence on the TFP growth of R&D, labour quality and ICT has been studied separately. This means that we do not know what the impact of each variable is when the others are held constant. To get this knowledge a simple OLS regression (weighted by value added) has been estimated with a dummy for the service industries. All the variables became significant on at least the 2 percent level, and more than 50 percent of the differences in TFP (R^2adj=0.54) are explained. However, the coefficient for the labour quality became not too surprisingly negative. This means that when the effect of labour quality on ICT and R&D is excluded it is negative, but as mentioned earlier this could at least in part be explained by the price indices and problems with rationalisation in some service industries with a very qualified staff.

As was very clear from our analysis earlier the service industries have lower TFP growth. Actually they have 1 percent lower TFP-growth per year given the other variables. The coefficient for R&D intensity indicates that an increase of 10 percent of the value added gives an increase in TFP-growth rate by a little more than 0.4 percent per year, and an increase of 10 percent of the proportion of ICT-capital in relation to the value added gives almost the same effect or 0.4.

The Swedish trade balance in TFP terms

Technical change and competition are the main driving forces

Total factor productivity is often called technical change; this implies that innovation is the main force behind the TFP growth. Important factors that are involved in the creation of an innovate environment are research, ICT use and human capital. As already mentioned, this was the reason why we studied the relationship between these factors and TFP development on the industry level. In figure 7.11 it was possible to see a relationship between R&D intensity and TFP growth. The observations in this figure were however industries, not single firms.

But let us look at the situation for a single firm. If a firm is really innovative and does not just spend a lot of money on R&D, it will increase the value of its products and services or improve its production and distribution, if its innovation has more of a product orientation or process orientation. If the firm is a true monopolist or has more limited monopoly power, in scope or time, based on patents or on the advantage of being first in the market, the firm can expect to benefit a lot from its innovation. But if its position in the market is weaker due to strong competition by other innovative firms, the rewards will be just a fraction of the total benefits of this innovation to society. A market where there are many examples of both these alternatives is the market for ICT goods and services.

In the 1960s IBM had a very large market power and huge profits, as Microsoft in the 1990s and Google in recent years. But most of the submarkets of the ICT market are characterized by fierce competition, where a firm's innovative ability does not guarantee large profit margins. Those who have benefited most from the rapid technological developments are the customers who have continuously received better products and services for the same or lower prices.

In an industry that is less dynamic and where fewer innovations are taking place, the customer can normally not expect falling prices even if the competition is intense. But if such a market undergoes a dramatic change, for example opens up to international competition, the prices can fall even on a rather stagnant and not so innovative market as the Swedish food market. When Sweden joined the EU the Swedish food producers, both the farmers and the food processing industry, suddenly had to compete with other European firms. And during the last years new players have entered in the national distribution market in the form of foreign grocery chains that have established themselves in Sweden. Both these major changes in the competitive environment have led to lower prices for the Swedish consumers. During the 1980s the CPI for food increased by 0.7 percent more per year than the total CPI, but after 1990 it has increased by 1.7 percent less. So there are two major forces that influence price development: technical changes and competition in the market.

Who benefits most from TFP growth?

It is not only a continuous fight between producers and their customers of how much each should benefit from technological development. It is also in fact a competition among nations. If for example a country produces a lot of IT hardware it could be expected to benefit from the rapid productivity growth that gives a boost to their GNI. This is of course true in volume terms with fixed prices, but not as self evident when it is measured in current prices. And the transaction between countries is done in current prices. If a country's trade balances, it does so in current prices. The country has to buy its imports with the euros it receives from its export. If international competition is fierce, the national firms have to charge lower prices than they could this year in order to sell their products to other countries also next year. This means that they cannot distribute as large sums to their employees and their owners as they otherwise could have done. In turn their employees and owner cannot buy as many foreign consumer goods as if their employer could have been able to keep the price level from this year. In the trade battle between nations it is of utmost importance to a country to sell its products for as much money as possible and buy as cheap as possible. If a country's export is dominated by products and services that are produced by industries with high TFP growth sold on very competitive markets, it will have to sell them at decreasing prices and thus give away a large part of the rapid TFP increase to customers in other countries. But on the other hand it is of course an advantage to specialise in high tech industries with a high TFP growth since this increases the growth rate of the country. The trick is to produce products with high TFP growth rates with rather weak competition or use a lot of them in your own country. But it is definitely an advantage to import a lot of products and services with high TFP growth sold on very competitive markets.

The input of goods and services also matter

The prices of goods and services are not only dependent on the changes in the internal process of the firm that sells them, that is, the development of its value added. The income from sales, or gross production, depends thus on the value added, or the contribution that a firm does itself to all the inputs that it buys from other firms, as well as inputs such as: raw materials, intermediate goods, energy and services. For companies that produce a goods, their value added is in general worth considerably less than half of the value of the finished good. Value added is more important for many service firms, but for all firms the inputs bought from other firms are of great importance.

The change to the prices of the goods or services that a certain industry sells therefore depends not only on the TFP growth of its own industry but also on the TFP growth of all the industries that it uses as inputs. For example if the price of crude oil increases, some industries like the petroleum refineries that use crude oil as an input are faced with increasing costs. Since they do not add much to the value of their inputs and thus can not absorb any of this cost increase, they pass them on to their customers. Among these customers, the land transport industry and the real estate business are important. The land transport industry has good TFP growth and does not need to pass on so much to their customers. On the other hand, the real estate firms have difficulties to improve their productivity.

