On the Re-Emergence of Small Scale Production: The Norwegian Case in International Comparison[1]

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ABSTRACT. Several studies on industrial restructuring point to the phenomenon of a changing size structure in many western economies. This article first rewievs international studies along these lines and then analyses developments in Norway from 1970 to 1990. For manufacturing, a pattern similar to those observed in other countries is found: from the middle of the 1970s there has occurred a slight shift from concentration in bigger establishments to growing employment shares in smaller establishments. Detailed analysis furthermore reveals that the shift towards smaller units has occurred in most sectors of manufacturing. When explaining this shift, however, the conclusion is the opposite of popular views emphasising the dynamism of small firms. The data points very clearly to a general industrial decline in Norway as a main explanation for the change in size structure. Rather than being attributed to the strengths of SMEs, the growing share of SMEs may be interpreted as a result of industrial weakness.

Introduction

Since the early 1980s there has been a considerable interest in the role of small businesses in the economy, in particular related to special dynamic areas that may be observed in many countries. A rich literature has emerged on industrial districts and their characteristics, in particular related to the development of the 'third' Italy (Brusco, 1982, 1986; Goodman, Bamford and Saynor, 1989; Pyke, Beccattini and Sengenberger, 1990), but similar phenomena may be observed in other countries as well (Scott, 1990; Bull, Pitt and Szarka, 1991; Hansen, 1990). Other parts of the literature have focused upon the role of small business and tendencies towards the re-emergence of small scale production (Stanworth and Gray, 1991; Loveman and Sengenberger, 1991; Acs and Audretsch, 1993). Partly rather comprehensive perspectives have been developed advocating that a more fundamental shift is taking place in Western economies (Piore and Sabel, 1984; Sweeny, 1991), but these perspectives have also been criticised and heavily debated (Williams et al., 1987; Amin and Robins, 1990; Asheim, 1991).

One aspect of parts of this literature are tendencies towards simple generalisations and rather romantic perspectives regarding a new emerging era of small businesses and economic growth in rural areas. Although in many countries there may be special geographical areas with small firm agglomerations that perform significantly above average, it is a long way from recognising such phenomenon in specific regions to making generalisations about a more fundamental shift penetrating whole economies. In particular, it seems that many studies in this field are focusing on smaller regions or production systems, to a lesser extent studies are provided that evaluate the role and importance of industrial districts in whole economic systems.

The purpose of this paper is to

- review some of the statistical evidence underlying the discussions on industrial restructuring towards a more small scale economy
- present some statistical evidence on current trends towards restructuring of the Norwegian economy.

Final version accepted on December 4, 1996

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Small Business Economics **10**: 401–417, 1998.

Part I: Industrial restructuring in some countries

The issue of industrial restructuring is complex and may be approached in many ways. A commonly used technique is to focus upon the employment shares of various size categories of firms and establishments, and to see to what extent these shares are changing over time. Although many aspects of control and interdependencies are neglected in such studies, they at least provide some information about the basic economic structure and how it is organised in firms and production units (establishments).

An interesting international study by Loveman and Sengenberger (1991) provides some comparative data on tendencies towards industrial restructuring in some major countries. Some of their data are summarised in Table I.

Loveman and Sengenberger conclude that the employment share of small establishments (less than 100 employees) appears to follow a V-shape over time. They conclude: *"Indeed, . . . the time series behaviour of small unit employment shares has followed a 'V' pattern in which declines through the late 1960s – early 1970s are reversed and small unit employment shares increase into the 1980s. What is remarkable about this finding is not that the recent growth in small unit employment shares has been enormous in all countries, but rather that the pattern of decline and then growth is so robust over such a wide sample of countries, sectors, size distributions, and institutions."* (p. 7)

It may be interesting to observe this obviously general pattern (with the exception of Germany). However, according to these data, the changes are rather small. None of the countries can show a very significant change in the employment share in small establishments. The U.K., having the biggest change, only had a 8% increase in the relative employment share, and for the other countries the figures are even smaller. Thus, the figures emerging from Loveman/Sengenberger's study tend to indicate a rather marginal tendency, particularly when taking into consideration all other effects that may be working (see later).

The most interesting aspect of these figures is the great difference in the relative importance of small manufacturing establishments. On the one hand, Japan, France and Italy have about 50% of their total employment in small establishments, while the U.K. and the U.S. only have slightly more than 20% of their employment in this size category.[2]

In the next sections, I will summarise some of the data available for some countries.

United Kingdom

Several authors have commented upon the structural change that seems to have taken place in the U.K. during the last decades. In particular a very impressive picture is presented by Stanworth and

TABLE I
Employment shares by small establishments in manufacturing industries

Nation	Time period for data	Employment shares in small establishments (%)			Growth of employment-share (% points)
		First year	Lowest value (year)	Last year	
Japan	1957–84	59	51 (1971)	55	+4
U.S.	1974–84	24	24 (1974)	28	+4
France	1954–81	52	45 (1974)	47	+2
U.K.	1954–83	24	18 (1970)	26	+8
Germany*	1963–84	20	18 (1980)	19	+1
Italy	1951–81	54	55 (1971)	59	+4

Small establishments: less than 100 employees.
The last column indicates the growth of employment shares after the year with the lowest value.
* Data for Germany cover only enterprises with more than 20 employees. Therefore, these data are not comparable with data for the other nations. Furthermore, the German statistics include data for Handwerk from 1977, so data before and after this year are not comparable.
Source: Loveman and Sengenberger, 1991, p. 10, only data after 1950 included.

Gray (1991) in a followup study related to the Bolton Committee's pioneering work on small firms during the late 1960s. Figures on employment share in small manufacturing establishments as well as enterprises (with less than 200 employees) show a quite significant U-turn during the '60s and '70s. Small *establishments* show almost a 12% increase in their relative employment share over the years 1972–88, and the figures for small *enterprises* show a similar trend.

An analysis provided by Shutt and Wittington (1987) shows that manufacturing enterprises with less than 100 employees have increased their employment share from 15.3% in 1973 to 21.1% in 1982, and for small *establishments* the employment share increased from 18.2% to 25.2%. Similar figures are provided by Hughes (1993).

Thus, there obviously has been some significant changes, particularly against the background of the relatively low level of employment in smaller units in the U.K. when compared to other nations. However, during the same period of time, Shutt and Wittington conclude that there has been an increasing concentration by the top 100 manufacturing firms in the U.K., "*. . . large firms have stabilised their share of net output and, in a manner which parallels the general revival of small firms, made increasing use of small plants"* (p. 15).

