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Success in manufacturing employment in an industrial district: Higher productivity or lower wages?

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JÖNKÖPING INTERNATIONAL BUSINESS SCHOOL
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SUCCESS IN MANUFACTURING EMPLOYMENT IN AN INDUSTRIAL DISTRICT

- HIGHER PRODUCTIVITY OR LOWER WAGES?

by
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Abstract

This paper analyses the performance of manufacturing industries in the leading industrial district in Sweden, known as the Gnosjö region during the period 1980 to 1993. In particular, it focuses on a set of 22 industries at the finest level of industrial classification that accounts for than 75 per cent of manufacturing employment in the Gnosjö region. These 22 industries that during the actual period is declining in the rest of Sweden grow substantially in relative terms and in some cases also in absolute terms in the Gnosjö region measured in terms of employment. A life cycle approach is used to explain the possible driving forces behind the actual spatio-temporal patterns. In particular the role of productivity, labour costs and profitability is high-lighted. It turns out that in particular a higher profitability than for the average regions seems to be important for explaining the comparatively good performance of the 22 industries in the Gnosjö region.

1. INTRODUCTION

The south-western part of the county of Jönköping in Sweden – the GGVV-region – has an industrial structure that is very different from that in the rest of Sweden. The region, which may be characterised as an ”industrial district”, is dominated by small and medium-sized enterprises. It is well-known for its entrepreneurial spirit and in the literature this phenomena has been labelled ”the Gnosjö phenomenon”. In the international literature the region has been compared with other entrepreneurial regions, such as ”the third Italy”, Rhône-Alps, Baden-Württemberg, and Silicon Valley (Karlsson & Larsson, 1993; Karlsson & Wiklund, 1994). The employment share for manufacturing industry in this region is approximately double that of the rest of Sweden. This pattern seems to be very stable over time. An intriguing characteristic of this region is that many industries which are declining in other parts of Sweden actually are expanding in this region not only in relative terms but also in several cases in absolute terms.

In present day Sweden there is, historically speaking, a very high unemployment level and politicians at all levels and in all parts of Sweden have seen the GGVV-region as a model for solving current unemployment problems by means of increased employment in small and medium-sized firms. This is somewhat surprising since the manufacturing that takes place there is relatively low-tech and with a low representation of those sectors of industry that are knowledge and R&D intensive and, hence, commonly seen as the sectors of the future in the age of information technology and the emerging “knowledge society”.

There have been several attempts made to try to explain the Gnosjö phenomenon but most of these attempts have looked more at the social behaviour of entrepreneurs than at the hard economic facts. If one region is doing significantly better than almost all other regions it seems natural to start investigating the phenomenon in terms of significant differences compared to other regions in terms of productivity and productivity growth, costs and cost increases, and profits and profit increases. Having established this kind of fundamental differences it is then possible to start investigating what might be the underlying causes to these differences. First when the underlying causes have been sorted out is it possible to discuss whether the GGVV-region can function as a role model for other regions or not.

1.1 Purpose

The purpose of this paper is to try to explain why the manufacturing industry in the GGVV-region in comparative terms is so successful in preserving and in several industries also to increase employment. In the paper we test a number of different hypotheses. In particular, we investigate whether the apparent success is the result of higher productivity growth, if it is the result of low input costs, mainly low wages, and/or if it the result of higher profitability. Differences in productivity growth, in input costs or in profitability might in an industrial district be the result of the existence of particular types of agglomeration economies. However, in the paper we do not investigate the role of such economies.

1.2 Spatial processes of industrialisation and deindustrialisation

To understand those spatial processes of industrialisation and deindustrialisation that make regions experience growth as well as decline of various industries it is necessary to use a dynamic framework. Life cycle theories offer one useful starting point for examining such spatial processes. Assuming the existence of some evolutionary processes which governs spatial industrial dynamics, it is possible to analyse the spatial implications of each stage of the life cycle (Forslund-Johansson, 1997).

Life cycle theories form a rather heterogeneous set of theories but share some fundamental characteristics. Some of these theories apply to narrowly defined markets for individual products, while others are aiming at describing the evolution of entire industries, where an industry usually is defined by a set of technologically related products (Utterback & Suarez, 1993; Klepper & Graddy, 1990; Karlsson, 1988). Spatial applications of life cycle theories normally refer to the second variant (Norton, 1986).

Life cycle theories can be used to analyse a variety of phenomena within the field of spatial industrial dynamics. Here we are in particular interested to see how these theories can explain the relative and in some cases even absolute growth of nationally declining industries in specific regions. Why do the growth of industries vary so much over various regions? How come that some regions experience relative as well as absolute deindustrialisation at the same time as other regions experience relative as well as in some cases absolute industrialisation? What make the location patterns of manufacturing industries change over time?

The life cycle theories give some hints concerning the answers to these questions. We will here discuss three phenomena identified by these theories that may stimulate changes in location patterns. The first phenomena is *standardisation* that is supposed to occur in the growth and mature stages of the product life cycle. Standardisation here stands for the emergence of a dominant design for the products that define the industry. The loss of product variety leads to increased price competition and forces producers to put greater emphasis on cost reductions. In parallell to the standardisation of products a standardisation and routinisation of production processes is very likely to take place. The more standardised the products and the processes, the less need for company headquarters to monitor the production process closely and the less need for highly specialised and qualified employees and technical and consulting services. As standardisation occurs industries become in a sense foot-loose, i.e. their production no longer needs to be located close to company head-quarters and R&D facilities. At the same time these industries become more sensitive in their choice of location, since they to survive in competition have to find those locations that offer the lowest total costs. The relevant cost elements here consist not only of the cost for land, facilities, labour, and running inputs but also the general transaction costs for supplying the customers the products they demand. This means that standardisation will favour low cost regions. A low cost regions is not only characterised by low costs of various inputs but also of various location economies that can contribute to favourable cost conditions as well as generally favourable industrial milieu with a pool of trained labour, well-functioning information networks, and so on.

The second phenomena to be discussed here is *labour-saving innovations*. As the life cycle runs towards its later stages process innovations tend to out-weight product innovations. The possibility to introduce labour saving innovations is generally speaking stimulated by the standardisation process and by the general need to cut costs. Labour-saving innovations in mature or declining markets must by definition give rise to job losses due to increased labour productivity. A fundamental question is, of course, where the investments introducing the new labour-saving innovations will be made. Often new investments in new equipment needs new plants. This gives the firms an opportunity to choose to invest in the above mentioned low cost regions to, so to say, reap double benefits. Regions that are rapid to introduce new labour-saving innovations and/or to attract such investments from other regions may very well outperform producers in other regions in terms of productivity and, hence, induce deindustrialisation in these other regions.

A third phenomena to be considered is *demand stagnation or contraction*. When this phenomena occurs, a selection process is induced. When demand stagnates or even contracts, price competition becomes tighter and the failure rate of in particular small and medium sized firms increase. Large firms are less likely to fail abruptly and react instead by down-sizing their operations. In these phases of the life cycle mergers and acquisitions become more frequent. Hence, in later phases of the life cycle we shall expect heavy restructuring and relocation of industries. Which regions that will be losers in this process depends to a high degree upon where the older plants using older technologies, i.e. the plants that normally have the highest variable unit costs, and hence, the lowest gross profit shares, are located. As new industries normally are born and developed in larger urban regions, older plants often tend to be located in larger urban region and thus one should expect that contracting industries have a tendency first to abandon the larger urban regions.

Summarising this short discussion on spatial processes of industrialisation and deindustrialisation it seems obvious that regions that are gaining relatively and in some cases even absolutely in employment terms when industries decline nationally should be expected to be characterised by i) lower costs, in particular, lower labour costs, ii) higher productivity, and, in particular, higher productivity growth, and/or iii) higher gross profit shares in the actual industries.

1.3 The Data

The data used in the present paper is data for the manufacturing industry in Sweden for the years 1980 and 1993 collected by Statistics Sweden. The reason data from 1993 is used rather than data from a more recent year is that there was a major change in the Swedish Standard Industrial Classification in 1993 making comparisons before and after the change virtually impossible. The data contains information on industry, number of employees, work hours, wages, sales value, value added and amount of energy used. The data is collected at plant level rather than at firm level, this means that a firm with two plants will appear in the data twice. The reason is that technology tend to be plant specific and not firm specific.

In the empirical work all data are aggregated into geographical areas. The areas used are the Swedish ”A-regions”, which can be interpreted as labour market regions approximately equal

to commuting regions. In Sweden there are 70 such regions. Unfortunately, the municipalities of Gnosjö, Gislaved, Vaggeryd and Värnamo that form what we in this paper call the GGVV-region do not belong to the same A-region. Gnosjö, Gislaved and Värnamo constitutes an A-region while Vaggeryd belongs to another A-region. For the purpose of this paper Vaggeryd is aggregated with the other three municipalities and excluded from its original A-region. The major reason for aggregating these four municipalities to one region is that that share the same industrial structure and entrepreneurial behaviour and, hence, constitute a natural spatial delimitation of the industrial district often referred to as the Gnosjö region.

The data are based on six-digit manufacturing industries, according to Statistics Sweden's official industrial classification – the SNI code. At the six-digit level the manufacturing industry is divided into 196 separate industries based on the plants' major output. This is the finest level available for which data is registered. To limit the number of industries covered in the empirical analysis, those industries that accounted for at least one per cent of manufacturing employment in the GGVV-region in both 1980 and 1993 were selected. 22 industries at the six-digit level fulfilled these criteria. The industrial classification six-digit SNI codes for the 22 industries studied in this paper and information about what they produce are found in appendix A.

2. STRUCTURE AND DEVELOPMENT DURING THE EIGHTIES AND EARLY NINETIES

This chapter is devoted to a description of the 22 industries covered in this study in terms of employment, value added, specialisation quotients, and so on, in 1980 in the GGVV-region and in the rest of the country and in terms of changes of the same variables during the period 1980-1993.

2.1 Structure and Development in Terms of Employment, Value Added and Number of Plants

The 22 selected industries employed in 1980 12,913 persons in the GGVV-region, which was equal to 76.3 per cent of all manufacturing employment in the region (See Appendix B and C). The number employed in the selected industries had fallen to 11,023 in 1993 equal to a drop by almost 15 per cent. However, in 1993 the selected industries accounted for 83.5 per cent of all manufacturing employment in the GGVV-region. This may, at first sight, not appear as a success story. But, looking at the same industries at the national level their drop in employment was almost 35 per cent. Thus, the GGVV-region did very well during the period 1980-1993 in these 22 industries which were declining or even more or less disappearing elsewhere in the country.

The two most striking examples of successful industries in the GGVV-region are the manufacture of plastic materials (SNI 351320) and the manufacture of industrial machinery not elsewhere classified (SNI 382490) (See Figure 2.1). These two industries approximately doubled their employment in the GGVV-region in absolute terms between 1980 and 1993, while they declined in the rest of Sweden, in the second case by as much as 42 per cent.

If one looks at the development in terms of value added the picture gets even clearer (See Figure 2.2). In the GGVV-region the 22 industries actually increased their value added by 32.5 per cent (in fixed prices). In the rest of the country the value added for the same industries declined by 1.6 per cent (in fixed prices).

The three most successful industries in value added terms were, once again, the manufacture of industrial machinery not elsewhere classified, the manufacture of lifting devices (SNI 382991) and the manufacture of motor vehicle engines, parts and trailers (SNI 384320). All these industries increased their value added (in fixed prices) by approximately one and a half times. In the rest of Sweden the value added (in fixed terms) increased by 4.5 percent in industry SNI 382490, declined by 4.4 percent in industry SNI 382991 and increased by 32.3 percent in industry SNI 384320.