In order to incorporate all these linkages it is necessary to use the inverse of the input-output matrix. This matrix gives us the required information if we reduce each element in the diagonal vector by 1. We will therefore multiply this version of the inverse of the I-O-matrix with the vector with the growth rates of the Gross Production TFP. This transaction will give the TFP of the inputs of each industry. Then the TFP for the value added of an industry will be weighed together with this input TFP to get a new gross production measurement with respective weights for the value added and the inputs for each industry.

$$TFP_{GPNEW} = (1-(VA/GP))x\ [(I\text{-}O)_{Adjust}^{-1}\ x\ TFP_{GP}]+(VA/GP)xTFP_{VA} \quad (7.4)$$

There $(VA/GP)xTFP_{VA=}\ TFP_{GP}$

TFP_{GPNEW} = A 1x57-vector with the growth rates for the new measurement, which is defined in the equation above for Total Factor Productivity for Gross Production for each sector

TFP_{GP} = A 1x57-vector with the growth rates for Total Factor Productivity for Gross Production for each sector

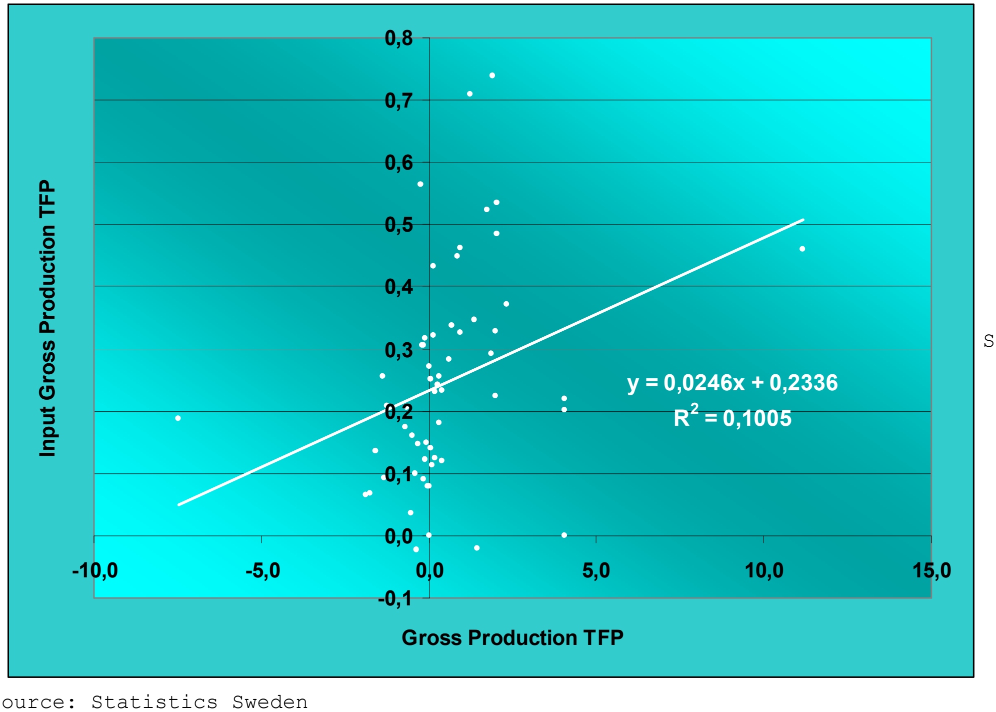
TFP_{VA} = A 1x57-vector with the growth rates for Total Factor Productivity for Value Added for each sector

$(I\text{-}O)_{Adjust}^{-1}$ = The inverse of the input-output matrix with an adjusted diagonal vector, and thus a 57x57 matrix

(VA/GP) = The value added part of the gross production

Ideally an I-O matrix for every year from 1993-2002 should have been used, but since there are only matrixes for 1995 and 2000, we have chosen to use the year 2000 version for the whole period. In figure X.1 the relationship between the traditionally calculated TFP for different industries and the input TFP for the same industries is shown. Two things are apparent, the relationship between the two measurements is very week and the average values for the inputs are much lower. The last mentioned is due to the fact that production from industries that is used intensely as inputs have generally low and in some cases even negative TFP developments. Actually the industry that has the by far the largest average weight, the business consultancy industry, has a negative TFP.

Figure 7.17. The relationship between the standard and the New Gross Production TFP



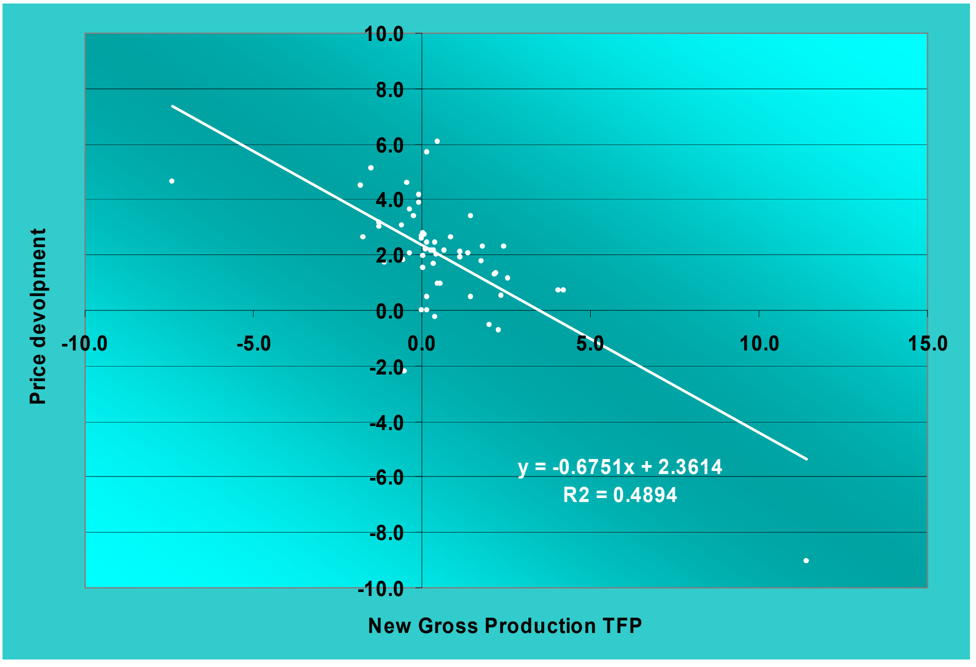
S

ource: Statistics Sweden

The same is true for two of the other three industries with very high weights, land transport and real estate services. The only exception is trade, which has a relative high positive TFP. In addition, some industries with rather low weights but with large negative TFP-developments drag the average down. This means that the New Gross Production TFP is not that much larger than the traditional Gross Production TFP.

But these TFP growth rates are based on our national data, and especially the inputs of goods are imported to a large extent. This creates a major problem, since we do not have access to a comprehensive set of TFPs for Sweden's major trading partners. In this exercise we are limited to use the TFP growth rates for the same industries in Sweden as proxies. They should in most cases give us a reasonably good approximation since in the integrated world of today technological progress should be more or less the same the world over, especially in the goods producing industries, while the service industries are still mainly national.