In their analysis on the role of large firm fragmentation, they conclude by saying: "*The parallel growth of small plants and small firms suggests that the general increase in small units can be at least partly explained by the deliberate strategies of large firms shifting production away from existing large plants into small firms and smaller plants. These strategies have disturbing implications for current optimism about the employment generating potential of small and new firms, both at national and regional levels"* (p. 21).

Canada

For Canada, MacPherson (1989) reports a significant expansion of small and medium-sized firms. The high level of activity could be observed over all manufacturing sectors. On average there was an employment growth of 42% over the period 1976–84, and for some sectors up to 100%. On the other hand, bigger establishments lost employment, particularly establishments in the 100–500 size band. However, in spite of these rather impressive figures, the total employment share of small establishments (with less than 100 employees) did not change more than by about 3% points, from 31% to almost 34% (Table II, p. 169). An opposite change took place among large establishments (500+), which reduced their employment share from 31% to 28%.

Germany

For Germany, the figures provided by Loveman and Sengenberger (op. cit.) gave no indication of a relative growth in the small firms sector. This view is confirmed by Bade (1986), who has presented data for 1970–82 regarding firms, employment and sales by size classes in the manufacturing industry. The data reveal that the employment share of small firms (20–100 employees; data for firms < 20 are not available) has been rather stable over the period. It was 12.4% in 1970 and 15.7% in 1982. However, there was a change in the statistics between 1976 and 1977 when data for handicraft firms were included from 1977. When correcting for this change, the variation over the period is almost negligible. Also when data for sales are considered, Bade concludes that there is not "*any evidence that smaller firms performed better"* (p. 263), and: "*In short, these official statistics for the mining and manufacturing industry do not provide much support for the assumption that the competitiveness of smaller firms has particularly increased in the last decade"* (p. 264).

However, partly different results regarding the German economy are presented by Fritsch (1993), who presents both historical data for the development over the last hundred years up to 1970 and data for recent developments from 1970 to 1987. Up to 1970, there generally has been a concentration, but from 1970 on there are opposing trends when manufacturing and services are compared. The latter shows an increasing concentration, while there has been a decreasing concentration in manufacturing. According to Fritsch, jobs in manufacturing decreased by 2 million (16.1%) over the period, and "*the decline of employment in the manufacturing sector, especially the employment losses of the large firms, led to a reduction*

in average firm size" (p. 44). During the same period, however, a significant restructuring has taken place in the West German manufacturing sector. Fritsch has controlled for the changes in sectoral composition by calculating a hypothetical size structure while keeping the intrasectoral employment shares of the size categories constant at the level of the 1970s. When doing this, it turns out that *"the main reason for the increasing share of small-firm employment in the FRG is simply the change in the sectoral composition of employment during this period"* (p. 44).

Italy

Italy should be of special interest since the development here, particularly in the northeast region, has been the main reference for the modern concept of industrial districts and the re-emergence of small scale production Several authors have analysed the development in Italy also at the macro level. However, it is difficult to find data, at least in the English language literature, that provide good illustrations of the importance of small and medium-sized enterprises in the Italian economy.

An exception from this is an article by Bellandi (1989) that provides comprehensive data for the regional variations of development in the manufacturing industry over the two decades 1961–81. His presentation of the data to a lesser extent illustrates the importance of SMEs, but when they are reorganised, they reveal a rather mixed picture of the role of small establishments.[3] The data confirm the V-shape suggested by Loveman and Sengenberger (op cit.), but for the manufacturing industry as a whole the tendency is not very strong. There is a reduction of the employment share of establishments with up to 50 employees from 46.8% in 1961 to 44.4% in 1971, and then an increase to 51.7 (+7.3%) in 1981. When the data are split between the various regions and for various manufacturing sectors, a diversified picture emerges.

There are significant differences between the various regions, both in terms of the relative importance of SMEs and the development over the period. The northwest industrial triangle, the region dominated by the biggest companies, experienced the most significant increase in the employment share of SMEs, whereas the southern region experienced a reduction over both decades. Between various sectors there are also significant differences. Sectors like furniture, textile and clothing, which are important for some of the industrial districts, generally have a very high employment share of SMEs, and they exhibit the same V-shape as commented upon earlier. However, there also seems to be a trend that the very small establishments, i.e. those with less than 10 employees, steadily lose terrain, even during the second decade, whereas the size-group between 10 and 50 employees grows significantly and absorbs the losses in the lowest size band.

According to these data, there is a main trend that SMEs play a more important role, but in relative terms the shift from 1971 to 1981 is about 4–10% of employment shares when the southern region is kept apart.

What happened during the 1980s? In a paper on Italian industrial dynamics, Mussati and Fumagelli (1991) have provided an analysis of the development during the 1980s based on data for the economic performance of various size groups of manufacturing industries in different regions. Among their conclusions is that the number of new firms is declining year after year, and the greatest decline is shown in the northeast region, the region that exhibited the best performance during the 1970s. Furthermore, they conclude that during the 1980s there was a decline of small firms, which was the principal subject of change in the industrial and services evolution. The flexible specialisation model is inefficient for explaining the evolution of the Italian industrial structure. After 1984 it is large corporations that have been the engines in industrial development (p. 11).

The quantitative importance of industrial districts and small scale economies

Sforzi (1990) has shed some interesting light into the issues of industrial districts through his analysis of the industrial structure of Italy. Based on his statistical analyses, it generally may be concluded that industrial districts play a relatively marginal role in the Italian economy. As many authors have noted, the phenomenon of industrial districts mainly occurs in traditional industries like

textiles, clothing, footwear and furniture. Scott (1990) points at three main areas: a) artisanal and design-intensive industries producing for final consumption, b) various sorts of high tech industries and associated suppliers and subcontractors, and c) service functions, especially business service.

Sforzi's analysis is restricted to manufacturing industries, and within this restriction, some conclusions may be summarised regarding industrial districts in Italy:

- 61 districts can be identified with almost 250' people employed in dominant manufacturing industries, i.e. industries that meet the characteristics of industrial districts. All together, the total employment of the districts counts for about 900' (5.4% of total employment in Italy), and the districts have a population of 2.4 million (4.3% of total population).
- The most important sector is textiles which accounts for 27.6% of employment in dominant manufacturing sectors of industrial districts, then follows footwear (20.6%), wooden furniture (12.7%) and clothing (12.0%). Other sectors, like mechanical engineering, metal goods and electrical engineering, only account for minor parts of employment in industrial districts.

