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## Industrial Policy and Repressed Structural Change in West Germany

### Industriepolitik und zurückgestauter Strukturwandel in der Bundesrepublik

Von Henning Klodt, Kiel

As wiser Physicians tamper not excessively with their Patients, rather observing and complying with the motion of nature, then contradicting it with vehement Administrations of their own; so in Politicks and Oconomicks the same must be used.

Sir William Petty (1662)

#### *I. Introduction*

In retrospective, the sixties appear just like the “golden age” of the West German economy. Growth rates were high and stable, inflation was low, and unemployment was almost unknown. This favourable macroeconomic performance was accompanied by rapid structural change that showed up in substantial shifts of output and employment between shrinking and expanding industries. Those days are gone – since the early seventies growth rates declined and structural change slowed down.

Several attempts were made in order to identify the determinants of low growth in West Germany and other industrial countries. The most cited impediments to faster growth in the seventies and eighties include the two oil-price shocks, declining ratios of capital formation, exhausted technological opportunities, increased real wage pressure, monetary shocks, intensified competition from abroad, and environmental restraints (for a survey see Bombach, 1985; Maddison, 1987). It is increasingly recognised, however, that the deterioration of economic performance might also be attributed to changing institutional conditions.

According to this view, the economic stability of the sixties gave rise to the establishment of powerful interest groups which increasingly objected to changes of relative income positions and hence reduced the adjustment flexibility of the whole economic system (Olson, 1982; Giersch, 1985). Hence, obsolete activities were probably not abandoned quickly enough and the growth potential of promising new activities were not fully exploited.

Successful lobbying of interest groups will in general show up in policy measures supporting these groups. As was analysed elsewhere, the activities of sector-specific interest groups in fact explain the sectoral pattern of internal and external protection in

West Germany (Donges, Schmidt et al., 1988). The importance of the institutional hypothesis can be evaluated, therefore, by an analysis of the impact of industrial policy on structural change.

## II. Patterns of structural change and industrial policy in West Germany

Structural change can be identified by shifting shares of output and factor inputs across industries. This paper concentrates on labour input for the following reasons: Firstly, insufficient adjustment of employment is closely related to the central weakness of the West German economy – the stubbornly high level of unemployment. Secondly, special attention shall be paid to the implications of internal protection (government subsidies) and external protection (trade barriers) for sectoral rigidities. These government interventions are protecting inputs, not outputs. Since the price of rather immobile factors (labour) is in general more affected by protection than the price of internationally mobile factors (capital), government interventions will primarily result in distortions of labour input (Basevi, 1966; Neary, Ruane, 1985).

The speed of structural change will be measured by an indicator that was originally proposed by Schiavo-Campo (1978)<sup>1</sup>). It is calculated as follows:

$$SC = \frac{1}{2j} \sum_i \left| a_i^1 - a_i^0 \right|$$

where  $a_i$  denotes the percentage share of industry  $i$  in total employment, the superscripts 0 and 1 denote the beginning and the end of period and  $j$  gives the number of years covered. This index provides a measure of net annual shifts of employment between different industries as a percentage of total employment.

Evidently, the concept is sensitive to the level of aggregation. Comparing the speed of structural change in different periods or different countries is impossible, therefore, if the level of disaggregation is not held constant. Moreover, it seems appropriate to calculate this index for peak-to-peak periods in order to avoid confusion of structural trends and cyclical swings.

Within the system of West German national accounts, employment data for 50 different industries of the business enterprise sector are available since 1960. The speed of structural change can be calculated, therefore, for five complete business cycles (Table 1). Apparently, structural change was much faster in the sixties than in the seventies and eighties. With the declining speed of structural change the average rates of output growth also slowed down.

The impact of industrial policy on structural change can be illuminated by a comparison of the sectoral patterns of government support and shifts in employment. Sectorally disaggregated data on government support are available

<sup>1</sup>) The Schiavo-Campo index was applied in several empirical studies. See e.g. Lawrence (1984), Donges, Glismann (1987). A rudimentary description of this concept was already presented by Salette (1968). Different concepts of measuring structural change were extensively discussed at the beginning of the „Strukturberichterstattung“ in West Germany (Breithaupt et al., 1979; Kregel, Filip, 1981). See also Schatz (1974).

Table 1: Structural change and output growth in West Germany (a) 1960–1986 (percent changes at annual rates)

Period	Structural change	Gross value added (b)
1960–65	1.08	4.85
1965–69	1.06	4.06
1969–73	0.96	4.03
1973–79	0.91	2.30
1979–86	0.68	1.44

(a) Business enterprise sector, excluding real estate.  
(b) At 1980 prices.