Figure 7.18. The relationship between the new gross production TFP and Prices 1993-2003

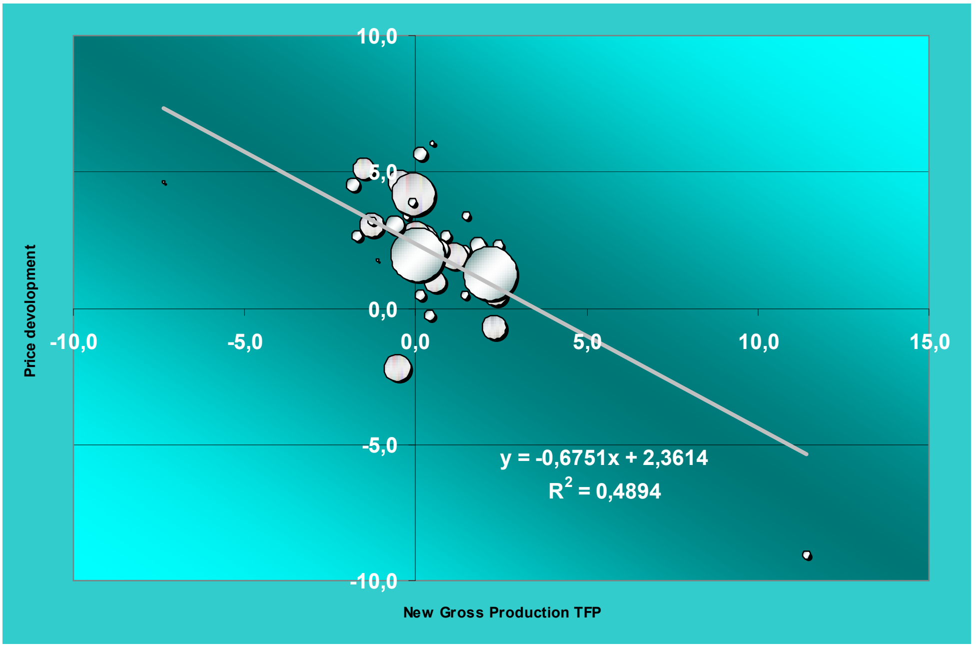


Source: Statistics Sweden

However there is a reason why a country imports a certain type of good from a particular country. And this reason is of course the latter country is in relative terms a competitive producer of this type of goods. If some countries have a comparative advantage in producing certain types of goods, they probably also have done well in the TFP field, so all the TFP growth rates are definitely not the same. But this kind of data should soon be available from the EUKLEMS project[x].

As can be seen in figure 7.18 the relationship between the prices and TFP is quite clear but not very strong. And apparently a couple of extreme observations have strengthened it markedly. If these observations are excluded the R^2 drops to a just over a third of its original value. However, taking the result as it is it tells us that an increase of the TFP growth rate by 1 percent per year gives a price increase of 0.675 less percent per year. That means that two thirds of the benefits of technological change are on average passed on to the buyers.

Figure 7.19. The relationship between the new gross production TFP and Prices 1993-2003



Source: Statistics Sweden

Compared to the similar Canadian[xi] calculation there is a marked difference especially taking into account the importance of the extreme observations in the Swedish case. The Canadian data is based on a very long time period, namely from 1961 to 1995, and the traditional gross production concept. The correlation coefficient of in this dataset is 0.8 compared to 0.7 for the full Swedish data with the same TFP-definition. Their result is also not as dependent on some extreme values as in the Swedish case. This gives an indication that the competition in the Canadian market is generally tougher than in the Swedish market.

However, the differences in importance between industries are quite large in Sweden. As an illustration of this fact a new version of figure 7.18 is shown in figure 7.19 where the industries are marked with spheres that are proportionate to their relative share of the value added of the whole business sector. In this picture the relationship seems to be stronger if the importance of the observations is taken into account. Still there is a difference between the Swedish and the Canadian results.

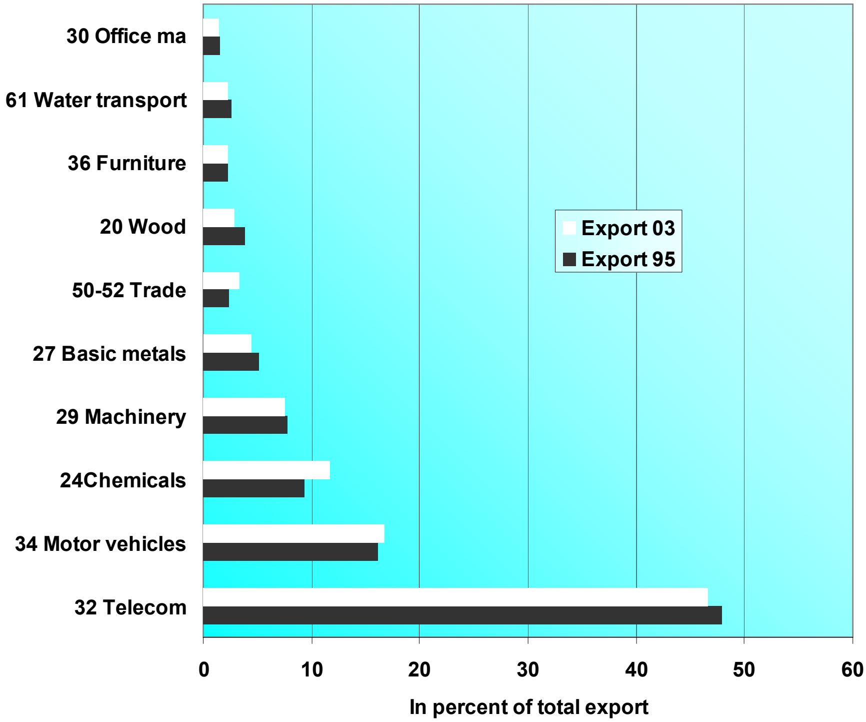
Swedish export and import of TFP

It is not only companies and industries that have to give away some of their productivity increases to their customers; nations must also do so. We will try to get some indications on how the Swedish trade balance looks in this perspective.