The question, then, is to what extent it is adequate to characterise the development as a shift towards the re-emergence of small scale production, or for instance as a *"considerable increase in the importance of small-to-medium size firms"* (Rey, 1989, p. 74). The evidence reviewed here does not give support for such strong conclusions. Although there obviously is something going on, it is hard to see that there is sufficient evidence supporting broader assumptions as for instance notions like a 'second industrial divide'.

One problem with many of these analyses is that data are applied at a very aggregated level, and thus they may cover various forms of restructuring. As Hughes (1993, p. 35) for instance formulates it: *"A disaggregation of small-firm activity by industrial group may well yield a picture of quite different relative fortune between, for instance, high-tech and other sectors."* And, as shown by Fritsch (1993) for the case of West Germany – in that case changes in the sectoral composition of the manufacturing industry gave the main explanation for the increasing employment share of small firms.

Part II: The Norwegian case

General trends

The general trend in the development of the manufacturing sector in Norway is much the same as in other countries (Table II). In the first half of the post war period there was a steady growth of employment in the manufacturing industries. This was followed by stagnation during the 1970s and then decline that has accelerated very significantly during the 1980s.

During most of the post war period there was a significant reduction in the number of firms and establishments. The process culminated during the 1970s and the 1980s when the number of firms and establishments grew for some time, but then they seemed to decline again during the late 1980s.

TABLE II
The manufacturing sector in Norway 1952–90

	1952	1963	1974	1980	1985	1990
Total employment (1000)	350.7	362.6	385.1	368.7	329.1	284.1
Firms (1000)	n.a.	n.a.	12.5	11.4	11.5	10.1
Establishments (1000)	26.7	20.4	14.3	13.3	13.0	11.5
Employment/firms	–	–	30.9	32.5	28.7	28.1
Employment/establishments	13.1	17.8	26.9	27.8	25.3	24.7
Employment share of big establishments (100+)	39.7	48.2	54.9	54.6	51.7	49.1
Employment share of small establishments (0–19)	33.4	22.6	16.6	16.2	17.8	18.8

Source: Statistics Norway: Industrial Censuses 1952, 1963 and 1974, Industrial Statistics 1980–90.
Big establishments: 100+ employees; Small establishments: 0–19 employees.

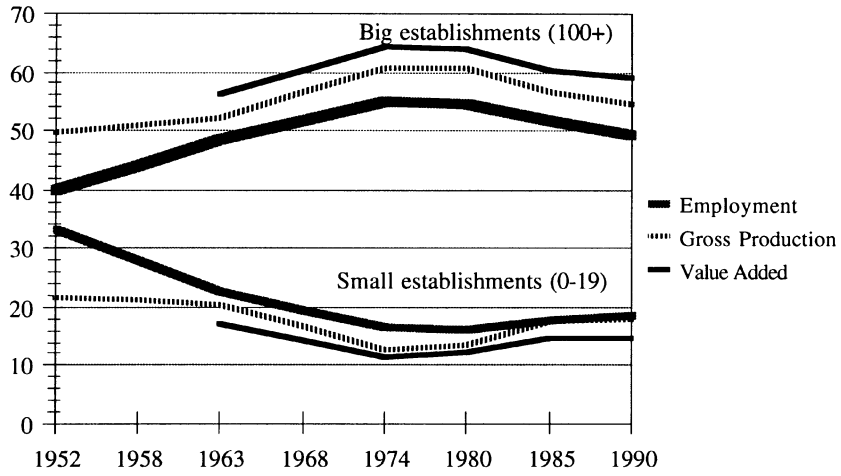
The role of small and medium-sized firms and establishments seems to follow the same pattern as in many other countries. The average firm and establishment size reached their peak values sometime during the 1970s or 1980s, and the tendency when entering the 1990s seems to be that the average size is still declining slightly. The data also indicate that the relative role of small firms, in terms of employment share, has increased during the 1980s after having been through a significant decline during the earlier decades. The data also reveal that the development of the shares of the gross production value and the value added have been parallel to that of employment shares (Figure 1).

However, although the trend of the Norwegian manufacturing industry turns out to be very similar to what is observed in other countries, the trend towards more small scale production should not be overestimated. According to our data, the employment share of small establishments only increased by 2.6% from 1980 to 1990, and the share of large establishments decreased by 5.5%.

The previous data have been related exclusively to the manufacturing sector. To provide a broader perspective on industrial restructuring, data for a broader set of industries are provided in Table III. The data include sectors that account for about 50% of total employment in Norway. With the exception of the primary sectors (agriculture, forestry and fishing), most private sectors are included. Public sectors are not included in the data.

Based on the data, the following conclusions may be suggested:

- The summarised data for all (available) sectors indicate a general trend towards more small scale production, both in terms of employment shares for small establishments and small firms. The relative importance of small establishments and firms has increased by about 7–8% in terms of total employment shares. However, the picture is a bit mixed as there is some variation in the patterns of the various industries.
- The trend towards more small scale production seems to be dominant for manufacturing, construction and transport industries. All these industries show an increasing relative importance of small units, both establishments and firms.
- On the other hand there is a significant reduction of small scale units in the mining and oil drilling sectors. However, this is mainly caused by the oil drilling sector, which has been developed during the two decades and which is dominated by large scale organisations.
- Other sectors show a more mixed pattern.



Source: Statistics Norway.

Fig. 1. Small and big establishments 1952–90. Shares of employment, gross production and value added. Data for 1958 and 1968 are interpolated.

