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THE IMPACT OF MANUFACTURED IMPORTS
FROM DEVELOPING COUNTRIES
IN THE FEDERAL REPUBLIC OF GERMANY

by

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Frank Wolter*

I

Introduction

Significant changes in the structure of production and employment are one of the salient features of West Germany's economic history. However, it was not until the mid-1970s that such changes were accompanied by sizeable friction. After 1973, the hitherto last year of full employment, the German economy has been characterized by disequilibria on the labour market and a fairly poor investment and economic growth performance as measured by prior standards. Obviously, since a couple of years the "demand" for adjustment in Germany, as in most other western industrialized countries, has outpaced the economy's adjustment capacity.

Whether or to what extent the adjustment difficulties are due to an increase in demand for structural change or to a decrease of the economy's flexibility cannot be precisely assessed; however, there is evidence that both factors are at work:

(i) In the course of the 1970s, various shocks have added to necessary adjustment to shifts in relative prices that are considered "normal" in the course of economic growth - price shifts which, among others, in highly advanced open economies are likely to foster a gradual rise of the weight of the non-tradables sector in the production structure (Heitger, Weiss,

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1979). First, in the German case the exchange rate adjustments since the late 1960s have removed somewhat abruptly artificial incentives to invest in the tradables sector which prevailed during the long phase of undervaluation of the DM. Second, drastic price hikes for basic inputs, most notably energy, have occurred. And third, since the early 1970s Germany's export and import substitution sectors have become exposed to rapidly increasing competition from new sources of supply, predominantly located in developing countries.¹

(ii) At the same time, observed increases in price and wage rigidities (Soltwedel, Spinanger, 1976; Fels, Weiss, 1978; Glismann et al., 1978) seem to have weakened the allocative efficiency of the market mechanism in the 1970s as compared to the 1960s. At least three factors are likely to have contributed to this development. First, with increasing real income the marginal propensity for intersectoral and interregional mobility of the labour force seems to have declined significantly. Second, wage bargains were increasingly governed by equity considerations ("Sockelpolitik"), a fact which may have caused disequilibrium in the evolving wage and productivity structures. And third, the "free" market segment of the economy has declined both over time because of economy wide structural changes in favour of substantially regulated domestic sectors and possibly also because of autonomous increases in Government activities (Table 1).

Among the factors mentioned to exert pressure for structural change in Germany, the present paper aims at investigating the adjustment in response to an increasing

¹ Throughout this paper developing countries (DCs) are classified in three groups, newly industrializing countries (NICs), OPEC and less developed countries (LDCs). Following a recent OECD-study (1979), NICs are identified with Brazil, Greece, Hongkong, Rep. of Korea, Mexico, Portugal, Singapore, Spain, Taiwan, Turkey, Yugoslavia; LDCs refer to all Non-OECD countries which do not belong to NICs, OPEC or centrally planned economies (CPEs).

Table 1 - Structural Changes in the West German Economy,
1960 to 1977

Contribution to Gross Value Added ^a	Year	1960	1965	1969	1973	1977
Tradables ^b		48.9	46.3	45.8	42.0	40.4
of which: Manufacturing		40.4	40.2	40.7	37.8	36.4
Non-Tradables ^c		51.1	53.7	54.2	58.0	59.6
of which: Government Services		7.3	8.2	9.0	10.6	11.6
Gross Value Added		100	100	100	100	100

^aCurrent prices. ^bAgriculture, forestry, fishing, mining, manufacturing. ^cEnergy, gas, water, wholesale and retail trade, banking, insurance, transport, communication, construction, dwellings, government services, private non profit organizations.

Source: See Annex III, (15).

division of labour with developing countries. The focus of the paper is on manufacturing in which adjustment pressure has become particularly strong.¹ The years 1965, 1969, 1973 and 1977, i.e. periods of relatively high capacity utilization, serve as benchmarks. The paper is organized in four chapters. Following the introduction, in chapter II, employment effects arising from trade with developing countries are compared with employment effects of other sources of structural change. Chapter III is devoted to an analysis of the nature of adjustment for trade with developing countries. Problems of and policies for restructuring are discussed in the final chapter.

¹In fact, it is the recent dynamism of imports from developing countries and, given their high price competitiveness, the maverick function of these countries in limited markets rather than the average level of market penetration which can explain that this new competition has become a source of major concern (Table A1, A2).

II

Sources of Structural Change

Political resistance against manufacturing imports from developing countries is largely based on the notion of unmanageable employment problems which are posited to result in the importing countries under conditions of free market access. Of course, balanced trade expansion as such does not create unemployment, notwithstanding the fact that the gains from trade may take the form of reducing the necessary inputs, including labour, to generate a given income level. What matters, however, are the effects on the structure of employment and the frictions potentially involved in times of rapid trade integration.