The Swedish trade data in current prices for 1995 and for 2003 is taken from the supply-use tables. The different industries' weights in the total export for each year have been multiplied by the average growth rates of the new gross production total factor productivity for the period 1993-2003.

Almost all the total TFP export has been created by just a handful of industries, since the 10 most important ones accounted for around 99 percent of the export of TFP both in 1995 and 2003. It is the same industries both years, and the only change in the ranking is that water transport and wood products have dropped one position while trade and furniture have gained one. The Swedish telecom industry alone stands for well over forty percent in both years, and two other industries contribute more than 10 percent and one just somewhat less in 2003. That means that these four industries represent over 80 percent of the Swedish export of TFP both in 1995 and 2003. All of these three important engineering industries have almost the same weight both years.

Figure 7.20. Swedish Export of TFP for the important industries. In percent of the total Export of TFP.



Source: Statistics Sweden

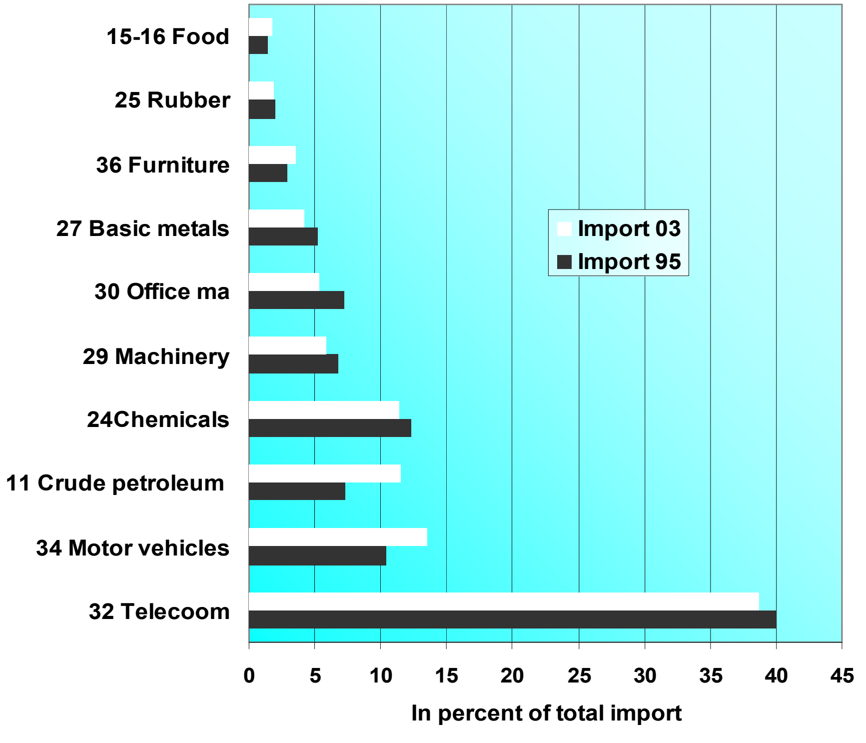
The chemical industry has, however, especially due to its pharmaceutical part, increased in importance. The traditional industries such as the wood industry, the basic metal industry and the furniture industry are on the list but with slightly decreasing weights over time. The last industry on the top ten list, the computer industry, is of a completely different type. The

Swedish specialisation in the ICT production field is very obvious with telecom at the top and computer industry ranked as the 10th.

Most of the industries that are large TFP exporters are also the industries from which Sweden imports a large part of its TFP. But this is a very tentative conclusion since the TFP measurements, as already mentioned, are based on the performance of these sectors in Sweden.

On the import side the telecom sector is also by far the most important one, and even if its importance has been reduced somewhat from 1995 to 2003, it still stands for well over a third of the TFP import single-handedly. Furthermore, the second most important industry is the same as on the export side, namely the car industries which like the chemical industry and crude oil industry has a weight over 10 percent.

Figure 7.21. The Imports of TFP distributed over the most important industries. In percent of the total Import of TFP.



Source: Statistics Sweden

That gives an aggregate of the four major TFP import industries nearly the same dominance as the four major exporters of TFP, with a weight of 70 percent in 1993 and 75 percent 2003. Two engineering industries follow: the machinery industry which after the specialisation of the Swedish machinery industry during the 1980s has become a major import product for our country, and the office machine industry which is much more important for the TFP import.

All these engineering industries and the chemical industry which are high up on both the export and import lists are characterised by extensive inter-trade due to a high degree of specialisation among the OECD-countries.

The industries that only appear on the import list, besides the crude oil industry, are the last two, namely the rubber and plastics industry and the food industry. The first mentioned of these is yet another expression of the fact that the Swedish economy has traditionally been based on steel and wood and not on coal, which is the historic base for almost all chemical-related industries. The very scarcity of people living on the Swedish soil is proof, if anything, that the comparative advantage of Sweden does not lie in agriculture and thus not in food production. So it is no surprise that the food industry emerges on the import list.

We have now come to the question if Sweden is a net exporter of TFP or a net importer. The average of "New Gross Production TFP" is rather similar for both the Swedish export and import in 1995 as well as in 2003.

Table 7.2. Swedish export and import of TFP 1995 and 2003

	Export TFP 1995	**Import TFP 1995**	**Export TFP 2003**	**Import TFP 2003**
Average TFP in percent per year	1.84	1.69	1.74	1.62