The total number of plants in these 22 industries was 277 in 1980. In 1993 the number of plants in the same industries was 239, which means that the number of plants dropped by almost 14 per cent between 1980 and 1993. This can be compared with the rest of the country where the number of plants decreased by 26 per cent during the same period. Once again we

see that this group of industries in the GGVV-region was doing much better than the same industries in the rest of Sweden during the actual period.

Figure 2.1 *Percentage Change in Employment in the Selected 22 Industries between 1980 and 1993 in the GGVV-region and in the Rest of Sweden (RSW)*

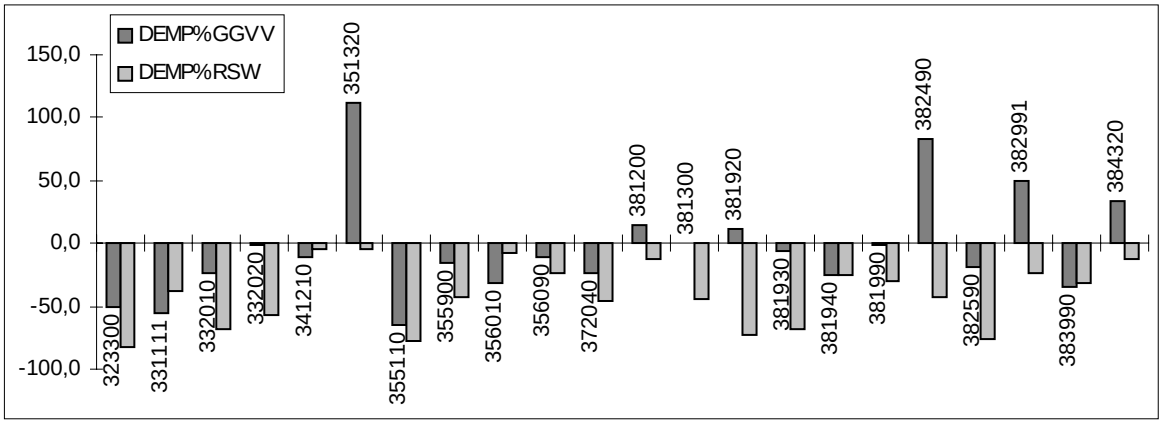
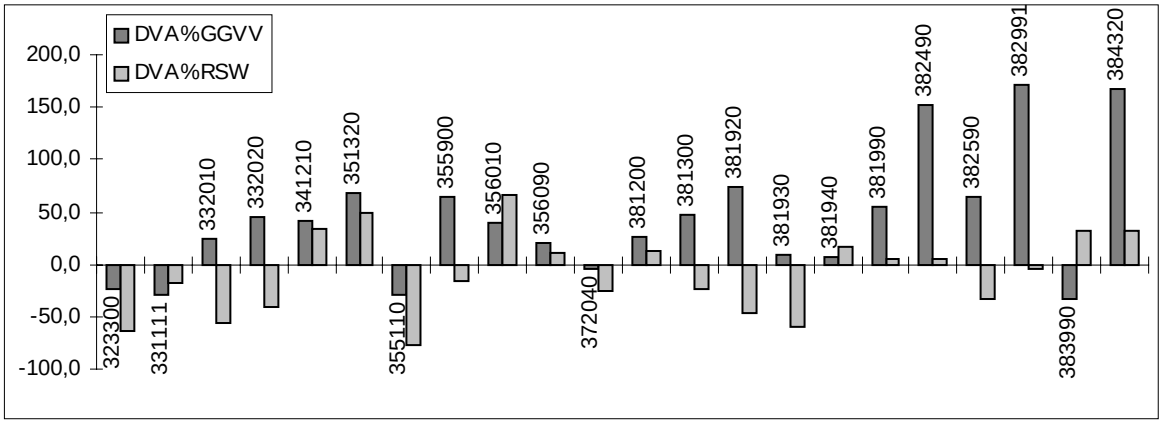


Figure 2.2 *Percentage Change in Value Added in the Selected 22 Industries between 1980 and 1993 (in fixed prices) in the GGVV-region and in the Rest of Sweden (RSW)*



The GGVV-region is known as the Swedish small business district. The size structure of plants in a region is, of course, to a high extent a reflection of the industrial structure of the region. But even for the 22 industries that characterises the GGVV-region we find that the average plant size is smaller than in the rest of Sweden (Appendix B and C). In 1980 the average plant size in the actual set of industries in the GGVV-region was 46.6 employees. A number that in 1993 had decreased to 46.1 employees. For the rest of Sweden the same numbers was 56.5 employees in 1980 and 50.4 employees in 1993. This means that the average plant in 1980 was about 21 per cent larger in the rest of Sweden than in the GGVV-region. In 1993 the difference had declined to about 9 per cent. The lower average size of the plants in the GGVV-region seems to rule our internal economies of scale as a major general explanation of the better performance of the actual industries in the GGVV-region.

2.2 Specialisation Quotients

In this paper a simple specialisation quotient is used to establish the relative importance of the 22 industries for the GGVV-region. The specialisation quotient is defined as:

$$SQ_{r,i} = \frac{X_i^r / X^r}{X_i / X} \cdot 100 \qquad (1)$$

where X_i^r = employment in region r in industry i,

X^r = total employment in region r,

X_i = employment in industry i in the rest of Sweden

and X = total employment in the rest of Sweden

If $SQ_{r,i} > 100$, the industry has a higher representation in region r than in the national economy. If $SQ_{r,i} < 100$, the industry is less represented in region r than in the nation as a whole. In the formula above employment can be substituted by value added or income data without any changes in the interpretation. By calculating specialisation quotients for the 22 manufacturing industries from the 1980 and the 1993 data the relative specialisation can be determined.

Now, in interpreting what might have happened during the period one has to remember that the specialisation quotient is a relative measure. The specialisation in the region is measured in relation to the national composition of industries. This means that there are two ways by which a particular quotient can decrease. Either the share of employment in the region has fallen or the share in the country as a whole have risen. In both these cases the specialisation quotient for the region has fallen.

The specialisation quotients in terms of employment for the GGVV-region can be found in Appendix B. The table in the appendix shows that the specialisation quotient for the actual industries in most cases is very high. It also shows that for all but five industries the specialisation quotient increased between 1980 and 1993.

Specialisation quotients for the GGVV-region computed in terms of value added can be found in Appendix C. In 1980 all industries except three had a specialisation index higher than 100. In 1993 all 22 industries had a location quotient for the GGVV-region that was higher than 100 and in many cases substantially higher. And between 1980 and 1993 all except four of the 22 industries increased their specialisation in terms of value added in the GGVV-region.

Taken together the calculations show that for the actual industries the GGVV-region is a very important location and a location whose importance in most cases increased during the period 1980-1993.

2.3 The Specialisation Quotients Ratio - a Measure of Success ?

If the ratio between two specialisation quotients from different years is calculated, the relative success or failure of a particular industry in a region can be determined. This means that according to this definition is the relative success or failure of an industry in a region is dependent on the relative development for the same industry in the rest of the country.

The specialisation quotients ratio, $R_{r.i,93,80}$, between 1980 and 1993 for region *r* and industry *i*, can be defined as:

$$R_{r,i,93,80} = \frac{SQ_{93}}{SQ_{80}}$$

If R < 1 there has been a decrease in the specialisation of the industry in question in the actual region. If R > 1 there has been an increase in the specialisation of the industry in the actual region.

In Table 2.1 and Table 2.2 the relative specialisation in 1980 and the rate of growth of specialisation between 1980 and 1993 have been divided into classes in order to establish the pattern of development. The rules by which this classification has been done is the following. First it was decided if the specialisation was high (H), medium (M) or low (L) in 1980. The decision rule was:

If , $SQ_{80} \geq 1000$, the industry specialisation was considered to be high.
If, $1000 > SQ_{80} \geq 500$, the industry specialisation was considered to be medium.
If, $SQ_{80} < 500$, the industry specialisation was considered to be low.

Then it was decided if the growth in specialisation between 1980 and 1993 had been fast (++), medium (+) or negative (-).The decision rule was:

If, $R_{r,i,93,80} \geq 2$, the growth was considered to be fast.
If, $2 > R_{r,i,93,80} \geq 1$, the growth rate was considered to be medium.
If, $R_{r,i,93,80} < 1$, the growth rate was negative.
This classification were done by quotients and ratios calculated from both employment figures and value added figures.[1]

The patterns in Table 2.1 is not so clear cut. Table 2.2 on the other hand shows some interesting results. No industry with a high value added specialisation in the GGVV-region had a decline in specialisation between 1980 and 1993. Of these industries that had a medium specialisation in 1980 the majority showed a clear but modest growth in value added specialisation during the same period. For those industries that had a low specialisation in 1980 the most typical pattern was a rapid increase in value added until 1993.

[1] See appendix B and C for the complete list of specialisation quotients and ratios.

Table 2.1 *Employment Specialisation in the GGVV-region in 1980 and Growth in Specilaisation 1980-1993 (SNI Codes)*

1980	Growth Rate		
	+ +	+	-
H	323300 381930	355110 355900 356090	356010
M	332010 382590 332020 381920	372040 381200 381990	341210
L	351320 382490	381300 384320 381940 382991	331111 383990

Table 2.2 *Value Added Specialisation in the GGVV-region in 1980 and the Growth in Specialisation 1980-1993 (SNI Codes)*

1980	Growth Rate		
	+ +	+	-
H	323300 355110	355900	
M	381930 382590	341210 372040 351320 381200 356090 381990	356010
L	332010 382490 332020 382991 381920 384320	381300	331111 381940 383990

3. METHODS OF ANALYSIS

In this chapter a further step is taken to analyse how the development of the actual industries in the GGVV-region compares with the development of the same industries in other regions in Sweden. Here we apply ideas from the literature on spatial industrial dynamics, in particular the filtering-down theory and the spatial product life cycle theory, that both assumes that industries develop along various spatio-temporal patterns (Karlsson, 1998). A common feature of these theories is that industries initially develop in the larger urban regions and then over time either hierarchically or according to some other pattern move to more and more peripheral regions. Combining these theories with a vintage model approach, that stresses that each vintage of plants keep its productive characteristics for extended time periods, it should as a theoretical simplification be possible to assume that the plants in each individual region can be aggregated to some average plant, whose characteristics mirror when the particular industry was established in the actual region.

Aggregating all plants in a given industry to one “average” plant it is then possible for a given year to rank all regions, where the actual industry is represented according to their productivity, their gross profit shares, and so on. This should give a good picture how individual regions do compared with other regions. Furthermore, this approach makes it possible to study how the position of individual regions may change over time for different industries. If a region moves up in the distribution of regions that is an indication of investment processes, either adding new capacity to a region or upgrading old industrial capacity. If a region moves downwards in the distribution that is an indication of insufficient investments in new capacity or improvements of old capacity.

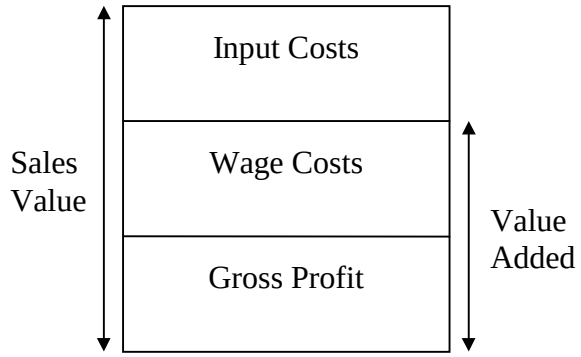
Once the industrial sectors of interest have been established it is time to explain why these sectors did so well. This will be done in the framework of a vintage type of production theory using Salter distributions of productivity and gross profit shares (cf. Salter, 1960). These distributions we estimate using data on value added and wages.