TABLE III
Employment shares of establishments and firms 1970–90

	Total employment	Employment share in establishments			Employment shares in firms		
		1–19	20–99	100+	1–19	20–99	100+
All sectors							
1970	797,945	38.4	27.0	34.5	32.0	24.2	43.8
1975	927,764	39.7	26.3	34.1	33.8	22.9	43.3
1980	943,107	40.1	26.4	33.5	34.2	22.6	43.2
1985	972,364	43.2	27.3	29.5	37.3	23.2	39.5
1990	866,656	44.8	26.7	28.4	39.6	24.5	35.9
2. *Mining and oil drilling*							
1970	9,091	25.0	18.9	56.1	20.3	17.9	61.9
1975	10,066	23.1	15.3	61.6	18.7	14.4	66.9
1980	15,585	13.1	13.2	73.7	12.8	9.4	77.8
1985	16,486	12.1	13.4	74.6	9.6	9.7	80.7
1990	19,028	10.5	8.6	80.9	13.5	10.5	75.9
3. *Manufacturing*							
1970	375,655	17.4	28.5	54.2	14.4	22.9	62.7
1975	382,092	17.3	27.9	54.8	14.4	22.4	63.2
1980	365,555	17.1	29.1	53.8	14.1	22.4	63.4
1985	333,843	18.6	31.0	50.4	15.1	22.3	61.6
1990	283,717	20.1	31.4	48.6	19.0	28.8	52.2
5. *Construction*							
1970	91,201	41.4	30.9	27.7	40.3	30.6	29.0
1975	107,061	47.6	27.1	25.3	45.5	26.4	28.1
1980	112,475	50.2	25.5	24.4	48.0	23.9	28.1
1985	122,977	52.1	25.9	22.0	50.9	23.8	25.4
1990	113,668	50.0	26.2	23.8	45.9	24.4	29.7
6. *Wholesale, retail, hotels and restaurants*							
1970	237,564	67.6	23.5	8.9	54.1	24.6	21.3
1975	262,873	64.8	25.8	9.3	53.4	24.4	22.2
1980	261,890	65.1	25.8	9.1	53.2	24.5	22.3
1985	288,966	64.1	26.8	9.1	53.7	24.9	21.4
1990	254,794	65.5	25.6	8.9	52.7	23.7	23.6
7. *Transport*							
1970	45,012	33.0	29.8	37.2	25.2	22.3	52.5
1975	87,941	41.2	21.4	37.5	36.0	16.5	47.5
1980	96,818	38.2	21.7	40.1	33.2	16.5	50.3
1985	91,834	42.8	23.7	33.5	37.1	18.1	44.7
1990	77,454	44.5	24.2	31.3	38.3	21.0	40.7
8. *Real estate and producer services*							
1970	10,855	55.4	22.7	21.9	51.5	19.6	28.9
1975	35,476	55.7	28.1	16.1	49.6	24.4	26.0
1980	50,108	51.4	26.5	22.1	46.4	23.6	30.0
1985	72,822	51.9	25.4	22.7	48.2	22.7	29.1
1990	78,281	55.2	25.6	19.3	45.0	22.5	32.5
9. *Personal services*							
1970	29,567	67.8	25.6	6.6	63.3	25.6	11.1
1975	42,255	53.2	23.0	23.8	46.6	25.2	28.2
1980	40,676	59.7	23.9	16.4	51.4	27.0	21.6
1985	45,436	65.0	23.5	11.5	57.4	26.4	16.2
1990	39,741	71.2	17.9	10.8	64.8	18.2	17.0

Source: Statistics Norway.
Note: Data for employment shares of firms and establishments are not directly comparable. The figures for total employment in the table are based on establishments.

Group 6 (wholesale, retail, hotels and restaurants) shows at this aggregated level a rather stable pattern. This is also the case for group 8 (real estate and producer services), which to some extent shows increased employment shares by small firms and establishments during the last years. Also group 9 (personal services) shows a rather mixed pattern.

Generally, it should be emphasised that these data are at a highly aggregated level, and there may be considerable variation between the sectors in the various industries. Thus, one should be rather careful not to draw simple conclusions.

Variations in the manufacturing sector

In the following presentation, the analysis will be restricted to data on establishments only, although we also have data available at the firm level. The reason for this is that employment data on firms do not give a correct picture of the distribution of employment in various sectors. In the statistics on firms, all employment of one firm is classified according to the sector where the firm has its main activity. For instance, during the late 1980s a significant proportion of the manufacturing sector was taken over by firms with main activities in other sectors, and thus are classified in other sectors in the statistics on firms. This problem is avoided when data related to establishments are analysed.

Tables IV and V give an overview of the development of the size structure of Norwegian manufacturing industries during the period from 1970 to 1990. Generally, there was some growth in the total number of establishments over most of the two decades (Table IV). Only during the last few years has the number of establishments dropped back to the level from where it started. The growth of establishments only occurred in the smallest group (1–10), where the number in 1990 still was higher than it was in 1970. All other size groups have been through a reduction in the number of units.

The development of establishments stands in some contrast to a very significant reduction in the total employment that reached its peak value in 1973 with 387,000 man years. Since then, manufacturing employment has declined to 284,000 in 1990 (Table IV), i.e. a loss of employment of more than a fourth.

This relatively dramatic change has resulted in a significant decrease in the average employment per establishment which has fallen from 24.6 to 18.0 over the period, i.e. a reduction of 27% (Table V). Details from the tables reveal that larger establishments in particular have lost employment. Almost two/thirds of the net loss of employment stems from larger establishment (with more than 100 man years).[4] When looking at establishments with more than 500 man years, it is rather impressive that in the beginning of the period they counted for more than 84,000 man years and 22.5% of the total employment, while by the end of the period these figures were reduced to 46,000

TABLE IV
Manufacturing establishments and employment according to size groups, 1970–1990

Year	0–9	10–19	20–49	50–99	100–499	500–999	1000+	Total
Establishments								
1970	9,839	2,189	1,775	758	613	61	28	15,263
1975	12,051	2,182	1,715	767	643	62	25	17,445
1980	11,490	2,104	1,761	737	639	54	24	16,809
1985	12,167	1,993	1,728	719	550	52	18	17,227
1990	11,264	1,857	1,467	627	476	44	12	15,747
Employment								
1970	35,664	29,567	54,401	52,560	118,772	40,273	44,418	375,655
1975	36,314	29,640	53,532	53,144	127,719	42,385	39,358	382,092
1980	33,579	28,817	54,247	52,124	122,625	35,586	38,577	365,555
1985	35,135	27,074	53,440	49,942	105,748	35,202	27,302	333,843
1990	31,852	25,062	45,335	43,704	91,166	28,696	17,902	283,717

TABLE V
Manufacturing employment shares according to establishment size, 1970–1990