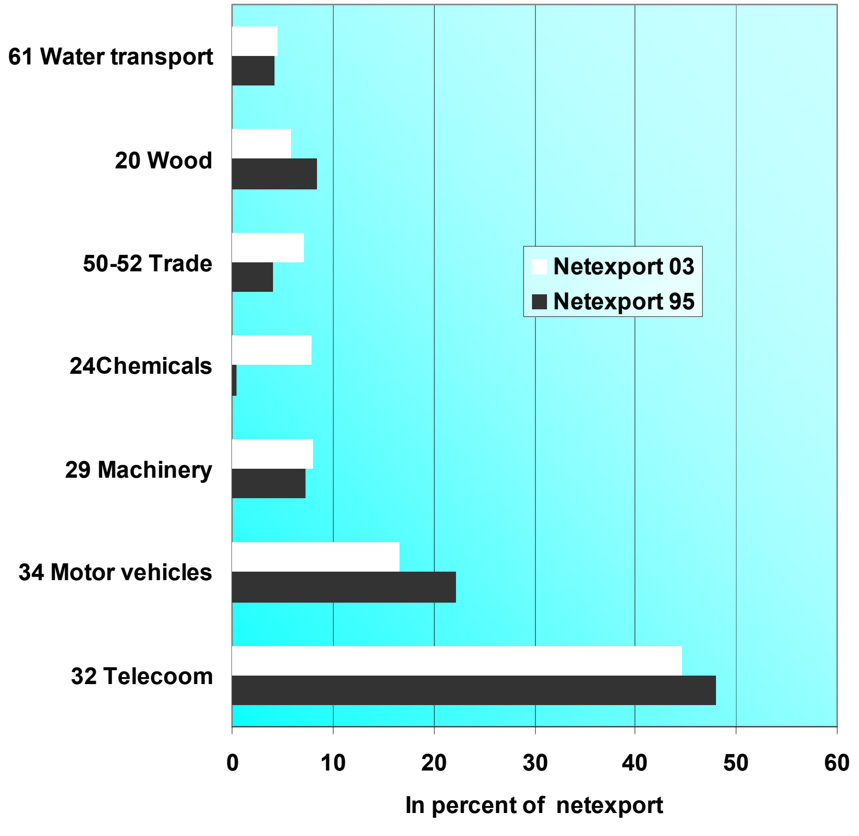
Source: Statistics Sweden

However, there is a difference and this is positive both years. The difference has nevertheless decreased somewhat from 0.15 to 0.12 percent per year.

This means that Sweden exports more TFP than it imports, but the difference is limited. Still, Sweden is giving away a lot of TFP in another sense since the relative net export as a percentage of the import was 24 percent in 1995 and 22 percent in 2003.

If you want to measure the relative importance of the different industries of the net export of TFP it is not self evident how you should calculate it, since there are some sectors that have a negative TFP net export, even if they are fewer than those that have a positive one. And a couple of industries have a positive net export of the TFP due to a combination of a negative TFP and a negative net export, among them the clothing industry. So our choice is to distribute the total net export over the industries which have both a positive TFP growth and a positive net export.

Figure 7.22. Net export of TFP



Source: Statistics Sweden

We then come up with a short list of the eight industries that are representing at least around 5 percent or more of the net export in 2003. This show a the not very surprising result; the telecom sector is the by far the most important one, followed by the car industry that had half the weight of the telecom industry in 1993 and a third in 2003. The machinery industry then follows, which is an engineering industry that has more than kept its relative importance. The most dramatic change is the emergence of the chemical industry as a net exporter. The service industry trade has also increased in importance which is not the case for the other service industry on the list, water transport.

The handful of industries where Sweden is a net importer of TFP is dominated by the oil industries, mainly the petroleum refineries but also the crude oil industry which has increased dramatically in importance. This is of course a very shaky conclusion since our Swedish Crude Oil industry is not a big one and does not produce any crude oil but other products that are included in this industry. As a result TFP growth for this industry probably differs a lot from that of the countries we do import from. The only other important industry on the import side is the computer industry. This industry in Sweden is small and not very dynamic. Its TFP is just a third of the other ICT-producing industry, the telecom industry. If we instead had used the TFP from ower national telecom industries as a proxy for the TFP, the effect on our net import of computers would have offset two thirds and not just one seventh of the impact of the telecom industry in 2003. On the other hand the telecom industry has just partly recovered from the crisis of 2001-2002 so its net export should be much higher 2004-2005.

Our very tentative conclusion is then that Sweden does not export TFP to any significantly larger extent than it does import, but due to the fact that Sweden has a large trade-surplus. But since our terms of trade have somewhat deteriorated during the last decade our specialisation is apparently not optimally seen from this perspective.

Appendix 1. Theory and model outline

As already been mentioned, we will take a KLEMS point of view in our productivity analysis. That means that the effects of input of capital (K), labour (L) and intermediate input on production was incorporated. The intermediate input was broken down into input of energy (E), materials (M) and services (S).

The production function expresses the relationship between the factor inputs and the output in the economy. Let gross output be a function of capital, labour and intermediate input. A is an index of the level of technology in the economy.

$$Y = AK^{\alpha} L^{\beta} M^{\gamma} \qquad (1)$$

A is commonly referred to as total factor productivity, TFP, or multi factor productivity. Changes in A shift the production possibility curve making it possible to produce more without changing the factor inputs.

Growth accounting is a technique commonly used in productivity analysis. This method allows the growth in production and labour productivity to be decomposed into growth of the factor inputs and growth in total factor productivity, TFP. Studying the production function, estimates on growth in production and growth in factor inputs is normally not a problem to obtain. Using growth accounting, total factor productivity is that part of growth in output that cannot be explained by growth in the input factors. While having estimates on growth in output and input factors TFP is estimated residually.

While using the production function stated above standard neo-classical growth assumptions was used as; constant returns to scale, perfect competition and profit-maximizing firms. All of this meant that factor inputs were rewarded by the size of their marginal productivity. The growth in TFP was assumed to be Hicks-neutral. Assuming constant returns to scale yields the coefficients to sum to one; $\alpha + \beta + \gamma = 1$.

The equation (1) was reformulated in a growth oriented way. By taking the logarithm and the first difference of the production function we express all variables in terms of rates of growth and get:

$$\Delta \ln Y = \alpha \Delta \ln K + \beta \Delta \ln L + \gamma \Delta \ln M + \Delta \ln A \qquad (2)$$

Δ refers to the first difference, i.e. $\Delta x \equiv x_t - x_{t-1}$.

Studying the model it is clear that growth in gross output is possible only by raising the input of one of the input factors or by raising the level of technology in the economy, that is, the total factor productivity, TFP. By expressing the production function in growth rates (log differences) the growth in Y is split up in the share weighted growth in capital, labour, intermediate consumption and TFP.