The theoretical framework for the vintage model can be summarised as follows. A production unit (plant) is characterised by its durable resources including the technique of operation (production, distribution etc.). The operation technique can only be changed through investments. This means that labour productivity, at fixed prices, is unchanged if new investments are not made.

On an aggregate level three processes are at work: technical improvements in existing plants, investments in new plants and scrapping of old plants. It is possible to describe the economic age of a plant with an age index. Such an index can be constructed using the plant’s gross profit share, which is the quotient between gross profit and value added. When technique improvements are made at a plant the age index is changed by an increasing gross profit share as a result. When the gross profit share diminishes it is a sign of economic ageing.

The connections between sales value, value added and gross profit is depicted in Figure 3.1. Value added is a statistical measure of the production at a plant and is calculated as sales value less input costs. Gross profit is the difference between value added and wage costs. The

gross profit should cover various fixed costs, as shown in Figure 3.2. These costs include depreciation of invested capital, fixed administrative costs and costs for repair. After these costs have been subtracted from gross profit the remaining part is net profit.



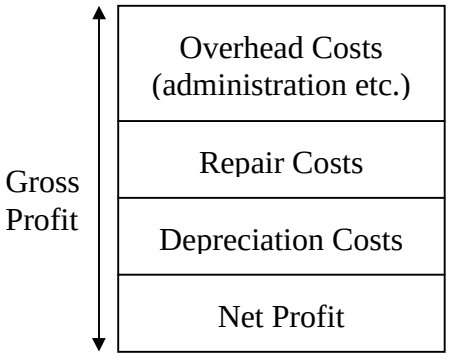


Figure 3.1 *Sales Value, Value Added and Gross Profit*
Figure 3.2 *Gross Profit, Fixed Costs and Net Profit*

Assume that we have a plant producing and selling the quantity x of a product at price p. The sales value, Q, is defined as:

$$Q = px \tag{2}$$

The plant have used the quantities $v_1,.....v_m$ of inputs to produce x. Let p_i be the price of input i. The value added, F, can then be defined as:

$$F = px - V$$

$$V = \sum_i p_i v_i \tag{3}$$

Assume that the workforce needed to produce x is $S > 0$. Let w be the wage rate. The gross profit, B, can then be defined as:

$$B = F - W$$

$$W = wS \tag{4}$$

If gross profit is related to value added we get the gross profit share, b , which is defined as:

$$b = B/F \tag{5}$$

Gross profit share can also be related to the productivity of the workforce, ω, defined as:

$$\omega = F/S \quad (6)$$

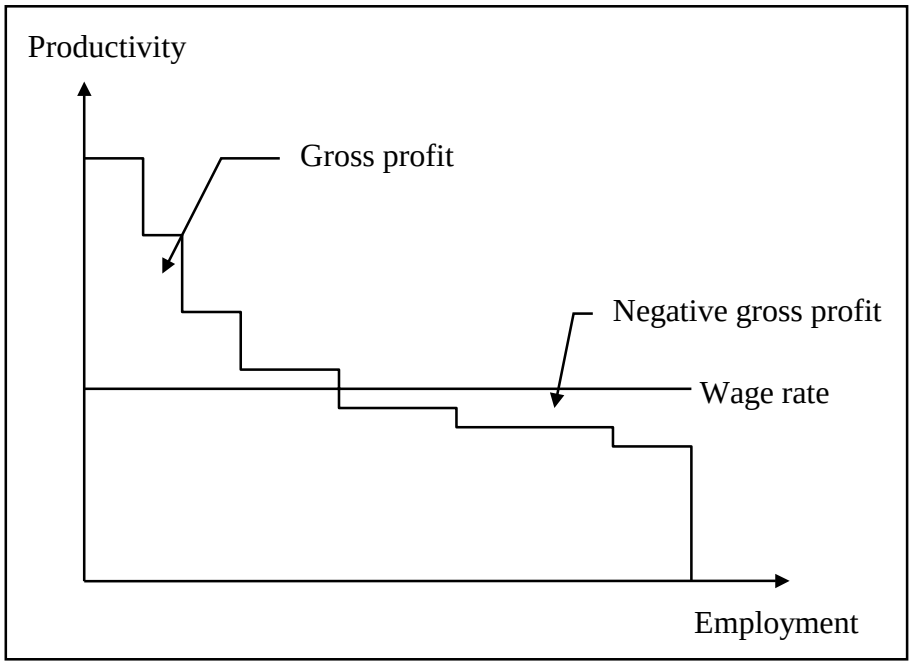
and since $B/F = 1 - W/F$, we can write:

$$b = 1 - w/\omega \quad (7)$$

This implies that the productivity of the workforce must be larger than the wage rate in order to give a positive gross profit share.

These productivity and gross profit share measures calculated for individual plants can be presented in a cumulative distribution over total employment or total value added (See Figure 3.3). These distributions then can be used to analyse differences between regions or differences in time. Also the shape of the distribution can shed light on what type of structural changes are going on or if the industry or parts of the industry is sensitive to changes in input prices (e.g. wage rates).

Figure 3.3 *Interpretation of a Productivity Salter Distribution*



4. EMPIRICAL EVIDENCE

In this chapter we present the results of our empirical investigations. Here we apply the productivity distributions for various industries over regions to analyse how the GGVV-region is doing in comparison with other regions in Sweden. We complement the productivity distributions with tables giving information about the situation for the GGVV-region

compared with the average region and the best region in 1980 and 1993 in terms of productivity, labour costs and gross profit shares. Furthermore, the tables contain information about how the changes in the same variables in the GGVV-region compared with the average region and the best region in Sweden.

In this section the productivity distributions for various industries over regions are investigated. In particular, we study how the GGVV-region is doing in comparison with those other regions where the actual industries are represented. The productivity distributions are found in Figure 4.1 and in Appendix D. A look through the diagrams shows that the GGVV-region improves its relative position significantly in about half of the 22 industries, while in about six cases its relative position significantly deteriorates between 1980 and 1993. In the rest of the cases the relative position of the GGVV-region only changes slightly.

The examination of the productivity distributions and the comparisons of the productivity distributions for 1980 and 1993 give important indications concerning the investment patterns for the various industries in the GGVV-region. To get a deeper understanding of the underlying causes of the comparatively speaking strong performance of the 22 industries in the GGVV-region we now continue by comparing the performance of the actual industries in the GGVV-region with the performance of the same industries in the average region and in the best region. This information is gathered in Table 4.1, 4.2 and 4.3.

Starting with the productivity data in Table 4.1 we see that in 1980 14 of the 22 industries in the GGVV-region outperformed the average region in terms of productivity even if the difference in three cases was slight. In 1993 this figure has increased to 16 industries. This is a clear hint of why the GGVV-region is able to improve its relative position. However, compared with the best region there is still a long way to go. In 1980 only six industries exhibited an average productivity that was 75 per cent or better of that in the best region. In 1993 that figure had declined to five industries, but of them one had a top position.

Figure 4.1 Regional Productivity and Wage Distributions in Selected Industries 1980 and 1993