Source: Statistisches Bundesamt (a); own calculations.

for the “international sector” of the West German economy, namely agriculture, mining and manufacturing. With respect to different adjustment requirements, this sector is divided into three categories<sup>2</sup>). Industries of the first group (Schumpeter industries) are characterised by a high level of human-capital intensity and a high research intensity. These industries take advantage of those production factors that are relatively abundant in highly developed economies. This group includes chemistry and allied products, petroleum refineries, machinery, office equipment and computers, motor vehicles, aircraft and aerospace, electrical equipment, and instruments. Production in the second group (Ricardo industries) is tied to specific areas because of the location of natural resources or climatic and other regional properties. This mainly applies to agriculture, mining, basic metals, and shipbuilding. The remaining industries (Heckscher-Ohlin industries) are either labour intensive or physical capital-intensive<sup>3</sup>).

In international perspective a permanent shift of employment towards Schumpeter industries can be observed (Rothwell, Zegveld, 1981, 1985; Freeman, Clark, Soete, 1982; Lawrence, 1987). This not only applies to advanced industrial countries but also to many less developed countries, especially to the dynamic region of South East Asia. A high-wage economy like West Germany must be inclined to keep pace with this development in order to avoid a deterioration of its relative and absolute income position (Krugman, 1979). In the case of Ricardo industries, the comparative disadvantage of the West German economy was aggravated by the discovery of new deposits of natural resources and improved production techniques abroad. Hence, increasing shares of Schumpeter industries and correspondingly declining shares of Ricardo and Heckscher-Ohlin industries are to be expected in the course of time.

Actually, sectoral shifts in West Germany were in accordance with this pattern in the sixties and early seventies (Fig. 1). In the period following 1973, however, the relative decline of Ricardo industries was almost stopped. The decline of Heckscher-Ohlin industries, on the other hand, was even more pronounced, which might primarily be attributed to the increased real wage pressure since 1973/74. The shift towards Schumpeter industries, finally, was less distinct than in previous years.

<sup>2</sup>) For an extensive discussion of these categories see *Giersch (1978, 1979)*.

<sup>3</sup>) For a similar classification see *Krieger, Thoroe, Weskamp (1985)*.

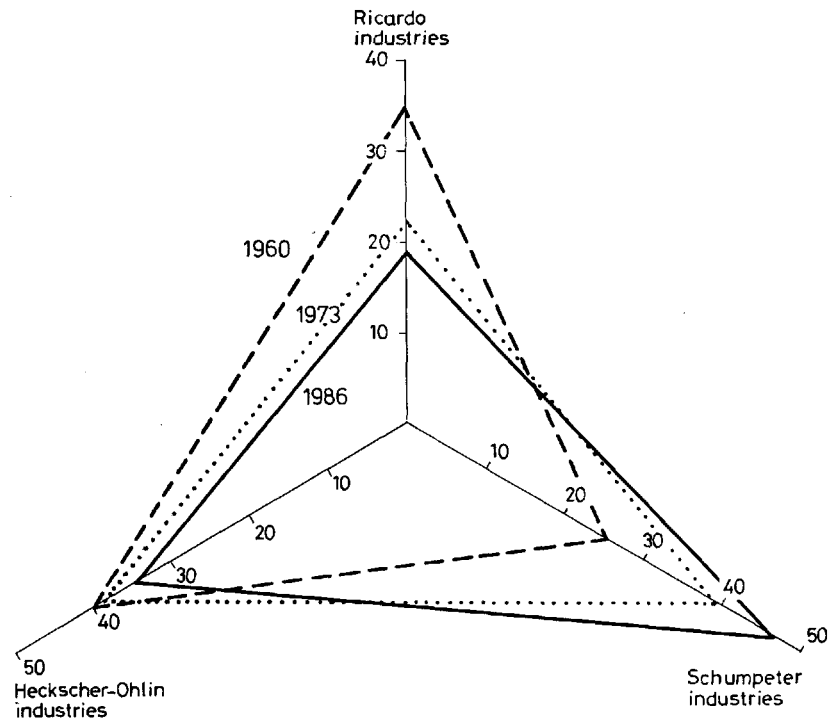


Fig. 1: Employment shares (a) by type of industry.

(a) Percentage shares in total employment of agriculture, mining and manufacturing. For each year, the shares of the three industry types add up to 100 percent.  
Source: Statistisches Bundesamt (a); own calculations.