Using this model enables us to study the share weighted growth in GDP. In so doing estimates on the weights of the factor inputs is needed. By taking the starting point in the firms profit maximization function, the quantities of capital services, labour and intermediate inputs are chosen so as to minimize total costs and maximize profits. Let Π denote the profit, Y is production, wL is the total cost of labour, rK is the total cost of capital and pM is the total cost of intermediate inputs.

$$\Pi = Y - \omega L - rK - pM \qquad (3)$$

While maximizing Π subject to $Y = AK^{\alpha} L^{\beta} M^{\gamma}$ it can be shown that

$$\alpha = \frac{rK}{Y} \ , \qquad (4)$$

$$\beta = \frac{\omega L}{Y} \ , \qquad (5)$$

$$\lambda = \frac{pM}{Y} \ . \qquad (6)$$

The weights of the factor inputs, α, β and γ, are represented by each factor’s share in total production.

Assuming perfect competition, there are no profits other than the remuneration to labour, capital and intermediate input. Hence the value of output can be expressed as:

$$Y = \omega L - rK - pM \qquad (7)$$

Then we see that the weights are represented by each factor inputs share in total cost.

In the empirical analysis below different types of capital was being used. Splitting capital into these subcategories yields:

$$\alpha \Delta \ln K = \sum_{j} \alpha_j \Delta \ln K_j \qquad (8)$$

where α_j represents each capital's share in total capital costs:

$$\alpha_j = \alpha \frac{r_j K_j}{\sum_{j} r_j K_j} \qquad (9)$$

Since we were interested in the effects of different types of labour the set of labour were divided into a number of categories. Assume in this case that A is the set of different labour types, and L_a the quantity of labour of type $a \in A$.

$$\beta \Delta \ln L = \sum\nolimits_{a \in A} \beta_{ait} \Delta \ln l_{ait} \qquad (10)$$

Here l_{ait} is the share of category a in total labour, and the β_{ait}-coefficients represent each types share in total labour cost:

$$\beta_{ait} = \beta_{it} \frac{\omega_{ait} L_{ait}}{\sum_{a} \omega_{ait} L_{ait}} \qquad (11)$$

Data

In our empirical analysis we studied the growth in TFP both on gross production and on value added. We used data from the national accounts on capital stocks, worked hours and intermediate input. The data on labour is derived from RAMS, register-based labour market statistics at Statistics Sweden. But on crucial part of the data was missing, genuine ICT-investment data. These were instead estimated from the production and import and export statistics in order to estimate the amount of the different ICT-goods and service that was supplied to the Swedish domestic market.

Capital Services

As mentioned earlier we will in this empirical analysis the flow of capital services streaming from capital was used rather than the value of the capital stock itself. By taking into account the heterogeneity of capital and those different types of capital have different marginal productivity; we get a more effective measure of the capital input in production.

The value of the flow of services from the stock is a better measure of the input in production than is the value of the stock itself. Over time there should be a substitution of capital towards capital with higher marginal productivity. For example as prices on ICT capital is falling industries tend to invest more in this cheaper and more productive capital.

Consider the capital stock K_t. The capital stock is estimated by using the traditional PIM-method.

$$K_t = K_{t-1}(1-\delta_{t-1}) + I_t \qquad (12)$$

Here δ is the value of depreciation in period t-1 and I is the value of investment in period t.

The value of the stock is estimated at the beginning of the year. Assuming that new investments becomes available for production in the middle of the year we express capital services as

$$C_t = a(0.5K_t + 0.5K_{t+1}) \qquad (13)$$

The capital service flow is assumed to be proportional to the average of the current and lagged capital stock where α denotes the proportionality constant[xii]. The flow of capital services is then estimated by using asset specific user costs to weight the growth in each type of capital and to account for the substitution between them.

User cost

The flow of capital services is weighted with the user cost of each type of capital. The user costs are, under certain assumptions, equal to the marginal productivity of capital. User cost can be seen as the cost of borrowing capital and investing in a capital good, renting it out, and collecting a rent.

The estimation of the user cost can be made more or less complex regarding tax regulations. In this study we are relaxing all effects of taxes.

The components of user cost are the rate of alternative investments, depreciation and the change in the price on investment goods. There are different options of choosing the rate of return. In this study we used the endogenous internal rate of return derived from the national accounts. By relating gross operating surplus to the capital stock, the rate of return was derived. This was done for each of the sector aggregates in the study. The rate of depreciation was estimated per sector and type of capital. Changes in prices on investment goods were derived from implicit price indices on investments in the national accounts.

In a very simple form the user costs were estimated as:

$$\mu_t = r_t + \delta_t - \Delta p_{t,t-1} \qquad (14)$$

where μ is the user cost, r is the rate of return, δ is the rate of appreciation and Δp is the rate of price change in new investment goods.

The estimated user costs are then used to calculate the weights by which the flows of services are aggregated. The weights are defined, for a capital good C_k as:

$$\upsilon_{k,j,t} = \frac{\mu_{k,j,t} C_{k,j,t}}{\sum_k \mu_{k,j,t} C_{k,j,t}} \qquad (15)$$

Labour composition

The effect of the labour input on production is not only a question of quantity but also of quality, or more correctly on its composition. The method which has been used is a traditional market oriented one. The working population has been split in many subgroups according to four different characteristics. For each of the subgroups we calculated the average incomes from both the employed and the self-employed.

If the labour market functions well, the average income for each subgroup is the market's valuation of the different categories as labour inputs. This is in accordance with a long tradition represented by Jorgensen[xiii] and Bureau of Labour Statistics[xiv] both of which have somewhat different approaches for the US labour market. This has been further developed on US and Canadian data by Gu and Maynard[xv]. The income means are then treated as the market valuation of different categories of labour in respective workplaces. In most workplaces there are of course only a small number of these categories represented. But with help of the average prices it is possible to calculate a synthetic labour cost or labour composition indicator for the whole workplace. It is necessary to go via the workplace level since this is the unit that has an industry definition, not the individuals. They get an industry connection by their workplace. The workplaces can then be aggregated to industries on different aggregation levels.

Instead of creating an average for the whole time period we want to take account of the changes that take place in the valuation of different types of labour over the years. To take account of the changes over the years in relative prices is rather uncommon in the literature, but has been used by the researchers mentioned earlier at Statistic Canada[xvi]. To be able to follow the changes in the labour market over the years in a meaningful way, it is necessary to deflate these mean incomes for different categories with the general wage increase; otherwise the labour composition indicator, which is based on the mean incomes, includes both inflation and real wage increases.