Figure X: *Industry 323300 (1980)*

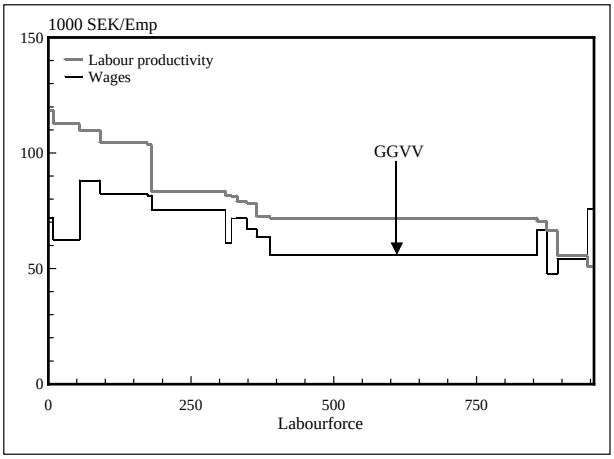


Figure X: *Industry 323300 (1993)*

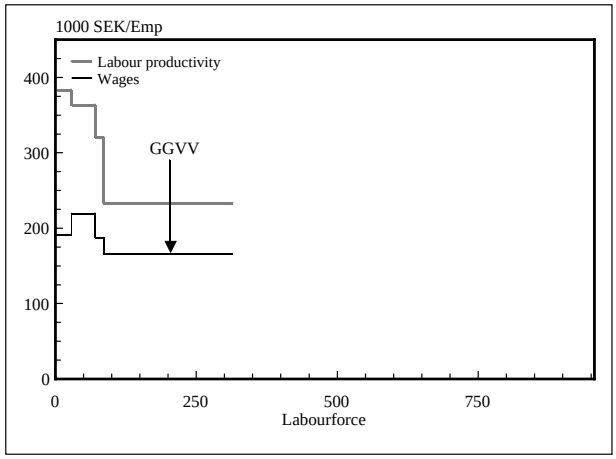


Figure X: *Industry 332010 (1980)*

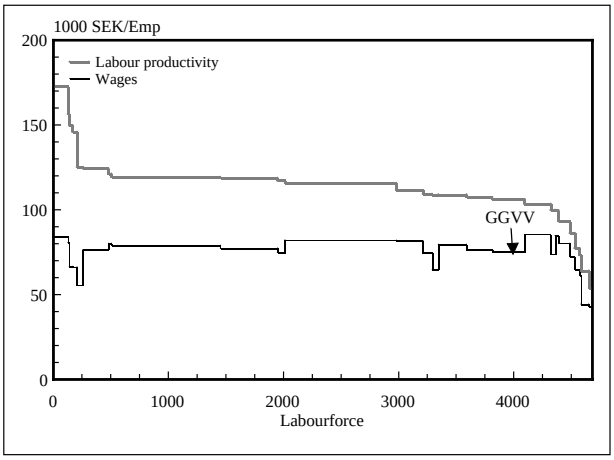


Figure X: *Industry 332010 (1993)*

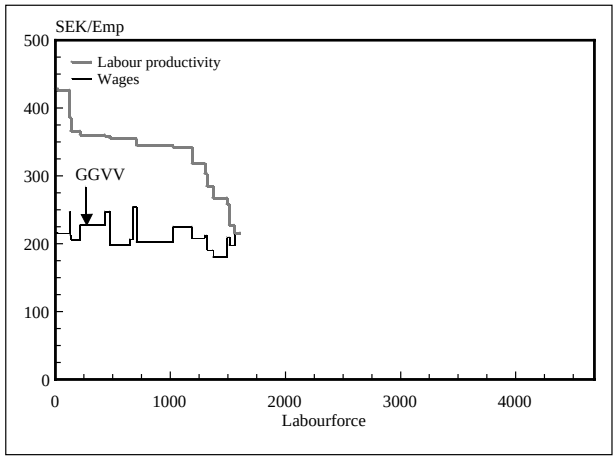


Figure X: *Industry 332020 (1980)*

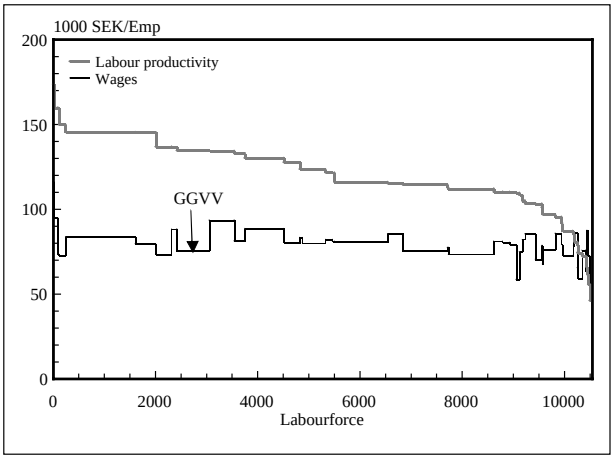


Figure X: *Industry 332020 (1993)*

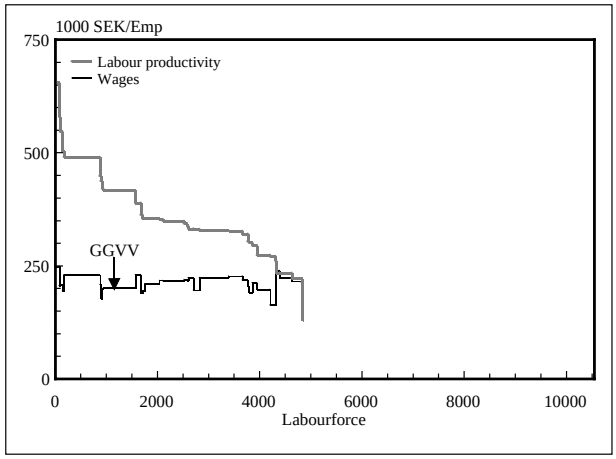


Figure X: *Industry 381920 (1980)*

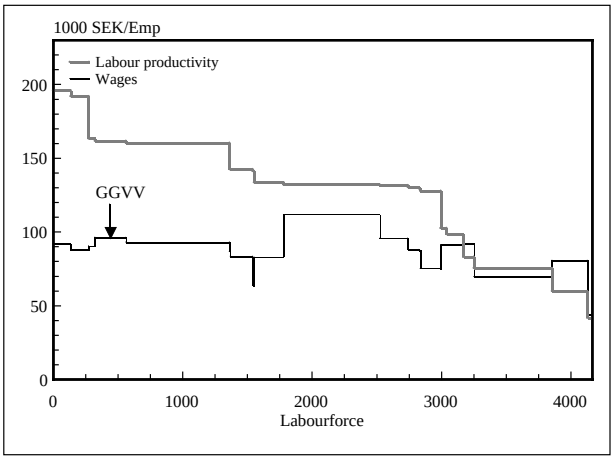


Figure X: *Industry 381920 (1993)*

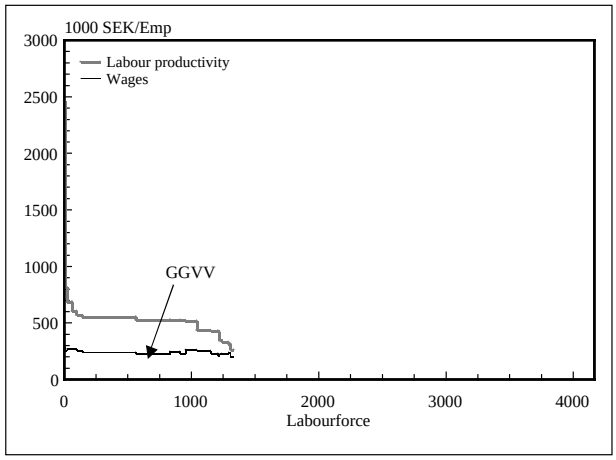


Figure X: *Industry 381930 (1980)*

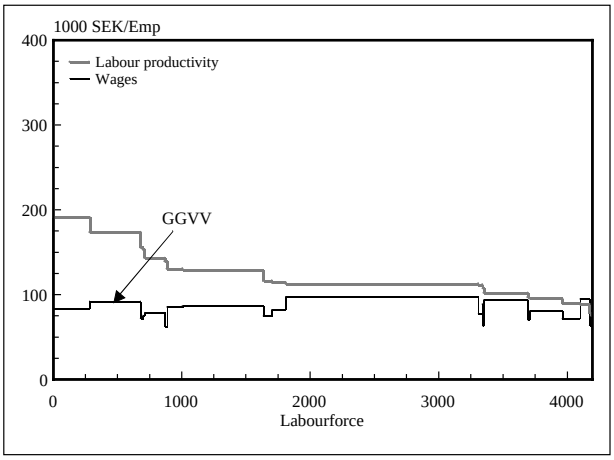


Figure X: *Industry 381930 (1993)*

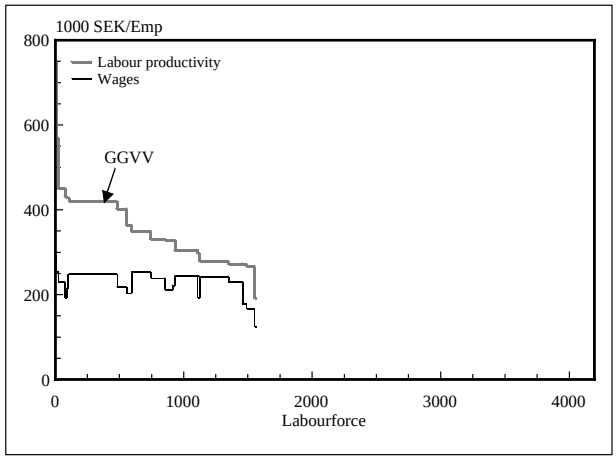


Figure X: *Industry 382490 (1980)*

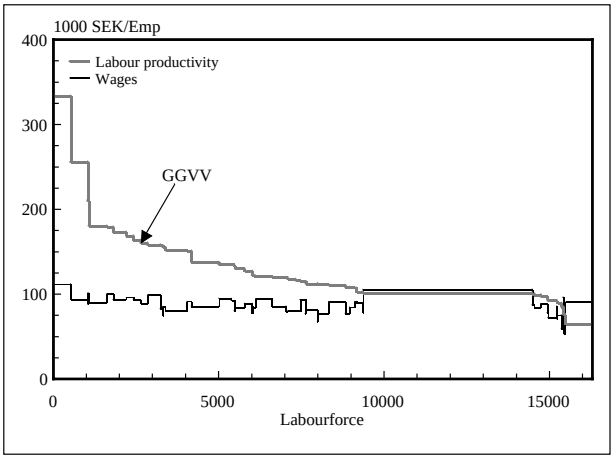


Figure X: *Industry 382490 (1993)*

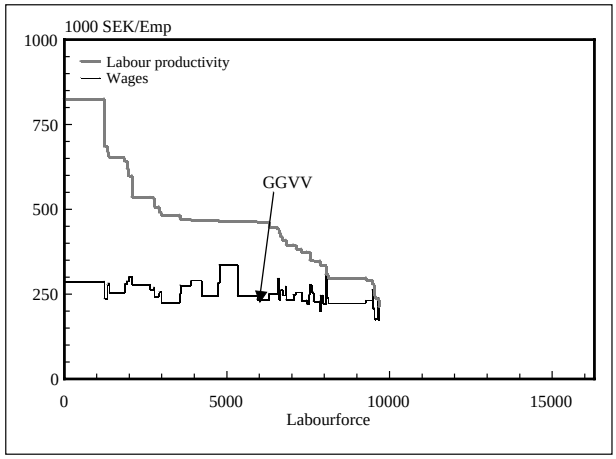


Figure X: *Industry 382590 (1980)*

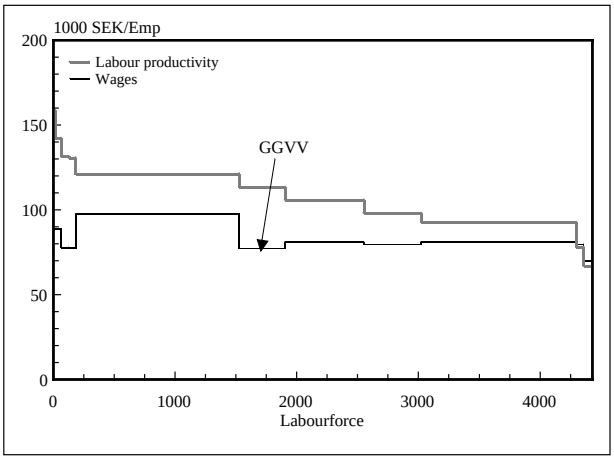


Figure X: *Industry 382590 (1993)*

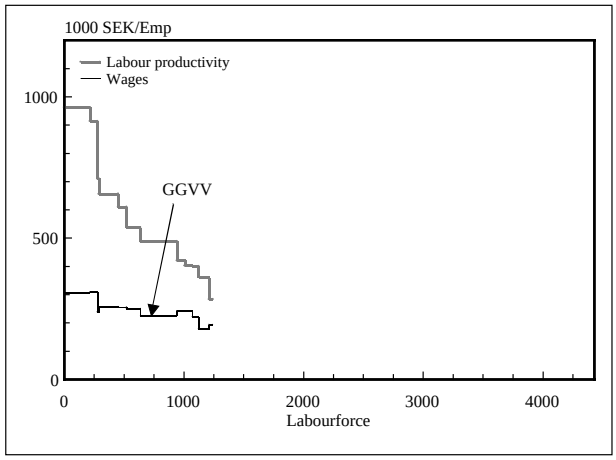


Table 4.1 also contains information of the ranking of the (average) productivity of the different industries in the GGVV-region compared with that in other regions where the different industries are represented. For 16 of the industries, i.e. for more than 70 per cent of the industries, the productivity in the GGVV-region was better than in the median region in both 1980 and 1993. In eight cases (= 36 per cent) in 1980 and in seven cases (= 32 per cent) in 1993 the GGVV-region was even in the best quartile of all regions. Thus it seems as if a majority of the industries covered by this study have a productivity advantage when localised in the GGVV-region compared to a localisation to an average Swedish region.

Table 4.1 *The GGVV-region in Relation to the Whole of Sweden in Terms of Productivity*

	Prod	**1980**		**Prod**	**1993**	
	(% of m)	(% of b)	R	(% of m)	(% of b)	R
323300	85,65	60,53	12/16	71,73	60,83	4/4
331111	118,7	72,34	17/67	138,2	67,33	6/66
332010	96,29	61,48	17/26	108,1	84,19	6/19
332020	123,9	77,47	9/48	114,9	63,62	10/34
341210	119,2	84,99	5/16	130,7	83,01	2/18
351320	176,0	89,06	2/32	105,0	56,33	18/35
355110	89,44	80,65	4/4	127,0	100	1/2
355900	93,69	49,41	8/19	119,5	82,36	4/17
356010	96,31	55,05	13/27	126,0	87,70	4/33
356090	98,10	62,70	27/48	84,17	32,72	33/49
372040	127,8	69,14	4/27	105,8	62,42	5/19
381200	128,4	88,08	6/36	89,07	37,54	16/24
381300	118,3	67,78	26/69	125,8	65,43	7/66
381920	127,1	82,55	5/20	86,67	21,33	7/17
381930	135,5	56,94	3/22	112,6	56,17	7/20
381940	110,3	61,36	15/43	93,62	64,01	28/39
381990	100,2	53,98	26/65	107,9	46,78	18/65
382490	122,0	48,00	10/54	106,8	55,99	23/52
382590	100,5	71,33	6/11	86,84	50,71	7/12
382991	79,40	30,31	35/52	104,7	54,02	19/52
383990	97,40	16,73	13/38	102,7	47,98	17/37
384320	100,9	58,01	27/60	133,7	62,56	6/58

Prod = productivity
% of m = percent of mean
% of b = percent of best (highest)

Next turning to the issue of labour costs we see in Table 4.2 that 50 per cent of the industries have labour costs that are higher than in the average region. Labour cost advantages do not seem to be a plausible explanation for the relative success of the GGVV-region. In only six cases in both 1980 and 1993 was the labour costs in the GGVV-region more than 25 per cent lower than those in the region with the highest labour costs. Looking upon the ranking of the GGVV-region in terms of labour costs with other regions there is no clear cut pattern. Both in 1980 and in 1993 50 percent in the industries has labour costs above the median and 50 per cent below the median. Hence, labour costs does not seem to give any particular advantages or disadvantages to the industries in the GGVV-region compared to a location to most other regions.