Year	Avr. size	1–9	10–19	20–49	50–99	100–499	500–999	1000+
Employment shares (%)								
1970	24.6	9.5	7.9	14.5	14.0	31.6	10.7	11.8
1975	21.9	9.5	7.8	14.0	13.9	33.4	11.1	10.3
1980	21.7	9.2	7.9	14.8	14.3	33.5	9.7	10.6
1985	19.4	10.5	8.1	16.0	15.0	31.7	10.5	8.2
1990	18.0	11.2	8.8	16.0	15.4	32.1	10.1	6.3
Accumulated employment shares (%)								
1970	24.6	9.5	17.4	31.8	45.8	77.5	88.2	100
1975	21.9	9.5	17.3	31.3	45.2	78.6	89.7	100
1980	21.7	9.2	17.1	31.9	46.2	79.7	89.4	100
1985	19.4	10.5	18.6	34.6	49.6	81.3	91.8	100
1990	18.0	11.2	20.1	36.0	51.4	83.6	93.7	100

and 16.4% of total employment. So there should be no discussion that big establishments generally have lost importance in the industrial structure of Norway. When analysing data for 22 sectors on the 3-digit level,[5] the main trend towards more significant small scale sectors in manufacturing industries is rather obvious (Table VI, Figure 2):

- 15 of 22 sectors have had a reduction in average size by more than 10%, only 3 have had a growth in average size by more than 10%. 4 sectors have only been through smaller changes.
- Comparison of employment shares in 1970 and 1990 reveals that in 15 sectors small establishments have increased their share and 6 have decreased their share.
- Linear regression analysis (explained in Table VI) of the development of employment shares over the period reveals significant growth of small establishments shares for 13 of 22 sectors (significant at the 0.01 level). The share of large establishments (100+) has had a significant reduction in 12 sectors. Among the very large establishments (500+), 14 sectors have been through a significant reduction.

Although the main trend is rather clear, it is important to notice that the picture still is rather complicated.

First, it may be noted that different measures for size give some variation in results. The average establishment size tells something else than the distribution of employment shares, although they are parallel in most cases. It may also be noted that employment shares of medium-sized units (20–99) show a pattern very different from those of small and large units. According to our regression analysis, 12 sectors have had a significant growth of employment share for medium-sized establishments, and 4 have had a significant reduction.

Second, there is significant variation between the various sectors in terms of size structure, which is illustrated by Figure 2. The average size varies from less than 10 man years per establishment up to 200.

Third, there are some differences between the various sectors in terms of the changing role of small scale units. Although the vast majority show an increasing relative importance of small scale units, there are also sectors developing in the opposite direction.

Explaining the changing size structure

We will now turn to the issue of how the tendency of the changing size structure can be interpreted. Do the data confirm the many assumptions of a re-emergence of small scale production?

The popular view is that the changing size structure is due to small firms' competitiveness and growth potential. However, if this is the case, does it then make sense that there has been significant decline in virtually all manufacturing sectors in Norway? The fact that manufacturing

TABLE VI
Manufacturing employment and employment shares 1970–1990

Sector	Employment (man years)			Man years per establishment			Employment shares 1970 (%)[a]				Employment shares 1990 (%)[a]				Estimated changes of empoyment shares 1970–190, based on regression analysis[b]			
	1970	1970	Change (%)	1970	1990	Change (%)	0–19	20–99	100+	500+	0–19	20–99	100+	500+	0–19	20–99	100+	500+
290 Mining, quarrying	9041	5569	–38.4	17.2	10.8	–37.2	24.8	18.7	56.4	27.6	34.4	22.1	43.6	13.0	7.5**	3.7**	–11.2**	–9.5**
310 Food prod. not fish	37943	38807	2.3	15.3	22.5	47.1	29.3	34.3	36.4	7.9	20.4	38.7	40.9	9.2	–9.2**	3.8**	5.2**	1.6
311 Fish prod.	19195	11241	–41.4	18.9	19.7	4.2	24.0	53.6	22.4	2.9	24.5	51.2	24.3	0.0	–0.6	–3.8**	4.3**	–4.3**
320 Textiles	33943	9679	–71.5	24.0	11.1	–53.8	16.4	38.8	44.8	1.9	29.5	50.7	19.8	0.0	10.9**	13.5**	–24.4**	–4.3**
331 Wood prod.	22913	17111	–25.3	10.6	10.0	–5.7	39.8	39.8	20.4	2.8	35.3	45.0	19.8	3.5	–2.1	7.0**	–4.8**	–0.6**
332 Furniture	12776	8985	–29.7	14.7	11.5	–21.8	31.1	44.3	24.6	6.8	29.1	48.8	22.2	0.0	–4.7**	2.4	2.3	–1.8
341 Pulp, paper	22956	11798	–48.6	85.7	83.1	–3.0	4.0	18.2	77.8	21.9	3.7	21.3	74.9	26.7	–0.4	1.8	–1.4	9.9**
342 Printing, publishing	32966	35177	6.7	23.9	14.7	–38.5	20.1	27.7	52.2	20.6	26.3	22.9	50.8	23.8	7.1**	–2.1*	–4.9**	1.1
351 Chemicals	8750	8062	–7.9	131.0	132.0	0.8	3.1	10.2	86.7	60.6	1.1	13.0	85.9	29.0	–1.8**	4.0**	–2.2	–24.4**
352 Pharmaceut.	938	1956	108.5	67.0	79.4	18.5	2.7	17.0	80.4	0.0	3.1	18.7	78.2	0.0	0.2	–1.0	0.8	0.0**
353 Petro./coal	1855	2172	17.1	41.2	19.2	–53.4	10.8	12.0	77.2	0.0	20.0	13.4	66.6	33.4	11.2**	0.3	–11.5**	16.3*
356 Other chem.	17628	10933	–38.0	27.5	19.3	–29.8	15.1	33.0	51.9	24.5	21.3	41.2	37.5	14.6	7.5**	12.8**	–20.3**	–15.3**
360 Min. prod.	12967	9045	–30.2	18.4	13.2	–28.3	23.8	28.3	48.0	8.2	29.3	38.2	32.5	0.0	3.6**	8.5**	–12.1**	–10.3**
371 Iron, steel, ferro-alloys	15439	7374	–52.2	206.0	147.0	–28.6	1.2	5.9	92.9	57.9	1.4	10.4	88.2	20.2	0.4*	6.2**	–6.6**	–41.0**
372 Non-ferrous metals	13414	10474	–21.9	141.0	159.0	12.8	2.2	4.3	93.5	81.5	1.7	5.6	92.7	75.5	1.9	0.7	–2.7	–1.5
381 Metal prod.	26289	21946	–16.5	19.1	9.6	–49.7	22.8	32.7	44.4	9.2	34.8	44.0	21.2	2.3	8.9**	12.2**	–21.1**	–9.2**
382 Machinery	22490	18600	–17.3	21.8	11.3	–48.2	18.2	29.8	52.0	21.6	24.9	30.7	44.4	19.5	7.0**	–3.3**	–3.7**	7.4**
383 Electrons	16104	17545	8.9	69.7	33.2	–52.4	5.7	16.8	77.5	45.9	10.4	23.1	66.5	19.6	4.0**	8.2**	–12.3**	–13.2**
384 Transport equipment	6992	5785	–17.3	42.1	33.1	–21.4	9.8	27.6	62.6	29.2	12.7	19.9	67.4	10.6	22.3**	–4.3*	2.1	–24.3**
388 Household appl.	6465	4685	–27.5	45.5	26.0	–42.9	8.7	26.4	65.0	23.8	12.6	32.8	54.6	0.0	2.9**	4.1**	–7.0**	–16.7**
389 Ship building	39422	29078	–26.2	53.3	34.3	–35.6	7.2	17.4	75.4	45.2	8.9	22.4	68.7	29.8	3.1**	10.5**	–13.5**	–16.9**
390 Other manufact.	4210	3264	–22.5	12.8	7.1	–44.5	34.9	39.1	26.0	13.4	37.6	32.0	30.4	0.0	5.7**	–9.2**	3.5	–12.4**