For this purpose the structure from one year, that is, the relative size of each category, is combined with the earnings for each category the following year. This is then aggregated to a fictive average earning of that year which is divided with the factual mean earnings of the last year. The increase in average earnings is then treated as a common price index that is used to deflate the incomes of each subgroup. The resulting changes of the deflated prices of a subgroup over the years is then only reflecting the market's relative appreciation, or its depreciation, of the value of this group as labour input compared with all other subgroups.

The characteristics that have been used are the traditional ones; age, education and ethnicity with one exception, i.e. gender is not included. The choice of the different categories for each variable is based on how they are valued on the market. The education variable is split into two dimensions: orientation, and levels. There are five different levels but only two fields: 1) the technical and natural science orientation and 2) all other orientations together. The levels starts with primary (level 1 and 2) and lower secondary, and end with post graduate education (level 6). Concerning age, the workforce is split in as many as six categories, but of these the first and the sixth are very infrequent on the Swedish labour market. These categories are namely those who are 16-20 years of age, and those who have reach the age of 67. The ethnicity variable is based on the countries where people are born. Those with an origin outside of Sweden are divided in four groups.

We have also limited the calculation to the private business sector since we are just studying this sector. It is also known that the public sector is paying less for the same competence. We have chosen broad education categories for the education orientations, since if they are narrower they tend to become more sector-specific.

Appendix 2. Developments 1993-2005

Table 1. Growth in Gross Production decomposed

ISIC	Gross Production	Total Capital Services	ICT Capital Services	Other Capital Services	Labour Services	Intermediate Input	TFP
01	0.30	-0.03	0.00	-0.03	-0.38	1.16	-0.44
02	-0.24	0.07	0.00	0.07	-0.03	-0.92	0.63
05	-1.31	0.09	0.45	-0.36	-1.07	-0.02	-0.31
10-12	9.60	-0.76	0.00	-0.76	-0.73	1.94	9.15
13-14	3.32	0.02	0.03	-0.01	0.13	1.46	1.71
15-16	0.80	0.26	0.14	0.12	-0.15	0.73	-0.04
17	1.55	-0.06	0.01	-0.07	-0.46	2.77	-0.7
18	-1.33	-0.24	0.02	-0.26	-0.89	1.56	-1.76
19	-0.06	-0.22	0.01	-0.23	-0.93	1.29	-0.19
20	3.41	0.20	0.07	0.13	0.3	1.35	1.56
21	0.55	0.20	0.07	0.12	-0.03	2.13	-1.75
22	0.36	0.20	0.26	-0.06	-0.54	0.41	0.28
23	8.36	0.22	0.09	0.13	0.06	0.62	7.46
24	5.43	1.16	0.12	1.04	0.31	2.66	1.31
25	4.31	0.23	0.03	0.21	0.45	2.41	1.21
26	1.41	-0.07	0.01	-0.08	-0.21	0.71	0.98
27	3.70	0.02	0.03	-0.01	-0.39	4.43	-0.36
28	3.99	0.74	0.25	0.5	0.69	2.78	-0.22
29	4.93	0.10	0.09	0.01	0.35	3.58	0.89
30	-3.27	-0.41	0.00	-0.41	-1.87	-3.67	2.67
31	4.71	0.09	0.04	0.05	0.44	4.3	-0.12
32	18.13	0.16	0.09	0.07	0.21	4.96	12.79
33	7.47	0.65	0.05	0.6	0.38	5.87	0.56
34	9.55	0.41	0.23	0.19	0.43	6.23	2.48
35	1.07	0.12	0.04	0.08	0.2	2.75	-1.99
36	2.40	0.10	0.03	0.07	-0.61	1.68	1.22
37	19.14	2.43	0.50	1.93	1.21	17.27	-1.76
40	1.57	0.48	0.11	0.37	0.04	1.12	-0.06
41	0.02	-0.11	0.04	-0.16	0.6	-0.01	-0.46
45	1.18	0.11	0.01	0.1	0.44	0.22	0.42
50-52	3.38	0.60	0.35	0.25	0.22	0.43	2.13
55	3.34	0.04	0.09	-0.06	0.58	2.06	0.66
60	2.24	0.89	0.22	0.67	-0.08	1.3	0.13
61	3.92	0.18	0.15	0.03	-0.13	1.13	2.74
62	-4.36	0.17	0.15	0.02	-1.44	0.49	-3.58
63	4.65	0.70	0.14	0.57	0.54	2.19	1.22
64	5.61	1.14	0.91	0.23	-0.48	2.93	2.01
65	2.81	2.64	1.19	1.45	-0.29	-0.1	0.56
66	-0.25	0.01	0.17	-0.16	0.36	0.44	-1.06
67	4.99	0.21	0.14	0.07	2.1	1.77	0.91
70	0.93	0.51	-0.08	0.59	-0.02	0.46	-0.02
71	3.79	2.48	0.53	1.96	0.36	1.53	-0.59
72	7.31	0.21	0.15	0.06	2.82	4.51	-0.24

ISIC	Gross Production	Total Capital Services	ICT Capital Services	Other Capital Services	Labour Services	Intermediate Input	TFP
73	7.23	0.72	0.08	0.64	1.35	5.02	0.14
74	3.09	0.43	0.28	0.15	1.18	1.13	0.35
80	5.89	0.68	0.27	0.4	1.64	3.42	0.15
85	6.70	1.51	0.17	1.34	3.3	3.42	-1.53
90	4.29	1.46	0.35	1.11	0.41	3.04	-0.61
91	1.77	5.77	0.60	5.17	0.44	1.28	-5.72
92	4.64	2.31	1.57	0.74	0.48	1.98	-0.12
93	2.49	-0.55	0.01	-0.56	0.13	1.67	1.24
95	17.55	0.00	0.00	0.00	4.06	0.00	13.49

Table 2. Gross Production TFP. In per cent per year.