Table 4.2 *The GGVV-region in Relation to the Whole of Sweden in Terms of Labour Costs*

	Wage	1980		Wage	1993	
	(% of m)	(% of b)	R	(% of m)	(% of b)	R
323300	81,19	63,15	14/16	86,74	75,44	4/4
331111	104,8	89,76	17/67	109,4	95,01	14/66
332010	103,6	87,98	14/26	106,1	89,42	4/19
332020	96,68	64,91	31/48	95,74	80,64	23/34
341210	110,9	88,11	3/16	110,5	91,34	4/18
351320	110,3	85,83	7/32	107,3	86,25	10/35
355110	93,74	83,28	3/4	109,4	100	1/2
355900	87,09	65,63	15/19	105,1	78,95	6/17
356010	101,0	78,23	12/27	104,8	75,79	11/33
356090	93,05	72,09	33/48	88,10	67,75	41/49
372040	105,6	79,24	8/27	100,9	81,32	10/19
381200	100,4	75,42	16/36	95,32	81,33	1724
381300	101,9	80,09	26/69	104,2	74,92	22/66
381920	113,0	86,02	2/20	92,73	77,21	14/17
381930	114,1	92,38	5/22	113,0	85,25	4/20
381940	94,82	77,38	30/43	91,98	69,72	29/39
381990	94,60	57,80	46/65	97,64	75,16	39/65
382490	104,2	79,34	21/54	93,76	69,96	37/52
382590	94,47	79,06	10/11	92,32	72,84	9/12
382991	98,92	78,22	29/52	91,88	56,54	41/52
383990	89,80	52,17	27/38	107,1	61,84	16/37
384320	95,46	79,95	27/60	97,44	61,39	32/58

% of m = percent of mean
% of b = percent of best (highest)

Lastly, turning to the issue of gross profit shares in Table 4.3, we find something interesting. In 1980, all except 3 industries in the GGVV-region outperformed the average region in terms of gross profit shares. In nine case with so much as 20 per cent or more. In 1993 only two industries in the GGVV-region had a gross profit share that was lower than in the average region. Also compared to the industries in the best region were the industries in the GGVV-region doing well. In 16 cases the difference was less than 20 per in 1980 and in 1993 the same figure was 15 cases.

If we then look upon the ranking of the GGVV-region for the various industries in terms of gross profit shares we find in 1980 19 out of 22 industries exhibit gross profit shares above the median. This is equal to more than 85 per cent. In 1993 this number had dropped to 18 but this means that still more than 80 per cent of the industries was doing better in the GGVV-region than in the median region. In both years 7 industries, i.e. almost 32 per cent of the industries belong to the best quartile. And only one industry in both years was to be found in the worst quartile. Hence, the industries in the GGVV-region has a very strong position in terms of profitability.

These results point in the direction that the secret behind the Gnosjö phenomenon is neither generally higher productivity in other regions, nor lower labour costs. Rather the secret seems to be an ability to balance productivity and labour costs in a way that produces a profitability that is clearly higher than in the average region. This higher profitability creates the funds

necessary to invest in increased and improved production capacity in a balanced way to keep the region ahead of most of its competitors.

Table 4.3 *The GGVV-region in Relation to the Whole of Sweden in Terms of Gross Profit Share*

	GPS	1980		GPS	1993	
	(% of m)	(% of b)	R	(% of m)	(% of b)	R
323300	114,2	73,03	5/16	85,58	75,72	4/4
331111	108,9	88,35	20/67	113,3	88,63	8/66
332010	96,31	71,69	14/26	104,2	85,37	8/19
332020	132,4	89,06	14/48	121,9	85,73	10/34
341210	111,6	86,42	7/16	116,7	88,71	5/18
351320	127,9	98,70	4/32	116,8	76,96	17/35
355110	97,28	82,61	3/4	110,5	100	1/2
355900	115,0	81,22	8/19	112,0	85,18	5/17
356010	103,6	71,91	12/27	112,9	92,41	7/33
356090	106,8	84,18	18/48	102,5	70,70	23/49
372040	136,8	90,05	7/27	107,4	75,49	4/19
381200	126,7	94,91	6/36	99,63	70,40	13/24
381300	115,3	84,19	14/69	116,2	80,29	10/66
381920	121,6	84,52	8/20	108,1	75,41	4/17
381930	122,7	80,68	6/22	103,9	79,38	9/20
381940	121,1	85,18	10/43	105,2	84,97	20/39
381990	108,6	74,77	19/65	110,6	81,08	14/65
382490	121,1	78,97	11/54	114,7	84,02	14/52
382590	112,9	84,71	5/11	101,0	86,55	6/12
382991	89,80	54,22	37/52	120,1	85,91	15/52
383990	123,4	66,94	8/38	109,7	74,13	14/37
384320	112,1	75,08	20/60	128,7	88,79	6/58

GPS = Gross Profit Share
% of m = percent of mean
% of b = percent of best (highest)

5. SUMMARY AND CONCLUSIONS

This paper deals with the leading industrial district in Sweden, the GGVV-region. In the international this region is also known as the Gnosjö region. It has been shown that this region during the period 1980 to 1993 in those 22 manufacturing industries identified at the finest level (the six-digit level) that form the manufacturing kernel of the region do considerably better than the rest of Sweden. The basic question asked in this paper is whether this better performance is the result of higher productivity/productivity growth or lower labour costs/labour cost increases. The somewhat unexpected answer is that neither of these factors seem to be the major factor. Instead the answer seems to come form the combined effect of productivity and labour costs that gives rise a profitability measured in terms of gross profit shares in the GGVV-region in almost all the 22 industries in the study that is substantially higher than in the average region. A profitability that generates the means necessary to invest in new capacity, introduce new production techniques and new and improved products and to upgrade existing production capacity to make the industries in the region forceful competitors to firms in the same industries in other regions in Sweden (and abroad). One may observe that it is generally said that the tradition in the GGVV-region is to finance investments out of internally generated profits.

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APPENDIX A: INDUSTRIAL CLASSIFICATION (SNI CODES)

Source: Statistics Sweden

323300	Manufacture of products of leather and leather substitutes, except footwear and wearing apparel
331111	Sawing and planing of wood products
332010	Manufacture of upholstered wooden furniture
332020	Manufacture of non-upholstered wooden furniture
341210	Manufacture of corrugated board and containers thereof
351320	Manufacture of plastic materials
355110	Tyre and tube manufacturing
355900	Manufacture of rubber products not elsewhere classified
356010	Manufacture of plastic containers
356090	Manufacture of other plastic products
372040	Non-ferrous metal casting
381200	Manufacture of furniture and fixtures primarily of metal
381300	Manufacture of structural metal products
381920	Wire cloth, wire and cable manufacturing
381930	Nail, bolt and nut manufacturing
381940	Manufacture of other metal products for construction purposes
381990	Manufacture of other metal products
382490	Manufacture of industrial machinery not elsewhere classified
382590	Manufacture of other office and accounting machinery
382991	Manufacture of lifting devices
383990	Manufacture of other electrical equipment
384320	Manufacture of motor vehicle engines, parts and trailers

APPENDIX B: EMPLOYMENT, SHARES, SPECIALISATION QUOTIENTS, NUMBER OF PLANTS IN GGVV

Source: Statistics Sweden, Industrial Statistics, 1980, 1993

SNI69	EMP80GGVV	EMP93GGVV	SH80%	SH93%	DEMP%GGVV	EMP80RSW	EMP93RSW	DEMP%RSW	SPECQ80	SPECQ93	Q93/Q80	Q93-Q80	NOFIGGVV80	NOFIGGVV93	NOFICHGGVV	NOFICHGGVV%
323300	467	229	2,8	1,7	-51,0	489	86	-82,4	9191,9	24918,4	2,7	157,3	10	7	-3	-30,0
331111	560	254	3,3	1,9	-54,6	21619	13321	-38,4	249,3	178,4	0,7	-0,7	19	8	-11	-57,9
332010	279	214	1,6	1,6	-23,3	4406	1394	-68,4	609,5	1436,6	2,4	8,3	6	4	-2	-33,3
332020	629	623	3,7	4,7	-1,0	9922	4234	-57,3	610,2	1377,0	2,3	7,7	25	15	-10	-40,0
341210	256	227	1,5	1,7	-11,3	2627	2516	-4,2	937,9	844,3	0,9	-0,9	1	1	0	0,0
351320	266	564	1,6	4,3	112,0	5196	4980	-4,2	492,7	1059,8	2,2	5,7	2	3	1	50,0
355110	1831	641	10,8	4,9	-65,0	1429	325	-77,3	12332,6	18456,9	1,5	61,2	3	1	-2	-66,7
355900	1531	1291	9,0	9,8	-15,7	4309	2440	-43,4	3419,8	4951,3	1,4	15,3	6	10	4	66,7
356010	333	228	2,0	1,7	-31,5	3179	2930	-7,8	1008,2	728,2	0,7	-2,8	7	9	2	28,6
356090	1135	1018	6,7	7,7	-10,3	8029	6103	-24,0	1360,6	1560,9	1,1	2,0	32	35	3	9,4
372040	269	204	1,6	1,5	-24,2	2779	1526	-45,1	931,7	1251,0	1,3	3,2	12	8	-4	-33,3
381200	312	356	1,8	2,7	14,1	3023	2634	-12,9	993,4	1264,8	1,3	2,7	10	13	3	30,0
381300	524	523	3,1	4,0	-0,2	21211	11772	-44,5	237,8	415,8	1,7	1,8	17	7	-10	-58,8
381920	240	269	1,4	2,0	12,1	3927	1065	-72,9	588,2	2363,7	4,0	17,8	10	9	-1	-10,0
381930	396	371	2,3	2,8	-6,3	3801	1196	-68,5	1002,8	2902,9	2,9	19,0	10	12	2	20,0
381940	436	329	2,6	2,5	-24,5	10685	8029	-24,9	392,7	383,5	1,0	-0,1	11	8	-3	-27,3
381990	1927	1895	11,4	14,4	-1,7	19286	13529	-29,9	961,7	1310,8	1,4	3,5	61	52	-9	-14,8
382490	204	373	1,2	2,8	82,8	16097	9328	-42,1	122,0	374,2	3,1	2,5	10	13	3	30,0
382590	378	304	2,2	2,3	-19,6	4053	941	-76,8	897,7	3023,2	3,4	21,3	2	2	0	0,0
382991	176	263	1,0	2,0	49,4	14966	11400	-23,8	113,2	215,9	1,9	1,0	4	6	2	50,0
383990	252	165	1,5	1,2	-34,5	6871	4664	-32,1	353,0	331,1	0,9	-0,2	9	2	-7	-77,8
384320	512	682	3,0	5,2	33,2	28223	24658	-12,6	174,6	258,8	1,5	0,8	10	14	4	40,0
SUM	**12913**	**11023**	**76,3**	**83,5**	**-14,6**	**196127**	**129071**	**-34,2**					**277**	**239**	**-38**	**-13,7**