It is beyond the scope of the present paper to compare the actual development of employment in Germany's manufacturing sector with a hypothetical situation of free market access. Rather, given the degree of protection and its change over time it is intended to arrive at some order of magnitude of the impact of trade with developing countries on manufacturing employment compared with the employment impact of other sources of structural change. Obviously, even this is an ambitious task as trade operates through a variety of channels on economic growth and employment which, moreover, are frequently inter-linked.¹ In the absence of an adequate econometric model considering all these factors the following calculations of employment effects are based on an accounting procedure which cannot

¹ After all, the adjustment pressure may be limited due to various factors. For, first, in many cases imports are not perfect substitutes for domestic production. Second, cheaper (than domestic) manufacturing inputs from developing countries strengthen the competitiveness of domestic industries, even of those which are most exposed to adjustment pressure. Third, import competition from new sources of supply raises X-efficiency which in turn will increase domestic competitiveness vis à vis foreign supply. And finally, exploitation of comparative advantage through trade integration is apt to speed up economic growth.

offer but rough estimates. Use will be made of a methodology recently presented by Krueger (1978), the details of which are given in annex I.¹ In principle, the approach attributes inter-temporal changes of employment by industry to three sources - productivity changes, demand changes (domestic and foreign), and import changes -, and, thereby allows for an assessment of the relative weight of these components. The evidence is on the direct employment effects of changes in these factors, only.

The results of such calculations for a break-down according to the German industrial classification are given in Table 2 for the period 1973 to 1977 and in Table A3 for the periods 1965 to 1969 and 1969 to 1973. The basic features may be summarized as follows:

(i) In contrast to the two previous periods, from 1973 to 1977 employment in the German manufacturing sector has decreased significantly. While from 1965 to 1973 the positive overall balance was the result of substantial structural changes within manufacturing during which expanding branches could provide more jobs than were displaced in declining branches, from 1973 to 1977 labour was displaced in each of the individual industries to a smaller or larger degree. 2

(ii) An intertemporal and macro-level comparison shows that the most obvious change to account for the reduction of employment in Germany's manufacturing sector was a slow-down of demand for manufactures between 1973 and 1977 - a reflection of the relatively poor growth performance during this period (which, however, by no means should be confused with a deficiency of demand management). For all three periods, displacement effects due to productivity or import changes exhibit the same order of magnitude, in the latter case, however, with a rising tendency.

¹As compared to previously employed methods (Frank, 1977; Cable, 1977; UNIDO, 1979) this procedure has the advantage of eliminating interaction factors between the various sources of employment changes. For a criticism of the methodology see Martin, Evans (1978).

Table 2 - Components of Employment Change by Industry^a; Demand, Labour Productivity and Imports, Federal Republic of Germany, 1973 to 1977

Industry	Employment	Demand	Labour Productivity	Imports
	Continuous percentage rates			
Primary and intermediate goods ind.	- 3.08	0.53	- 2.92	- 0.68
Stones and earthen goods ind.	- 7.84	- 3.98	- 3.68	- 0.17
Iron and steel ind.	- 1.96	- 0.81	- 0.44	- 0.73
Foundries	- 3.61	- 2.35	- 1.02	- 0.23
Cold rolling mills	- 3.40	- 0.77	- 2.40	- 0.25
Non-ferrous metal ind.	- 3.86	4.58	- 8.97	0.54
Mineral oil ind.	- 7.92	- 2.48	- 4.74	- 0.71
Chemical ind.	- 0.70	3.52	- 3.82	- 0.42
Sawmills and woodwork ind.	- 5.26	- 1.46	- 2.90	- 0.92
Pulp, paper, paperboard ind.	- 4.29	0.35	- 4.38	- 0.27
Rubber and asbestos manuf. ind.	- 5.02	- 1.43	- 1.48	- 2.11
Capital goods ind.	- 2.53	2.54	- 4.02	- 1.05
Structural and light metal eng.	- 3.40	- 3.98	0.86	- 0.29
Mechanical eng.	- 2.37	1.18	- 3.00	- 0.54
Manf. of road vehicles	- 0.26	5.28	- 4.70	- 0.84
Electrical engineering	- 3.39	3.46	- 5.59	- 1.25
Precision and optical goods, watches ind.	- 2.18	4.26	- 5.12	- 1.33
Steel processing, sheet and metal goods ind.	- 3.54	- 0.10	- 2.96	- 0.47
Office machines and data proc.	- 7.08	5.79	- 9.91	- 2.95
Consumer goods ind.	- 4.83	1.22	- 4.84	- 1.23
Fine ceramics ind.	- 4.07	0.72	- 2.43	- 2.33
Glass and glass prod. ind.	- 4.70	- 0.01	- 4.24	- 0.44
Woodwork man. ind.	- 2.74	1.42	- 3.93	- 0.22
Musical instr., toys, sporting goods ind.	- 2.00	3.70	- 4.60	- 1.17
Pulp and paper man. ind.	- 3.54	0.32	- 3.48	- 0.38
Printing and publishing	- 3.96	- 0.09	- 3.77	- 0.10
Plastics prod. ind.	- 1.24	2.91	- 3.55	- 0.60
Leather ind.	- 8.26	3.99	-11.48	- 0.80
Leather man. ind.	- 3.82	3.54	- 4.73	- 2.62
Shoe ind.	- 6.99	1.76	- 3.77	- 5.00
Textile ind.	- 6.87	1.56	- 5.86	- 2.57
Clothing ind.	- 7.46	0.84	- 5.86	- 2.42
Food, beverages, tobacco	- 3.74	1.84	- 5.12	- 0.46
Manufacturing	- 3.25	1.62	- 4.05	- 0.84