Sectors are explained in Appendix.

[a] The size group 100+ includes the 500+ group.

[b] Linear regression analysis is undertaken with employment share as dependent variable and time as only independent variable to test the strength of changes of employment shares. Employment shares for every year 1970–1990 have been calculated, and the regression line is estimated. The figures give estimated change of employment share over the time period 1970–1990 based on coefficients obtained through the regression analysis. Level of significance for the coefficients are provided in the table: 0.05: *; 0.01: **. Note that the data obtained through the regression analysis are not directly comparable with the real changes of employment shares.

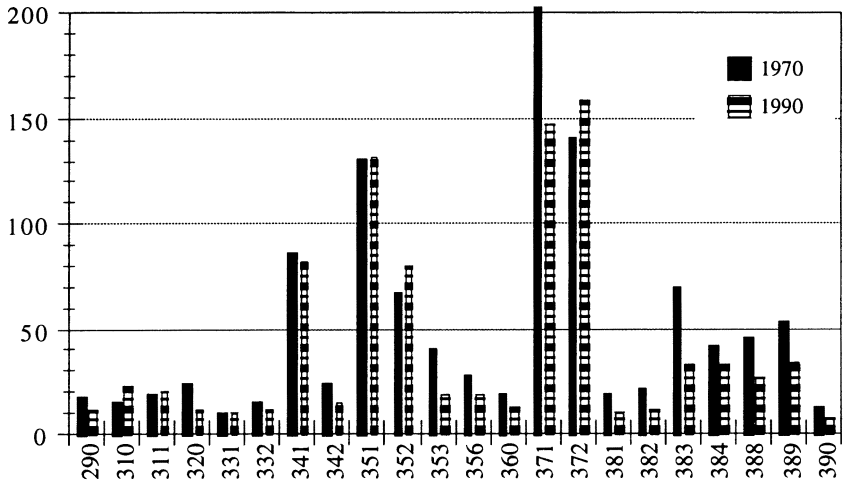


Fig. 2. Average size (man years) 1970–1990 for manufacturing industries. (See Appendix for industrial classification.)

employment has declined so significantly, and that the relative share of small establishments has been growing since the decline started, should give reason to search for alternative explanations. When reflecting around this question, one should also take into consideration that there are many forms of restructuring that may have taken place at the same time, like international restructuring of industries and intersectoral restructuring within national industries.

Generally, this raises rather broad issues regarding the global formation of production systems, and how national and regional systems fit into these changing patterns. However, the following has to be restricted to more narrow issues, and, as a basis for further analysis, the following hypotheses are suggested:

1. Does the general decline of manufacturing lead to a growing importance of SMEs? The manufacturing decline in Norway started during the middle of the 1970s, and continued until the early 1990s. The manufacturing industries have generally lost position in the international market place, either by losing market shares in the home market or in the international market. During the same period of time the employment share of small establishments has grown steadily. This may imply that in relative terms bigger establishments are losing more than smaller establishments, and that SMEs to a higher extent than larger establishments survive and 'remain' in the market place. If so, the growing share of SMEs may be interpreted as expressing industrial weakness rather than industrial strength. Our hypothesis is that industrial decline leads to a growing share of SMEs.
2. A hypothesis contradicting the previous one is that the growing share of SMEs is due to their superior competitiveness compared to that of larger establishments. Having developed towards a more open economy with increasing exposure to international competition, the competitive environment for Norwegian establishments has changed significantly. Based on the idea of the better competitiveness of SMEs, one would expect to find a growing share of SMEs in sectors with growing shares of export or import.
3. The regional restructuring of industries may explain the changing importance of SMEs. Regional division of labour in Norway has led to a significant decline of manufacturing in urban areas, while manufacturing industries in rural areas have developed better. Based on a hypothesis that regional restructuring affects the size structure and that SMEs perform better in rural areas than larger establishments, one would expect to find growing shares of SMEs in sectors located in peripheral areas, and declining shares in centrally located industries.

4. Changes in the sectoral composition of the manufacturing industry may explain the growing relative importance of SMEs. If sectors with mainly small establishments expand, while sectors with large establishments contract, the size structure of the manufacturing industry as a whole may be changed in favour of bigger shares of SMEs, but without any change in size structure in the individual industrial sectors, as has been the case in Germany (Fritsch, 1993). Earlier in this paper, however, we saw that significant changes have taken place within many sectors of manufacturing, but still it may be that changes in industrial composition may affect the over all size structure. So it may be important to control for this.

The hypotheses are tested by analysing covariation between changes in size structure of the individual sectors, and other aspects of economic development during the period 1970–1990. For this analysis some macro economic data on manufacturing and its regional organisation have been compiled, correlation and linear regression analyses have been performed, and a shift-share analysis has also been done.

When analysing changes in size structure, it is important to note which measure is applied for size. All five measures previously applied in the descriptive analysis are applied:

a. average employment per establishment in sector;
b. employment share of small establishments (0–19) in sector;
c. employment share of medium-sized establishments (20–99) in sector
d. employment share of large establishments (100+) in sector
e. employment share of very large establishments (500+) in sector.