SNI69 = Swedish Standard Industrial Classification
EMP80GGVV = Employment 1980 in the GGVV-region
EMP93GGVV = Employment 1993 in the GGVV-region
SH80% = Share of Total Employment in Manufacturing 1980 in the GGVV-region
SH93% = Share of Total Employment in Manufacturing 1993 in the GGVV-region
DEMP%GGVV = Percentage Change in Employment in the GGVV-region
EMP80RSW = Employment 1980 in the Rest of Sweden
EMP93RSW = Employment 1993 in the Rest of Sweden
DEMP%RSW = Percentage Change in Employment in the Rest of Sweden
SPECQ80 = Specialisation Quotient for the GGVV-region in 1980 (In Employment Terms)
SPECQ93 = Specialisation Quotient for the GGVV-region in 1980 (In Employment Terms)
Q93/Q80 = Ratio of Specialisation Quotients (In Employment Terms)
Q93 - Q80 = Difference of Specialisation Quotients (In Employment Terms)
NOFIGGVV80 = Number of Plants in the GGVV-region in 1980
NOFIGGVV93 = Number of Plants in the GGVV-region in 1993
NOFICHGGVV = Change in Number of Plants in the GGVV-region
NOFICHGGVV% = Percentage Change in Number of Plants in the GGVV-region

APPENDIX C: VALUE ADDED, SHARES, SPECIALISATION QUOTIENTS, NUMBER OF PLANTS IN REST OF SWEDEN

Source: Statistics Sweden, Industrial Statistics, 1980, 1993

SNI69	VA80GGVV	VA93GGVV	SH80%	SH93%	DVA%GGVV	VA80RSW	VA93RSW	DVA%RSW	SPECQ80	SPECQ93	Q93/Q80	Q93-Q80	NOFIRSW80	NOFIRSW93	NOFICHRSW	NOFICHRSW%
323300	33484	53349	1,4	0,9	-24,1	42431	31980	-64,1	4370,9	9042,1	2,1	4671,1	20	6	-14	-70,0
331111	123386	184768	5,2	3,1	-28,7	4204445	7326146	-17,0	162,5	136,7	0,8	-25,8	568	334	-234	-41,2
332010	29599	77084	1,2	1,3	24,0	506469	465496	-56,2	323,7	897,6	2,8	573,9	81	47	-34	-42,0
332020	84552	259546	3,5	4,3	46,2	1207026	1502682	-40,7	388,0	936,2	2,4	548,2	264	106	-158	-59,8
341210	48801	144174	2,0	2,4	40,7	420207	1172715	32,9	643,3	666,4	1,0	23,1	19	25	6	31,6
351320	82289	291234	3,5	4,8	68,5	911404	2838824	48,3	500,1	556,1	1,1	56,0	64	75	11	17,2
355110	263314	391222	11,1	6,5	-29,2	239161	113935	-77,3	6098,2	18611,7	3,1	12513,5	3	2	-1	-33,3
355900	171820	589612	7,2	9,8	63,4	567783	1002993	-15,9	1676,1	3186,3	1,9	1510,2	36	33	-3	-8,3
356010	44548	130232	1,9	2,2	39,2	423122	1472765	65,7	583,2	479,3	0,8	-103,9	46	54	8	17,4
356090	143181	359703	6,0	6,0	19,6	1091950	2547012	11,1	726,3	765,5	1,1	39,2	186	148	-38	-20,4
372040	37642	75379	1,6	1,3	-4,6	323221	504061	-25,7	645,0	810,6	1,3	165,5	47	29	-18	-38,3
381200	49828	131900	2,1	2,2	26,1	428119	1012106	12,6	644,7	706,4	1,1	61,7	71	48	-23	-32,4
381300	87583	270837	3,7	4,5	47,3	3145377	5008889	-24,2	154,2	293,1	1,9	138,9	563	423	-140	-24,9
381920	38772	141208	1,6	2,3	73,4	493563	561760	-45,8	435,1	1362,5	3,1	927,4	33	23	-10	-30,3
381930	68552	155648	2,9	2,6	8,1	455219	390296	-59,2	834,1	2161,6	2,6	1327,5	34	25	-9	-26,5
381940	58546	131740	2,5	2,2	7,2	1392789	3422548	17,0	232,8	208,6	0,9	-24,2	110	107	-3	-2,7
381990	255843	827491	10,7	13,7	54,0	2488516	5488207	5,0	569,4	817,2	1,4	247,8	549	469	-80	-14,6
382490	32638	172230	1,4	2,9	151,3	2087096	4578512	4,5	86,6	203,9	2,4	117,3	270	188	-82	-30,4
382590	42781	148280	1,8	2,5	65,0	430127	599990	-33,6	550,9	1339,5	2,4	788,6	28	16	-12	-42,9
382991	20665	117424	0,9	1,9	170,6	2309069	4636038	-4,4	49,6	137,3	2,8	87,7	156	158	2	1,3
383990	36560	50828	1,5	0,8	-33,8	910204	2506251	31,1	222,5	109,9	0,5	-112,6	95	60	-35	-36,8
384320	63154	354008	2,7	5,9	166,9	3581166	9950757	32,3	97,7	192,8	2,0	95,2	227	187	-40	-17,6
SUM	**1817538**	**5057897**	**76,3**	**84,0**	**32,5**	**27658464**	**57133963**	**-1,6**					**3470**	**2563**	**-907**	**-26,1**

SNI69 = Swedish Standard Industrial Classification
VA80GGVV = Value Added 1980 in the GGVV-region (1980 SEK)
VA93GGVV = Value Added 1993 in the GGVV-region (1993 SEK)
SH80% = Share of Total Value Added in Manufacturing 1980 in the GGVV-region
SH93% = Share of Total Value Added in Manufacturing 1993 in the GGVV-region
DVA%GGVV = Percentage Change in Value Added in the GGVV-region (In Fixed Prices)
VA80RSW = Value Added 1980 in the Rest of Sweden (1980 SEK)
VA93RSW = Value Added 1993 in the Rest of Sweden (1993 SEK)
DVA%RSW = Percentage Change in Value Added in the Rest of Sweden (In Fixed Prices)
SPECQ80 = Specialisation Quotient for the GGVV-region in 1980 (In Value Added Terms)
SPECQ93 = Specialisation Quotient for the GGVV-region in 1993(In Value Added Terms)
Q93/Q80 = Ratio of Specialisation Quotients (In Value Added Terms)
Q93 - Q80 = Difference of Specialisation Quotients(In Value Added Terms)
NOFIRSW80 = Number of Plants in the Rest of Sweden in 1980
NOFIRSW93 = Number of Plants in the Rest of Sweden in 1993
NOFICHRSW = Change in Number of Plants in the Rest of Sweden
NOFICHRSW% = Percentage Change in Number of Plants in the Rest of Sweden