ISIC	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
01	-3.7	-1.0	-1.4	2.4	-2.7	0.6	3.6	2.4	1.5	-0.3	-2.9
02	1.6	2.6	5.0	1.4	-3.5	6.9	-4.5	12.8	1.5	-6.2	3.1
05	12.6	7.3	4.6	-0.7	1.9	-16.5	-1.1	10.1	-9.4	9.8	-12.3
10-12	23.8	2.6	14.8	0.7	0.3	-1.2	6.5	-10.5	4.1	-0.4	13.7
13-14	-0.1	3.1	-2.9	4.3	-0.1	1.1	-4.2	-2.5	0.3	3.0	11.4
15-16	2.0	2.3	0.7	-0.9	0.2	-0.2	-0.9	0.0	0.1	0.5	-2.2
17	5.2	1.9	-2.8	-1.9	0.5	3.4	-0.4	-0.6	-0.5	-1.6	-1.0
18	-1.2	-0.3	-2.4	-2.0	5.0	-9.9	8.6	3.5	0.8	-1.7	-5.0
19	-4.5	1.1	1.2	0.7	0.0	-6.1	-2.9	-4.3	0.4	7.6	7.6
20	1.1	0.5	3.4	-0.1	1.7	1.7	1.0	0.4	0.4	2.4	3.3
21	0.3	-6.1	-3.7	2.5	-1.1	1.8	1.7	-1.6	1.6	3.1	-7.7
22	1.2	4.9	-0.4	0.6	-0.2	-0.9	-2.4	-3.6	1.9	1.4	-1.3
23	0.1	4.2	0.7	0.3	-0.9	0.6	-1.2	-0.1	1.7	-2.3	47.0
24	4.3	-6.8	-1.1	2.9	2.4	7.5	-0.6	-1.8	9.4	3.5	-0.9
25	2.7	1.8	-1.6	3.0	0.5	0.3	1.7	-1.0	2.2	-0.3	4.2
26	1.5	1.4	-4.8	1.5	1.8	0.7	2.3	2.6	0.8	-0.8	5.3
27	3.4	-1.7	3.1	2.5	-2.8	1.6	-0.2	-1.1	6.8	-2.0	-3.4
28	4.7	4.4	-4.1	-0.1	-1.8	-1.2	2.9	-3.7	-2.0	-0.3	-1.3
29	4.1	2.3	-0.5	-0.4	0.9	-0.5	1.5	0.1	0.9	0.2	1.7
30	-1.7	1.9	1.3	2.5	12.7	-2.3	-1.4	5.3	-0.3	5.3	25.4
31	-1.5	-0.5	-2.4	-1.6	2.1	1.8	6.5	0.1	-0.5	-2.7	-0.1
32	16.1	20.1	19.5	15.2	13.7	8.7	2.5	-6.8	12.6	10.0	31.4
33	1.9	-0.3	-1.8	1.9	5.7	-1.2	-3.4	-1.0	-3.6	0.1	9.5
34	9.1	-2.1	0.2	0.7	-0.4	10.3	5.7	-5.1	-0.4	1.4	8.1
35	-7.3	-0.6	-7.8	1.9	0.5	-1.4	-1.3	-1.1	-1.2	0.8	4.6
36	7.2	4.5	-0.7	3.9	4.1	1.7	1.0	-1.6	0.2	0.2	-4.4
37	-0.8	-8.7	-2.2	-2.6	1.4	-1.7	6.1	-2.2	-0.8	-1.0	13.4
40	-3.8	4.6	-4.9	0.5	-4.1	-0.7	3.2	3.2	-4.5	-6.7	8.1
41	-1.0	2.6	-4.7	-2.0	-1.4	-0.6	0.8	0.0	0.3	2.3	-1.6
45	1.6	0.6	0.3	-1.9	-0.7	-1.1	-0.7	-0.1	-0.2	-0.2	2.1
50-52	4.2	2.5	1.8	0.5	3.0	1.7	0.7	0.4	2.2	3.2	2.3
55	-0.5	0.6	-0.1	2.5	3.5	1.2	1.7	-0.5	-1.1	-1.4	-0.6
60	3.2	2.2	-0.9	2.8	0.5	-0.6	-2.0	-3.3	-1.0	-1.4	0.6
61	-0.4	2.7	10.2	4.4	-10.9	6.1	-3.8	1.8	6.7	-2.3	6.6
62	-6.0	2.1	1.0	-0.9	-2.9	-4.3	-0.9	-5.9	5.2	8.6	-8.0
63	-0.2	2.9	-0.2	3.6	1.3	-0.6	-3.9	-0.4	-0.9	-1.9	6.3
64	1.0	5.0	0.6	2.8	2.9	2.7	5.4	-2.2	0.7	1.5	5.1
65	-6.6	-4.9	0.4	0.9	-2.9	-4.3	6.1	-0.5	5.2	1.2	5.6
66	-3.6	-14.4	-3.4	1.8	5.6	-0.7	0.3	-0.8	-0.1	-3.5	3.1
67	-8.0	-1.7	10.2	-5.0	-1.4	1.5	-0.6	-0.7	1.7	0.7	6.9
70	-0.3	0.8	-0.7	-0.7	0.0	-0.6	0.6	1.2	1.1	-1.2	-0.2
71	-3.5	-3.4	3.3	-1.5	1.3	6.2	1.0	-0.8	-3.2	1.5	-2.9
72	2.2	-0.8	-5.3	2.3	-4.6	-3.8	-2.4	-0.8	1.1	7.2	2.2

ISIC	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
73	-1.2	-4.0	-8.4	4.5	0.2	-5.1	-1.9	-7.1	-4.9	14.0	8.8
74	0.9	-1.3	-1.8	-0.7	1.3	-0.8	-0.1	-0.6	1.0	1.1	1.8
80	-13.0	4.7	4.8	-0.9	4.9	3.6	-6.6	-4.3	3.4	4.3	-1.9
85	-6.5	2.8	-7.1	-3.7	1.7	-4.4	1.0	1.4	-0.5	-0.3	-0.9
90	0.3	2.5	-0.9	-3.3	-0.8	1.3	2.5	-0.9	1.8	-4.0	-4.3
91	-9.8	-5.2	-13.5	-7.1	-15.8	-8.4	-1.0	-4.0	-6.8	-3.2	4.2
92	-3.1	2.1	2.6	-0.5	0.8	-3.5	-0.2	-1.2	-0.8	-2.9	2.3
93	7.2	3.8	-2.5	2.5	1.3	0.0	2.2	-1.1	1.9	-1.7	-0.8
95	9.0	74.7	0.4	9.9	0.8	-25.8	15.8	48.1	-29.8	33.6	18.3

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