This evidence suggests that the reduced speed of adjustment in Ricardo industries plays a vital role in the overall slowdown of structural change in West Germany. This development did obviously not result from an improved competitiveness of these industries. On the contrary, the gap between domestic production costs and world market prices in agriculture is continuously widening, profitable West German coal deposits are almost exhausted, and in basic metals and shipbuilding various highly competitive foreign producers have entered the market<sup>4</sup>).

In fact, the conservation of Ricardo industries was mainly achieved by government intervention. On the whole, these industries are receiving about three quarters of all subsidies that are granted to agriculture, mining and manufacturing, whereas their share in output and employment of this sector is less than one

<sup>4</sup>) For a detailed analysis of the competitive position of Ricardo industries in West Germany see Schmidt et al. (1984).

Table 2: Government subsidies and subsidy rates in West Germany 1973, 1984

Industry	Subsidies (DM million)		Subsidy rate (a)	
	1973	1984	1973	1984
Ricardo industries	12 260	28 312	28.8	46.8
Agriculture	10 174	19 700	44.3	77.7
Mining	1 686	5 797	22.0	34.9
Basic metals	170	2 202	1.4	13.6
Shipbuilding	230	613	11.1	25.2
Heckscher-Ohlin industries	1 791	3 208	1.6	2.0
Schumpeter industries	3 995	6 954	2.8	2.6
Total (b)	18 046	38 474	6.0	7.9

(a) Subsidies as a percentage of net value-added.  
(b) Agriculture, mining, manufacturing.

Source: Donges, Schmidt et al. (1988); Jüttemeier (1984); Statistisches Bundesamt (a); own calculations.

quarter. And, more relevant for structural change, the level of subsidisation of Ricardo industries significantly increased since 1973. In agriculture and mining subsidy rates almost doubled, in basic metals and shipbuilding the increase was even more distinct (Table 2).

A quantitative assessment of the impact of industrial policy on structural change requires a concept for the measurement of distortions in labour input. In the next section, such an approach is derived from the concept of effective protection.

### III. Potential, actual, and repressed structural change

The effective rate of protection is defined as the ratio of actual net value-added at domestic prices to net value-added at world-market prices (Hiemenz, Hoffmann, Rabenau, 1971). Protection rates do not indicate, of course, the definite structure of output that would emerge in the absence of protection. Such an analysis would require a sectorally disaggregated general equilibrium model, which includes supply and demand functions of domestic and foreign subjects as well (Deardorff, Stern, 1985). Neverthe-

Table 3: Correlation of employment, compensation of employees and value-added 1960-1985

Variables (a)	Correlation coefficient		
	1960-85	1960-73	1973-85
Employment/compensation of employees	0.97	0.97	0.93
Compensation of employees/value added	0.94	0.92	0.79
Employment/value added	0.94	0.88	0.82

(a) Rates of change of sectoral shares.

Source: Statistisches Bundesamt (a); own calculations.

less, effective protection is a well established and widely accepted concept of measuring structural distortions in production.

Under two specific assumptions these distortions are equivalent to distortions in employment. The first assumption is an intersectoral wage-link. If the rates of change of nominal wages are equal in every industry, shifts in the sectoral structure of labour input are equal to shifts in labour income. The second assumption is concerned to changes of sectoral labour shares. If these rates of change are identical across industries, shifts in the distribution of labour income are equal to shifting shares of value-added. This would point to sectorally invariant elasticities of substitution, which might be attributed to an intersectoral technology-link. As a consequence of the wage-link and the technology-link, shifts in sectoral shares of output are very similar to shifts in labour input.

The empirical validity of these assumptions was examined by a correlation analysis. It covers 44 industries of the business enterprise sector in West Germany<sup>5)</sup>. As information on net value-added is not available for the whole period, the respective calculations refer to gross value-added. The results presented in Table 3 are highly supportive to the assumption that sectoral shifts in employment shares are closely related to shifts in output<sup>6)</sup>. Effective rates of protection are indicating, therefore, not only distortions in output but also distortions in labour input.

An appropriate data-base for estimating the sectoral structure of effective protection in West Germany was generated by several research projects carried out at the Kiel Institute of World Economics. The results were published in various studies: Comprehensive estimates of public subsidies by industry since 1973 are presented in Jüttemeier (1984) and Donges, Schmidt et al. (1988). Data on effective trade protection covering the period from 1958 to 1972 are provided by Donges, Fels, Neu et al. (1973). And data on trade protection for more recent years are included in Weiss et al. (1988) and Donges, Schmidt et al. (1988). In addition, the latter publications provide estimates of total effective protection resulting from both subsidies and trade barriers<sup>7)</sup>.