^aFor measurement concept see p. 33 sq.

(iii) The picture is very differentiated across industries. In general, productivity and import changes have tended to displace labour, albeit to largely differing degrees. Over time, for a decreasing number of branches demand changes were a stimulus for employment expansion; it is noteworthy, however, that in a number of industries positive employment effects due to increasing demand were larger in the 1973/77 period of relatively slow economic growth than in previous periods.

(iv) In general, imports appear to be an inferior source of displacement as compared to productivity changes. However, this is not true for all industries. From 1973 to 1977, in steel, rubber and asbestos manufacturing, structural and light metal engineering and shoes displacement due to increasing imports exceeded displacement due to increasing productivity. Apart from shoes, in these industries adjustment pressure was enforced by poor demand conditions.

(v) In absolute terms, from 1973 to 1977 displacement effects due to rising imports were most important in rubber and asbestos manufacturing, office machines and data processing, fine ceramics, leather manufacturing, shoes, textiles and clothing - by and large industries which have come under significant import pressure already since the late 1960s. In all other branches displacement due to imports did not exceed a continuous rate of 2 p.c.¹

Manufacturing imports originate from many foreign sources and, obviously, employment effects of trade are only partly

¹The picture presented by points (i) through (v) has to be slightly modified when recognizing that rising imports generally lead to rising exports and, hence, the employment effect of net trade is looked upon (Table A4). It appears that from 1973 to 1977 trade was neutral with regard to employment in total manufacturing. Across industries in many cases employment was stimulated by increasing trade; but there are also cases in which the changing trade position led to a decrease in employment. It is noteworthy that this is true, above all, for the consumer goods industries mentioned above, but also for office machines and precision and optical goods.

attributable to increasing trade with developing countries. In order to get a more precise picture of the differential impact of trade with major economic regions simulations were made to show by what percentage 1977 employment in German manufacturing industries would have been higher or lower if, on a regional basis, (a) imports would have increased at the same rate as demand for domestically produced commodities (Table 3), or (b) the trade balance would have remained constant (Table A5). The calculations warrant the following conclusions:

(i) In general, the notion that imports are a major source of displacement is particularly relevant for trade with developing countries. The displacement effects of imports are predominantly due to trade with advanced market economies.

(ii) In a number of individual industries trade with developing countries, especially with the group of newly industrializing countries, has had sizeable employment impacts. This applies above all for musical instruments, toys and sporting goods, leather manufacturing, shoes, textiles and clothing. But apart from clothing even in these industries still larger displacement effects are hypothetically attributable to trade with advanced market economies.

(iii) In net terms, trade with developing countries, in particular with OPEC, as overall trade was stimulating employment in Germany's manufacturing sector rather than job destroying.

In sum, employment effects of trade with developing countries have been generally small if compared with employment effects of productivity changes or of trade with advanced market economies. Nevertheless, in selected lines of production import pressure from trade with developing countries has been significant.¹

¹For a similar result arrived in calculations of direct and indirect employment effects of trade with developing countries see Schumacher (1978).