APPENDIX D: PRODUCTIVITY AND WAGE DISTRIBUTIONS

Figure X: *Industry SNI 331111 (1980)*

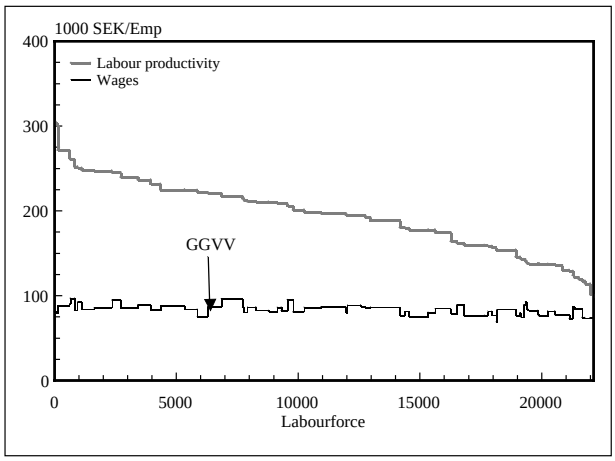

Figure X: *Industry SNI 331111 (1993)*

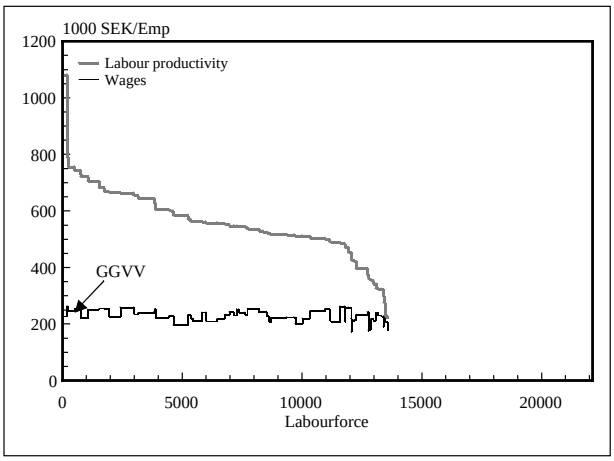

Figure X: *Industry SNI 341210 (1980)*

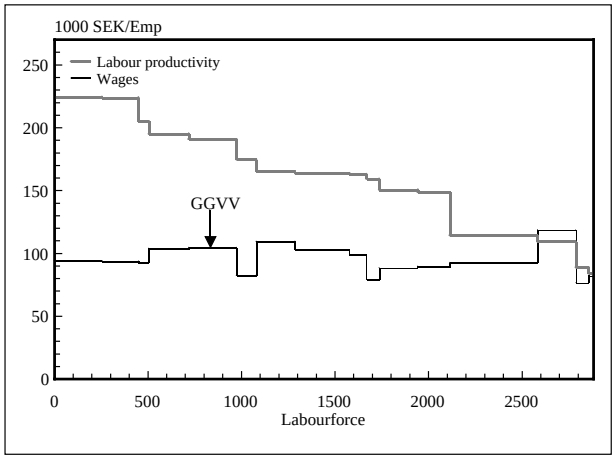

Figure X: *Industry SNI 341210 (1993)*

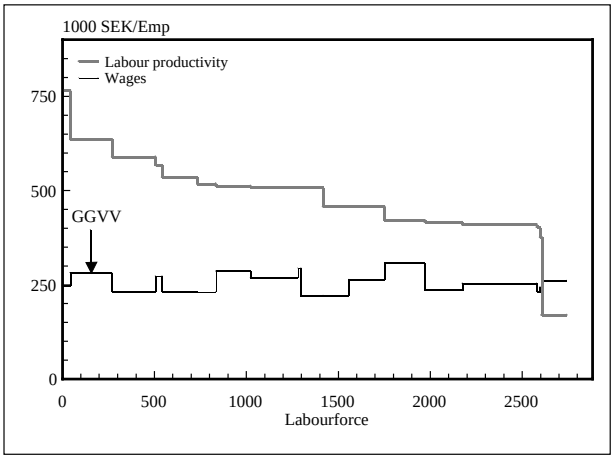

Figure X: *Industry SNI 351320 (1980)*

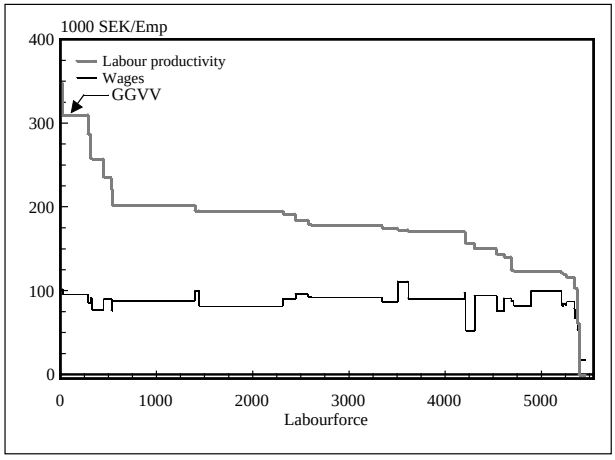

Figure X: *Industry SNI 351320 (1993)*

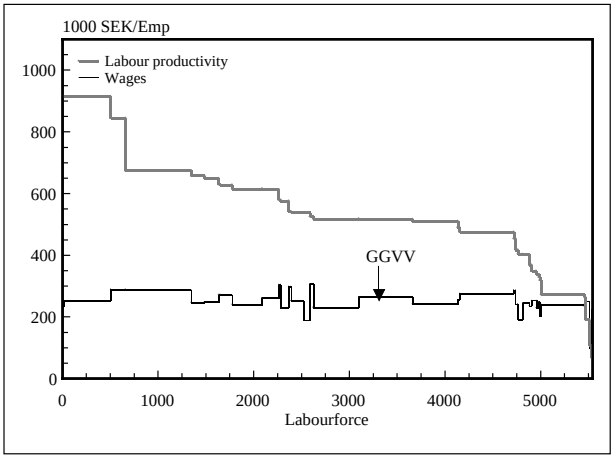

Figure X: *Industry 355110 (1980)*

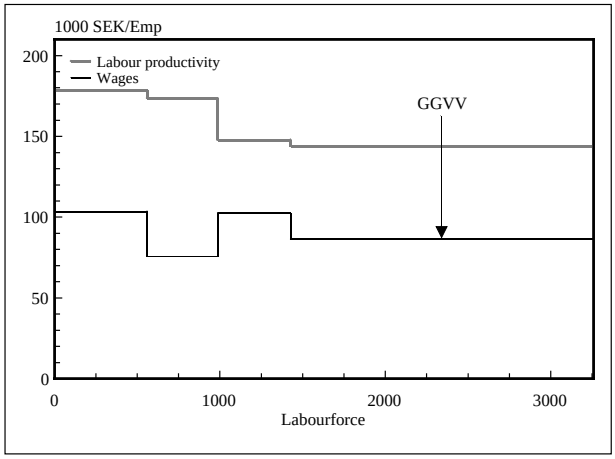

Figure X: *Industry SNI 355110 (1993)*

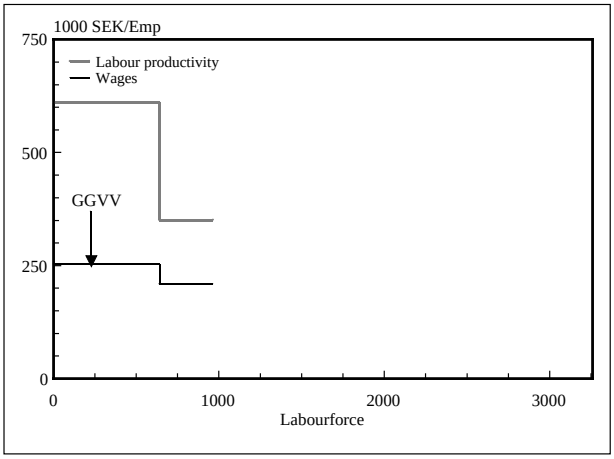

Figure X: *Industry SNI 355900 (1980)*

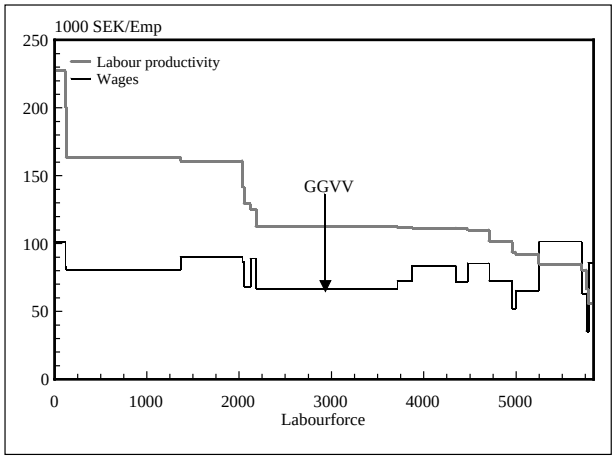

Figure X: *Industry SNI 355900 (1993)*

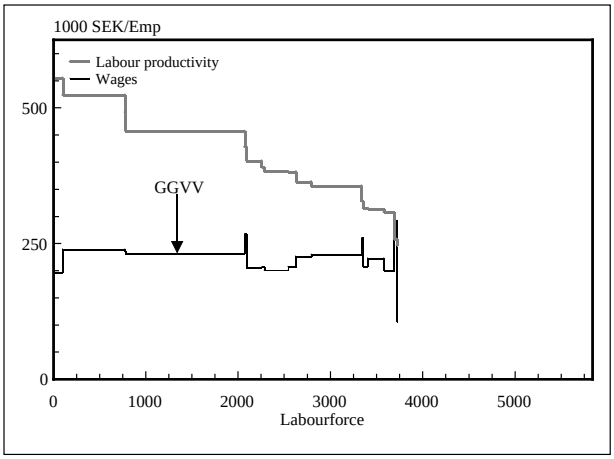

Figure X: *Industry SNI 356010 (1980)*

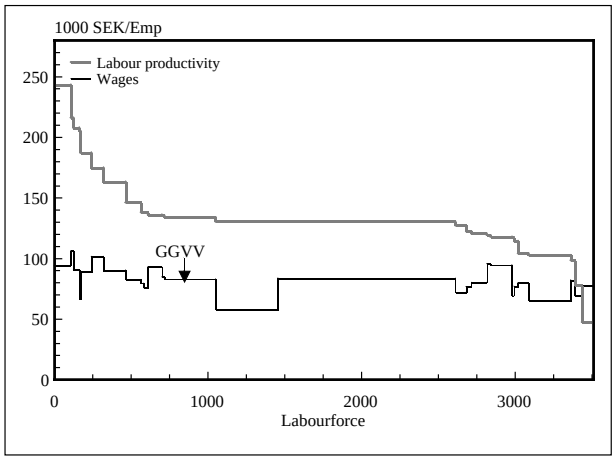

Figure X: *Industry SNI 356010 (1993)*

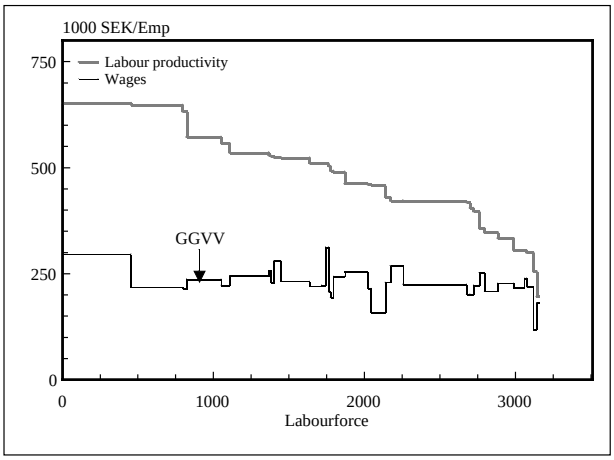

Figure X: *Industry SNI 356090 (1980)*

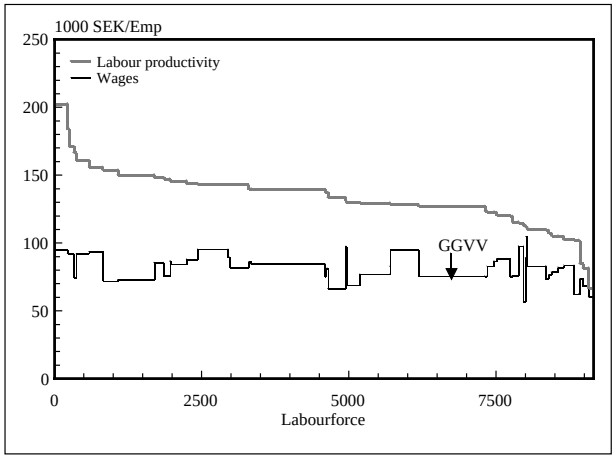

Figure X: *Industry SNI 356090 (1993)*

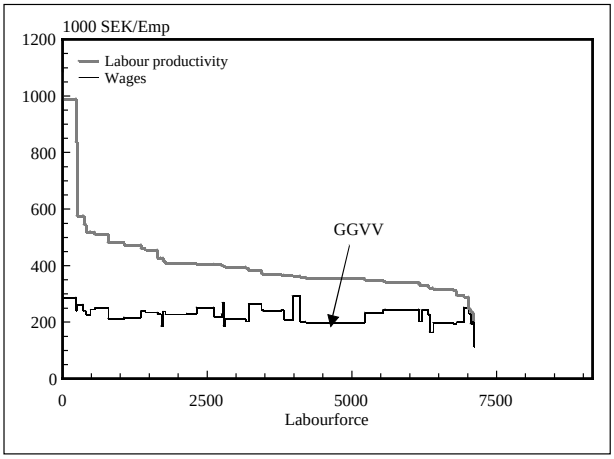

Figure X: *Industry SNI 372040 (1980)*