The focus of our analysis is on the *changes* in these variables, which are the dependent variables of the analysis. A set of *independent* variables is applied to explain changes in the independent variables. The variables are displayed in Table VII, which also shows the correlation coefficients.

It should be noticed that the units of analysis are the 22 individual manufacturing sectors (cf. Appendix). All variables are applied to these sectors. Our data go from 1970 to 1990. This is a long period of time, and for many sectors patterns of change have been different during the two decades. Therefore, the time period is divided in two, and all variables are calculated for each decade.[6] The results of the correlation analysis are displayed in Table VII and the regression analysis in Table VIII.

The analyses lead to the general conclusion that the most significant explanatory variable for changes in size structure is the relative change in employment. Sectors with declining employment show a declining average size of establishments, and parallel to this follows growing employment share of SMEs and declining share of large establishments. The relative change in employment gives the highest correlation coefficients and the most significant beta-values in the regression analysis. Other factors are also working, but not to the same extent.

It may be commented here that a statistical significant relationship does not necessarily imply a causal relationship, i.e. the observed changes in small establishment employment shares are not necessarily caused by the changes in total employment of sector. One could for instance speculate if growing productivity of small establishments could occur simultaneously with decreasing productivity and loss of employment in large establishments and an overall decline in employment of the industry. However, this type of explanation seems to make little sense. When looking into the data, it turns out there is a strong positive relation between changes in total employment of the industrial sectors and changes in gross production and exports, i.e. loss of employment indicate a declining industrial development and loss of competitive strength in the international market place.

Thus, there seems to be good reason for interpreting the growing shares of small establishments as an expression of industrial decline and industrial weakness.

In the following, the results will be commented on according to the previously suggested hypotheses.

TABLE VII
Correlations between explanatory variables and changes of size and changes of employment shares

Explanatory variables	Change average employment	Change of relative employment share of size group			
		0–19	20–99	100+	500+
Employment					
Total employment	0.07	–0.16	0.12	0.01	0.15
Absolute change of employment	0.19	–0.30	–0.29	0.37*	–0.03
Relative change of employment	0.83**	–0.60**	–0.21	0.49**	0.15
Regional distribution of employment					
Employment in peripheral areas	0.25	–0.26	0.08	0.09	0.12
Employment in semi-central areas	0.11	–0.21	0.18	0.00	0.08
Employment in central areas	–0.08	–0.04	0.06	–0.02	0.13
Relative employment share in peripheral areas	0.15	–0.03	–0.06	0.06	0.13
Relative employment share in semi-central areas	0.12	–0.13	0.12	0.00	–0.14
Relative employment share in central areas	–0.19	0.09	–0.01	–0.05	–0.04
Change of regional distribution of employment					
Change in absolute employment in peripheral areas	0.04	–0.23	0.03	0.11	0.05
Change in absolute employment in semi-central areas	0.12	–0.18	–0.26	0.28	–0.03
Change in absolute employment in central areas	0.21	–0.26	–0.36*	0.39**	–0.06
Change in relative employment in peripheral areas	0.09	–0.23	0.01	0.13	0.18
Change in relative employment in semi-central areas	0.35*	–0.34*	–0.31	0.41**	–0.17
Change in relative employment in central areas	0.38*	–0.30*	–0.18	0.30	0.04
Macro economic variables					
Gross production in sector	0.28	–0.29*	0.09	0.11	0.12
Export from sector	0.17	–0.12	0.03	0.05	–0.13
Import of commodities in sector	0.07	–0.10	0.19	–0.07	–0.01
Change macro economic variables					
Absolute change of gross production	0.28	–0.42**	–0.03	0.26	–0.05
Absolute change of export	0.06	–0.05	0.08	–0.03	–0.16
Absolute change of import	0.10	–0.25	–0.05	0.18	–0.12
Relative change of gross production	0.30*	–0.43**	–0.07	0.30*	–0.30
Relative change of export	0.14	–0.16	–0.05	0.13	0.00
Relative change of import	0.20	–0.38*	–0.12	0.30*	–0.22
Technology					
Level of technology*	0.07	–0.04	–0.15	0.12	–0.30

Data on employment, regional distribution of employment and changes of regional distribution of employment are obtained from Statistics Norway's data on establishments. Data on macro-economic variables are obtained through a special delivery from Statistics Norway.

* The level of technology is classified in three categories; low, medium and high, which are given values 1, 2 and 3 respectively in the statistical analysis. The classification of industrial sectors according to level of technology is given in Appendix.

The importance of general industrial decline

Our first hypothesis is that industrial declines implies a growing share of SMEs. The hypothesis is strongly supported, as relative change in employment shows a high positive covariation with the change in average size (employment per establishment), a negative covariation with the change in share of SMEs, and a positive covariation with the change in larger establishments. It may be noticed that the regression equation explains as much as 80% of the total variation of changes in average size, and the relative change in employment is the most significant factor.

A similar result, although not so strong, is obtained for the covariation between the relative change in gross production and the changing size structure. Thus the results support the suggestion that the growing relative importance of SMEs is an expression of a general industrial weakness, and not an expression of the strength of SMEs.

TABLE VIII
Results of regression analysis for explaining changes of size structure

Explanatory variables	Change average employment	Change of relative employment share of size group			
		0–19	20–99	100+	500+
Relative change employment	0.879****	–0.430**		0.433**	
Employment in peripheral areas		–0.263*			
Change of absolute employment in peripheral areas	–0.291***				
Change of absolute employment in central areas			–0.424**		
Gross population	0.209**				
Relative change of gross production		–0.382**			
Relative change of imports				0.403**	
Explained variance (adjusted R^2)	0.804	0.529	0.157	0.422	–
F-value	53.1****	15.2****	8.1**	14.9****	–

The table show beta-values. In the regression analysis all explanatory variables shown in Table VII are applied, but only significant variables are included here.

The competitiveness of SMEs

This hypothesis suggests, in contradiction to the previous hypothesis, that the growing share of SMEs is due to their competitiveness. This hypothesis has to be rejected based on the obtained data.

The analyses generally give few significant relationships between changes in exports and imports and changes in size. Only in the case of import is there a negative covariation between the relative change in import and the change in share of SMEs, and a positive covariation with change in larger establishments. This is opposite to what should be expected based on the hypothesis, so the hypothesis is not supported, which is consistent with the support obtained for the previous hypothesis.