Table 3 - Hypothetical Job Losses Attributable to Change in Import^a by Major Trading Region^b,
Federal Republic of Germany, 1973 to 1977

Region ^c	AMEs	JAP	CPEs	NICs	OPEC	LDCs	World
Industry	(in per cent of 1977 employment)						
Primary and intermediate goods ind.	2.09	0.06	0.28	0.02	0.04	0.16	2.64
Stones and earthen goods ind.	- 0.43	- 0.00	- 0.06	- 0.02	- 0.00	- 0.03	- 0.55
Iron and steel ind.	1.92	0.32	0.28	0.20	0.02	0.21	2.94
Foundries	0.57	0.01	0.03	0.08	0.00	0.00	0.69
Cold rolling mills	0.66	0.04	0.09	0.02	0.00	0.00	0.81
Non-ferrous metal ind.	- 6.30	- 0.26	2.30	1.29	- 1.37	1.81	- 2.53
Mineral oil ind.	1.28	0.00	0.32	- 0.06	0.08	0.16	1.78
Chemical ind.	1.44	0.03	0.18	0.02	- 0.00	0.03	1.70
Sawmills and woodwork ind.	2.06	- 0.01	0.73	- 0.07	0.04	0.59	3.34
Pulp, paper, paperboard ind.	0.68	0.00	0.03	0.02	0.00	0.01	0.75
Rubber and asbestos manuf. ind.	7.21	0.29	0.24	0.78	0.01	0.07	8.60
Capital goods ind.	3.35	0.45	0.34	0.04	0.01	0.06	4.24
Structural and light metal eng.	1.08	0.00	0.01	- 0.11	0.00	0.00	0.99
Mechanical eng.	1.85	0.10	0.05	0.08	0.01	0.01	2.10
Manuf. of road vehicles	2.72	0.25	0.05	0.37	0.01	0.01	3.41
Electrical engineering	3.45	0.68	0.07	0.71	0.02	0.11	5.04
Precision and optical goods, watches ind.	3.33	1.60	0.04	0.42	- 0.00	0.07	5.46
Steel processing, sheet and metal goods ind.	1.33	0.14	0.02	0.15	- 0.00	0.05	1.69
Office machines and data proc.	11.54	0.08	- 0.06	0.38	0.01	0.19	12.15
Consumer goods ind.	2.67	0.05	0.32	1.24	- 0.02	0.52	4.78
Fine ceramics ind.	8.57	- 0.01	0.18	0.78	- 0.00	0.17	9.69
Glass and glass prod. ind.	1.01	0.00	0.22	0.14	- 0.00	0.02	1.38
Woodwork man. ind.	0.46	0.00	0.17	0.09	0.00	0.03	0.75
Musical instr., toys, sporting goods ind.	2.34	0.07	0.38	1.34	0.00	0.64	4.77
Pulp and paper man. ind.	1.17	0.02	0.00	0.14	0.00	0.00	1.34
Printing and publishing	0.11	0.00	- 0.00	0.00	0.00	- 0.00	0.11
Plastics prod. ind.	2.22	0.07	0.00	0.07	0.00	0.04	2.41
Leather ind.	1.39	0.15	0.53	0.01	- 0.03	- 0.04	2.01
Leather man. ind.	5.39	0.11	1.07	3.24	0.07	1.11	11.00
Shoe ind.	15.08	0.02	0.98	5.56	- 0.00	0.41	22.04
Textile ind.	6.02	0.16	0.42	2.43	- 0.08	1.45	10.40
Clothing ind.	2.61	- 0.03	0.92	4.44	0.01	1.64	9.59
Food, beverages, tobacco	1.54	- 0.02	0.02	- 0.03	0.04	0.09	1.64
Manufacturing	2.47	0.16	0.19	0.29	0.02	0.18	3.31

^aChange of share of turnover in turnover plus imports between 1973 and 1977. Positive (negative) figures indicate hypothetical job losses (gains). - ^bFor measurement concept see p.33sq. - ^cAdvanced market economies (AMEs), Japan (JAP), centrally planned economies (CPEs), newly industrializing countries (NICs), oil producing and exporting countries (OPEC), less developed countries (LDCs).

Source: See Annex III, (9), (11), (13), (14).

III

On the Nature of Adjustment

From a theoretical point of view it is quite obvious that the division of labour between the Federal Republic of Germany, or, for that matter, other advanced market economies, and developing countries is predominantly of an interindustrial nature. This follows simply from the fact that large differentials in factor endowments between the two groups of countries exist which allow for the exploitation of comparative advantage along classical lines of trade theory.¹ However, it can be also assumed that the division of labour turns towards intra-industry trade intensification the more developing countries are catching up; in the course of factor price equalization the basis for inter-industry trade is gradually eroding (Balassa, 1978).

Calculations of the average intra-industry trade intensity for the German manufacturing sector, indeed, tend to support the above hypotheses both across regions and - with regard to developing countries - over time (Table 4)².