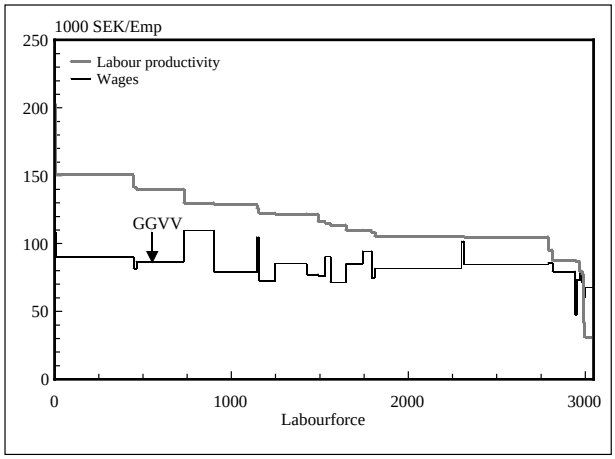

Figure X: *Industry SNI 372040 (1993)*

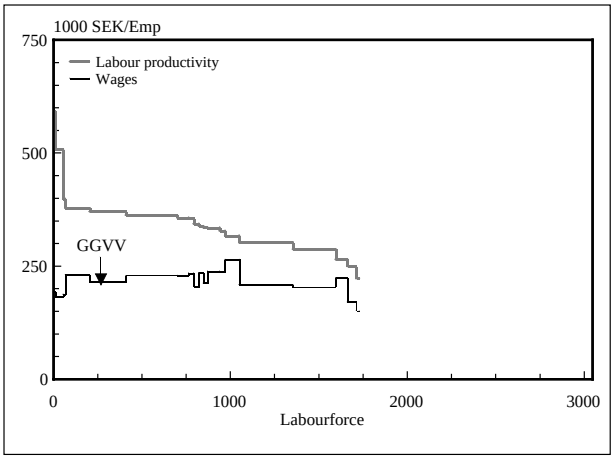

Figure X: *Industry SNI 381200 (1980)*

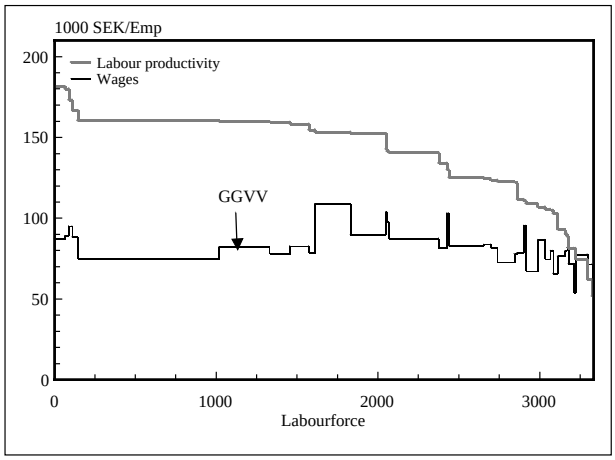

Figure X: *Industry SNI 381200 (1993)*

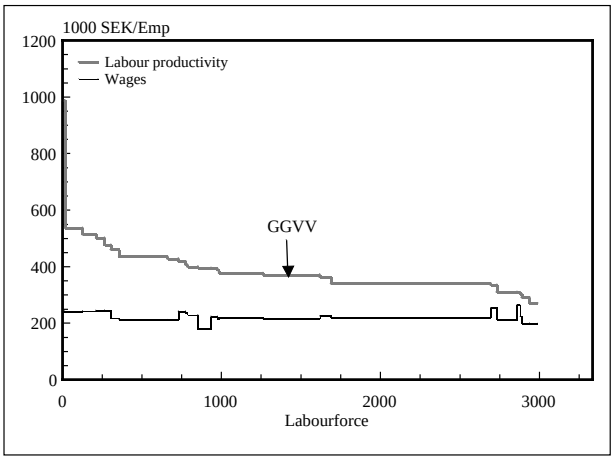

Figure X: *Industry SNI 381300 (1980)*

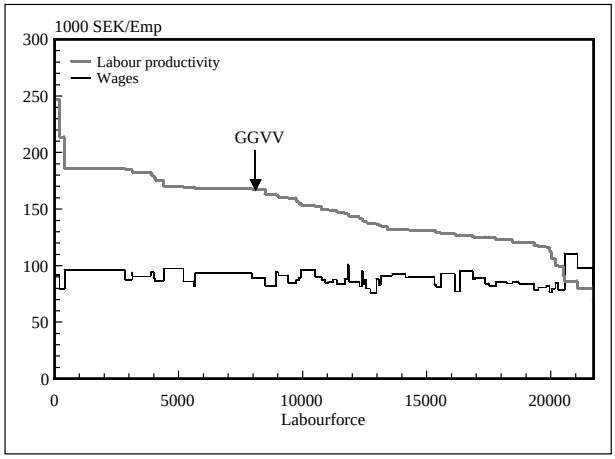

Figure X: *Industry SNI 381300 (1993)*

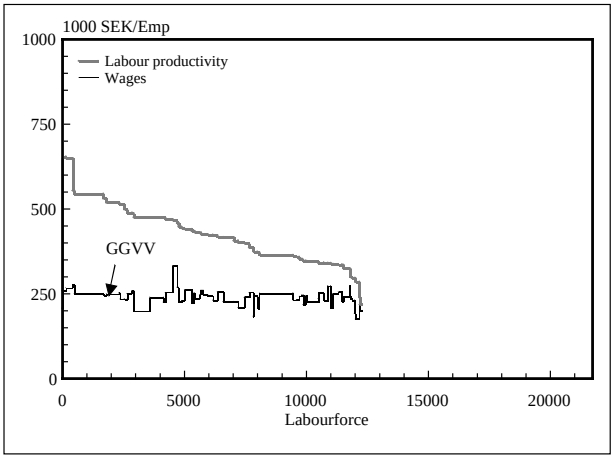

Figure X: *Industry SNI 381940 (1980)*

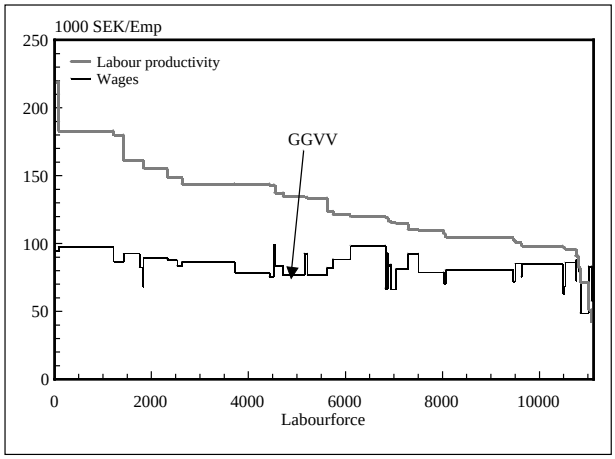

Figure X: *Industry SNI 381940 (1993)*

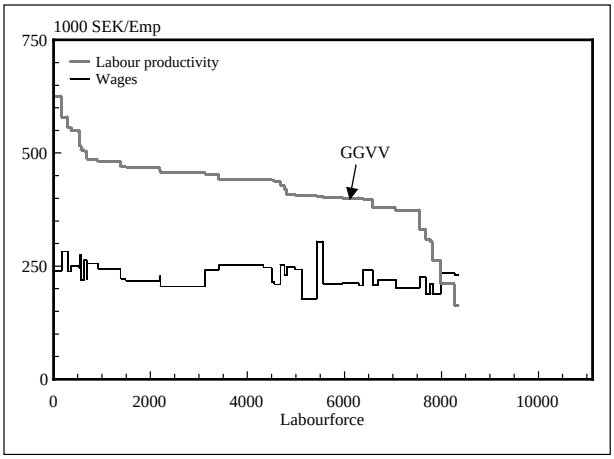

Figure X: *Industry SNI 381990 (1980)*

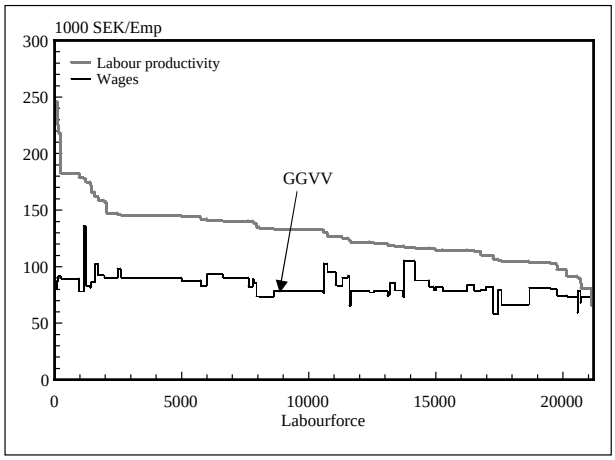

Figure X: *Industry SNI 381990 (1993)*

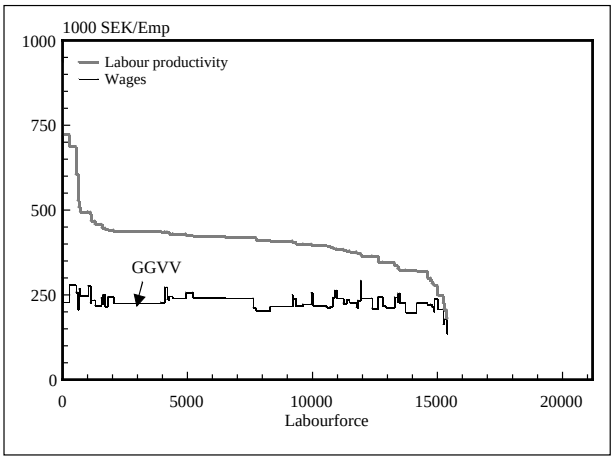

Figure X: *Industry SNI 382991 (1980)*

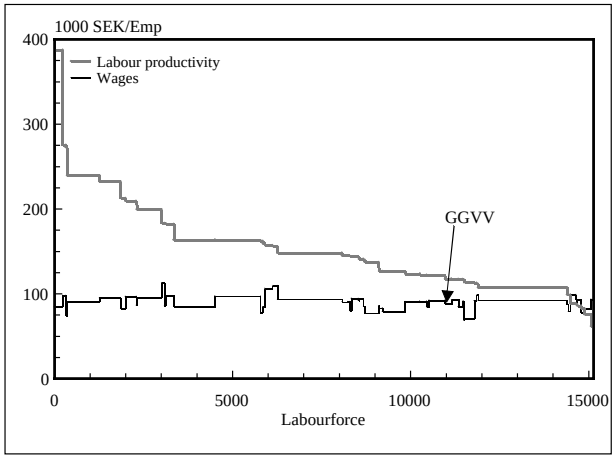

Figure X: *Industry SNI 382991 (1993)*

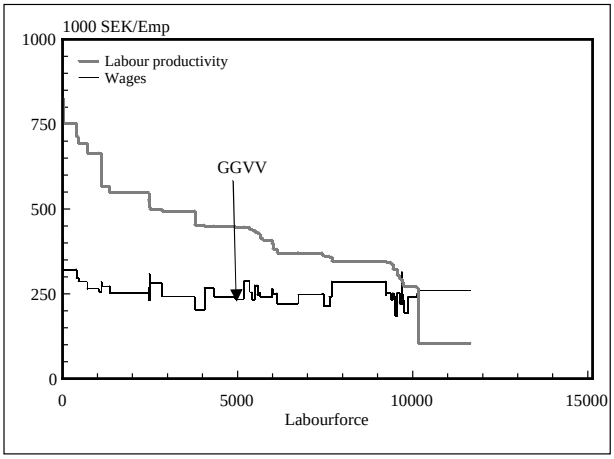

Figure X: *Industry SNI 383990 (1980)*

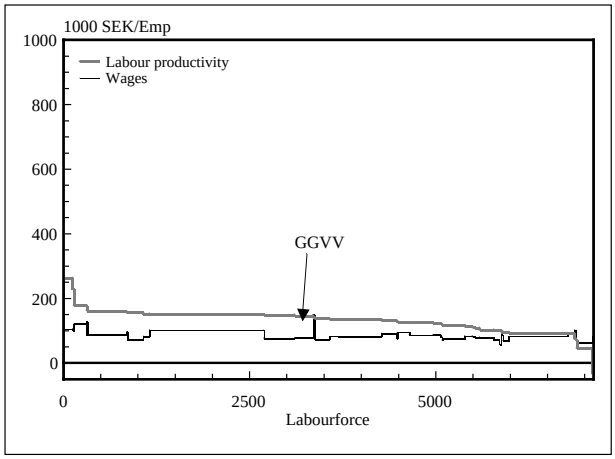

Figure X: *Industry SNI 383990 (1993)*

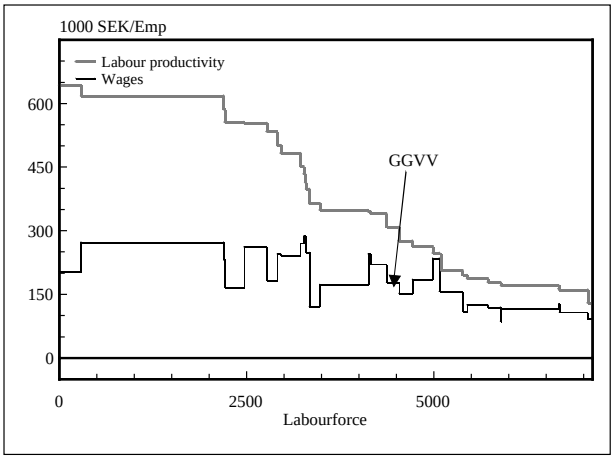

Figure X: *Industry SNI 384320 (1980)*

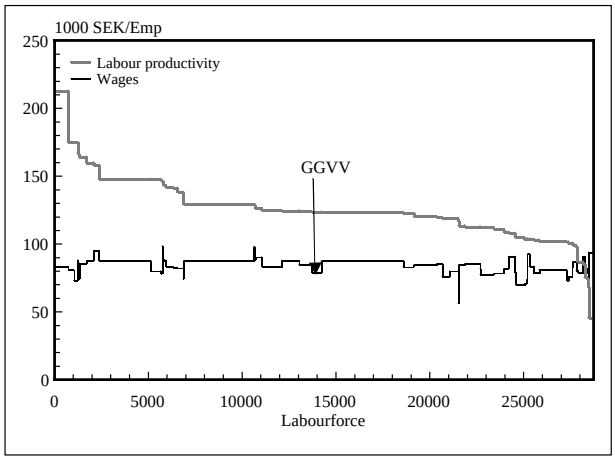

Figure X: *Industry SNI 384320 (1993)*