Regional restructuring and SMEs

The hypothesis suggests that regional restructuring affects the importance of SMEs in the way of growing shares of SMEs in industries located in peripheral areas. Both the correlation analysis and the regression analysis reveal some significant covariations, but relations are complex.

There are positive and significant correlations between relative change in employment in semi-central and central areas and change in average size of establishments. This means that sectors that have a declining development in central and semi-central areas also have a declining average size. This may imply the opposite relationships in peripheral areas, which to some extent is supported by the regression analysis. It reveals a significant negative covariation between the change in absolute employment in peripheral areas and the average establishment size, i.e. expanding industries in peripheral areas have a declining average size. Thus, there seems to be some connection between the regional reorganisation of industries and the changing size structure, but the relationship is neither very strong nor clear.

Intersectoral changes

The hypothesis suggests that changes in the overall size structure of manufacturing industries may have been affected by changes in sectoral composition. As we have seen already, several manufacturing sectors have had a significant change in size structure. Thus there is little reason to expect that a changing sectoral composition should be of significance.

To test for this, we have undertaken a shift and share analysis of the development from 1970–1990 (Table IX). Two hypothetical size distributions for 1990 are calculated. The first is the distribution that would have occurred if the size structure had remained constant for the whole manufacturing industry over the period (row C). The second is the distribution that would have occurred if the size structure of the various sectors had remained as they were in 1970, and with the sectoral composition as of 1990 (row D).

The results show that intersectoral changes

TABLE IX
Manufacturing employment and employment shares 1970–1990

Explanatory variables	Total	Establishment size			
		1–19	20–99	100+	500+
A. Employment 1970	375,655 (100)	65,231 (17.4)	106,961 (28.5)	118,772 (31.6)	84,691 (22.5)
B. Employment 1990	283,717 (100)	56,914 (20.1)	89,039 (31.4)	91,166 (32.1)	46,598 (16.4)
C. Hypothetical distribution 1990 based on total size-distribution in 1970	283,717 (100)	49,266 (17.4)	80,783 (28.5)	89,704 (31.6)	63,964 (22.5)
D. Hypothetical distribution 1990 based on size distribution within sectors 1970 and employment shares between sectors 1990	283,717	51,073 (18.0)	79,080 (27.9)	87,496 (30.8)	66,068 (23.3)
E. Total redistribution (B-C)		7,648	8,256	1,462	–17,366
F. Sector component (D-C)		1,807	–17,03	–2,208	2,104
G. Competitive component (E-F)		5,841	9,959	3,670	–19,470

explain just smaller parts of the changing employment shares, and therefore smaller parts of the growing relative importance of SMEs. Of the total redistribution of employment, the most significant part may be attributed to what is called the competitive component in the analysis. Thus, the hypothesis of intersectoral restructuring has to be rejected.

Conclusion

Based on the data presented in this paper, it may be concluded that there has been a shift in Norway towards a more dominant small scale sector in manufacturing industry. A significant decline in average size of establishments has occurred, and employment shares of small establishments have grown modestly from 17.3% in 1975 to 20.0% in 1990. This trend is similar to the trend observed in many other countries.

The main explanations for this shift, however, turns out to be the opposite of popular views of SMEs as being particularly competitive, and what among scholars is suggested as a re-emergence of small scale production. As far as Norwegian manufacturing industries are concerned, the data point very clearly to the general industrial decline as a main explanation for the growing share of SMEs. Rather than being attributed to the strengths of SMEs, the growing share of SMEs may be interpreted as a result of industrial weakness.

Acknowledgements

This article is based on research work carried out at the Eastern Norway Research Institute, Lillehammer, during the years 1992–1995, and funded by the Norwegian Research Council. I am grateful for valuable comments from two anonymous referees. Any errors or omissions remain my own responsibility.

Appendix: Industrial classification

Code	Industrial sector	ISIC-codes	Technology
220	Oil and gas extraction	22	
290	Mining and quarrying	21, 23, 29	
310	Food, beverages and tobacco, except fish products	31 except 3114 and 3115	Low
311	Fish products	3114, 3115	Low
320	Textiles, clothing, footwear and leather products	32	Low
331	Wood and wood products	331	Low
332	Furniture and fixtures	332, 3812	Low
341	Pulp, paper and allied products	341	Low
342	Printing, publishing and allied industries	342	Low
351	Chemicals	351	Medium
352	Drugs and medicine (Pharmaceutical products)	3522	High
353	Petroleum and coal products	353, 354	Low
356	Other chemical products, rubber and plastics	352 except 3522, 355, 356,	Medium
360	Mineral products	36	Low
371	Iron, steel and ferro-alloys	371	Low
372	Non-ferrous metals	372	Medium
381	Metal products (not machinery)	381 except 3812	Low
382	Machinery (not high-tech)	382 except 38241 and 3825	Medium
383	High tech products, office machines, computers and electronic equipment, scientific instruments, photographic and optical goods	3825, 3831, 3832, 3845, 385	High
384	Transport equipment except ships and boats	3842, 3843, 3844, 3849	Medium
388	Household appliances, not specified electrical machinery	3833, 3839	Low
389	Oil and gas well machinery and tools, building of ships and boats	38241, 3841	Low
390	Other manufacturing	39	Medium

Notes

[1] Previous versions of this paper have been presented at the conference "Autonomy and Independent Work – Experiences with restructuring industrial organisation in West and East", University of Nijmegen, The Netherlands, November 30–December 1, 1992, and RENT VII, Research in entrepreneurship, Budapest, November 1993. This final version presents major changes and provides new data on the size structure of firms and establishments in Norway.

[2] The data for Germany are not directly comparable as establishments with less than 20 employees are not included in the statistics.

[3] I have presented these data in a previous paper (Spilling, 1992).

[4] This should, however, not be interpreted as if all employment loss stems from the larger establishments. The figures only indicate net changes of the various size groups. *Within* the various groups there may be losses and gains that counteract each other. Establishments moving between size groups also will affect the employment shares.

[5] The analysis includes all 21 sectors within manufacturing (group 3) and sector 290, mining, belonging to group 2. Sector 220, oil drilling, for which we also have data, is not included in this analysis. This is because it has developed from scratch during the period, so there is no initial structure with which to make comparisons.

[6] The development over the two decades has been analysed simultanously as well as separately. Here, only results for the simultaneous analysis are presented. To do this, one has to assume that the same mechanisms have been working during both decades.

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