In this paper data on total effective protection were calculated for the year 1973, which marks the end of the period of rapid structural change in West Germany. These calculations are derived from data for subsidies and net value-added for the year 1973 and effective tariff rates for 1978. As nominal tariff rates imposed on West German imports were almost unchanged between the end of the Kennedy-Round (1967) and the end of the Tokyo-Round (1979) and sectoral input coefficients prove to be rather stable over time, the 1978 effective tariff rates probably provide a suitable approximation of effective tariff rates in 1973. Equivalently, total effective protection in 1984 was calculated from subsidies and net value-added of 1984 and effective trade protection of 1985. The results are shown in Table A1 in the appendix.

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<sup>5)</sup> The number of observations is determined by the availability of data on compensation of employees.

<sup>6)</sup> All coefficients are significant at the 1 per cent level. The consistency of structural change in nominal output and labour input is, by the way, a common result of empirical studies concerned to the so-called three-sector hypothesis. For the West German economy see, e.g., *Fels, Schatz, Wolter* (1971), *Donges, Klodt, Schmidt* (1989). For a survey of international studies see *Norton* (1986).

<sup>7)</sup> According to *Corden* (1971) total effective protection is the sum of effective tariff protection and effective internal protection. Internal protection is calculated as the ratio of subsidies to net value-added at world market prices.

Table 4: Potential, actual and repressed structural change in West Germany 1960–1984 (a)

Period	Potential	Actual Structural change	Repressed
1960–73	1.502	1.247	0.255
1973–84	1.000	0.562	0.438

(a) For the method see text. For the sample of industries see Table A2 in the appendix.

Source: As Table 2.

These data can be applied for an assessment of the impact of protection on the structure of employment. For this purpose, the sectoral employment figures of 1984 were divided by the effective rates of protection in 1984. These protection-adjusted figures provide an approximation of the structure of employment in 1984 that would probably have emerged in the absence of protection.

Based on these calculations three different types of structural change can be distinguished:

- A comparison of the protection-adjusted structure of employment in 1984 to the actual structure of employment in 1973 yields a Schiavo-Campo index of potential structural change between 1973 and 1984.
- A comparison of the actual structure of employment in 1984 to the actual structure of employment in 1973 yields a Schiavo-Campo index of actual structural change between 1973 and 1984.
- The difference between potential and actual structural change yields a Schiavo-Campo index of structural change repressed by protective measures.

Similar calculations were carried out for the period from 1960 to 1973.

According to this approach structural change in the seventies and early eighties was much more hampered by tariffs and subsidies than in previous years (Table 4). In absolute terms, the amount of repressed structural change almost doubled; in comparison to potential structural change it increased from 17 to 44 percent.

It should be kept in mind that these calculations only refer to subsidies and tariffs. It can not be concluded, therefore, that the whole reduction of potential structural change is reflecting a decrease of adjustment requirements. This reduction might also be influenced by other impediments to structural change like restrictive labour market laws or shifts in the behaviour of unions and employer organisations<sup>8)</sup>.

#### IV. Conclusions

The evidence presented in this paper gives support to the institutional hypothesis, according to which a substantial part of the slowdown of structural change since the early seventies can be attributed to successful lobbying activities resulting in sector-specific government support. Officially, industrial policy in West Germany is dedicated to the reduction of frictional unemployment<sup>9)</sup>. In fact, this policy yielded the

<sup>8)</sup> On the importance of these topics for labour markets in West Germany see *Donges, Schatz (1986); Burda, Sachs (1987); Soltwedel (1987)*.

<sup>9)</sup> The principal design of sector-specific government measures is documented in *Deutscher Bundestag (1968)*, which is still the official guideline of industrial policy in West Germany.



opposite result. Massive government support to Ricardo industries could not prevent a decline of employment in absolute terms. Instead, it reduced the adjustment flexibility of the whole economic system and gave rise to a widening gap between potential and actual structural change.

Within the system of industry-specific government support, trade protection is of reduced importance. Nowadays, the conservation of declining industries is mainly achieved by public subsidies. Most of these measures were already initiated in the sixties or even the fifties. For instance, the first programme of government assistance to shipbuilding was launched in 1962 and protection of agriculture dates back to the early fifties. In the aftermath of 1973, however, government interventions were significantly intensified. On average, subsidy rates in Ricardo industries almost doubled and sectoral shifts of labour input from shrinking to expanding industries were increasingly repressed. In consequence, industrial policy was reducing both incentives for and capabilities of faster economic growth.

This analysis is mainly concerned to the international sector of the West German economy. An extension to service industries would require a different approach. In services, public subsidies are in general of minor importance (with the outstanding exception of rail transport). Instead, protection of services is achieved by a complex system of regulations. Since most of these regulations are intended to deter new entry, protected service industries are prevented not from shrinking but from expanding. As the share of services in total employment tends to rise in the course of economic growth, these regulations are hampering structural change as well. Further research on government interventions and sectoral rigidities should probably concentrate on this aspect of repressed structural change.

## Appendix

Table A1: Effective protection by industry in West Germany, selected years

Industry	Net value-added		Government subsidies		Effective tariff protection		Total effective protection (a)	
	1973	1984	1973	1984	1978	1985	1973	1984
	DM million				per cent			
Agriculture	22990	25350	10174	19700	0.0	0.0	44.3	77.7
Mining	7680	16610	1686	5797	0.0	0.0	22.0	34.9
Chemicals	24800	48270	605	871	16.2	9.8	19.0	11.8
Petroleum refineries	4450	4240	168	126	10.7	10.7	14.9	14.0
Plastic products	5960	12080	130	247	15.8	7.1	18.3	9.3
Rubber products	3410	6060	46	55	12.7	8.0	14.2	9.0
Stone, stone products	10100	11870	114	205	8.7	6.1	9.9	7.9
Clay products	1510	2150	24	52	7.3	5.6	9.0	8.2
Glass, glass products	2670	3550	33	70	10.6	7.8	12.0	9.9
Iron and steel	9610	11610	99	2049	9.9	9.7	11.0	19.6
Non-ferrous metals	2220	4550	71	153	12.1	11.2	15.7	14.9
Foundries	3570	5320	36	66	11.6	7.6	13.7	8.9
Rolling mills	8710	11410	35	90	7.7	6.1	8.1	6.9
Steel construction	5850	9240	124	160	4.8	3.1	7.0	4.9
Machinery	33320	55580	806	1812	2.6	1.6	5.1	4.9
Office equipment, computers	4180	7890	251	114	8.1	9.8	14.6	11.4
Motor vehicles	25420	55320	381	582	10.3	12.7	12.0	13.9
Shipbuilding	2070	2430	230	613	-7.1	-1.2	3.2	23.7
Aircraft and aerospace	1500	3990	582	715	15.6	14.1	60.5	34.5
Electrical equipment	32260	60650	952	2219	8.6	5.1	11.8	8.9
Instruments	5770	9830	75	213	7.2	5.2	8.6	7.5
Fabricated metal products	10750	16430	122	269	7.9	5.7	9.1	7.4
Jewelry, cuttlery etc.	1950	3320	15	39	8.3	8.9	9.1	10.2
Wood, wood products	1930	2420	24	65	21.7	16.1	23.2	19.2
Furniture and fixtures	9730	13020	86	168	12.7	6.5	13.7	7.9
Pulp and paper	1790	3710	41	59	19.3	14.2	22.0	16.0
Paper products	3960	5940	59	184	27.9	19.8	29.8	23.5
Printing and publishing	6740	11350	265	509	2.0	0.9	6.0	5.4
Leather, leather products	2670	3130	11	29	9.2	7.2	9.6	8.2
Textiles	9230	10730	115	203	18.9	13.3	20.4	15.4
Clothing	6950	8250	83	140	31.4	23.2	33.0	25.3

(a) Sum of effective tariff protection and percentage share of subsidies in net value-added at world market prices.

Source: Donges, Schmidt et al. (1988); Jüttemeier (1984); Statistisches Bundesamt(a); own calculations.

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### *Zusammenfassung*

In diesem Aufsatz wird der Einfluß der Außen- und Binnenprotektion auf das Tempo des Strukturwandels in der Bundesrepublik untersucht. Dafür werden detaillierte statistische Informationen über Zölle und Subventionen nach 31 Wirtschaftszweigen präsentiert. Die Auswirkungen dieser Protektionsmaßnahmen werden mit einem modifizierten Konzept der effektiven Protektion analysiert. Es wird gezeigt, daß sich die Industriepolitik in der Bundesrepublik zunehmend auf die Konservierung von Ricardo-Industrien konzentriert und den sektoralen Strukturwandel spürbar behindert.

### *Summary*

This paper examines the impact of external and internal protection on the speed of structural change in West Germany. It provides detailed statistical information on tariffs and subsidies for 31 different industries. The impact of these measures is analysed by a modified version of the concept of effective protection. It is demonstrated that industrial policy in West Germany is increasingly concentrated on the conservation of Ricardo industries. In consequence, the speed of structural change is substantially reduced.

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