Notably, inter-industry specialization in trade with newly industrializing countries has been reduced already to some 60 per cent whereas it still largely predominates in trade with the two other groups of developing countries. A corollary of

¹It may be recalled in this context that the basic ideas of the "newer" hypotheses to explain the interindustrial division of labour date back well before World War II.

²These calculations are based on data referring to the three digit SITC-level. Opponents of the concept of intra-industry trade have often pointed to the difficulties in defining an industry. Obviously, the three-digit-SITC-level is far from being an ideal industry-concept. However, this classification was dictated by data availability of exogenous variables to be tested as potential determinants for intra-industry trade. For a discussion of the aggregation problem see Gray (1979) and Pomfret (1979) and the literature cited therein.

Table 4 - Average Intra-Industry Trade Intensity^a by Trading Region, Federal Republic of Germany, 1969 and 1977 (n = 101)^b

Region ^c Year	AMEs	JAP	CPEs	NICs	OPEC	LDCs
1969	72.1	38.3	39.9	28.1	5.0	10.8
1977	78.9	46.7	34.9	39.1	13.7	19.9

^a Measured according to Michaely (1962) or Aquino (1978). -
^b Three digit SITC-classes. - ^c Advanced market economies (AMEs); Japan (JAP); centrally planned economies (CPEs); newly industrializing countries (NICs); oil producing and exporting countries (OPEC); less developed countries (LDCs).

Source: See Annex III, (7).

this finding is that an intensification of trade with developing countries can be expected to necessitate more intersectoral reallocation of production factors than an intensification of trade with advanced market economies.

The phenomenon of intra-industry trade has been largely linked to the existence of scale economies in the production of differentiated commodities (Grubel, Lloyd, 1975). Empirical testing of the determinants of intra-industry trade intensity across manufacturing branches, however, has been generally less successful than the investigations into the nature of inter-industry trade (e.g. Pagoulatos, Sorensen, 1975). To date, the scanty availability of relevant data has remained a major obstacle in rigorously testing the various hypotheses advanced. The following analysis is based on a body of data collected from various sources by Herman (1978). These data are available on the three-digit SITC-level for the whole manufacturing sector which, accordingly, was the basis to define an industry. Through regression analysis it was attempted to explain intra-industry trade intensity across these industries by degree of maturity, scope for product differentiation, presence of scale

economies, and trade resistance factors such as industry-specific transport costs. In addition, a measure to account for "undue" aggregation was introduced. The best fit results of a large number of trials are presented in Table 5. Statistical significance could be found only in Germany's trade with OPEC and less developed countries, but none in Germany's trade with newly industrializing countries. Germany's intra-industry trade with developing countries seems to be intense in new rather than in mature industries. In view of the relatively weak competitive position of developing countries in sophisticated products this finding suggests that a significant fraction of Germany's intra-industry trade with developing countries consists of intrafirm trade of multinationals, subcontracting and the exchange of finished products for standardized inputs.

With regard to the determinants of advanced countries' interindustrial specialization in trade with developing countries two approaches have turned out to yield particularly fruitful results, the neo-factor proportions and the neo-technology account (Hufbauer, 1970). While the former attributes comparative advantage to intercountry differences in (physical and human) capital endowment and interindustry differences in capital requirements, the latter stresses intercountry differences in the potential to innovate and interindustry differences in the susceptibility to innovation as moving agents in framing trade structures and their change over time.

To identify determinants of West German manufacturing industries' structure of competitiveness in trade with developing countries both concepts were subjected to empirical tests. Cross industry regressions were run on three sets of approaches, named neo-factor proportions, factor endowment, and technology hypotheses; the endowment hypothesis is meant to constitute an enlarged factor proportions approach in which skills, natural resources and infrastructure are taken into account. The following exogenous variables have been employed:

Table 5 - Determinants of Intra-Industry Trade Intensity^a, West German Manufacturing in Trade with Selected Regions, Cross Section Regressions, 1977 (n = 99)^b

Region ^c	Equations ^{d,e}	R ² _{adj.}
OPEC	IIC = - 15.724 + 0.00245 FT + 0.00443 SE - 0.00097 MO + 0.00434 LA (+2.26)** (+2.70)** (-0.80) (+0.68)	0.78
LDC	IIC = - 3.916 + 0.01991 FT + 0.00046 AI + 0.00114 MO - 0.00048 LA (+5.89)*** (+0.67) (+0.68) (-0.44)	0.27

^aMeasured as $Q_i = [(X_i + M_i) - |X_i^e - M_i^e|] : (X_i^e + M_i^e) \cdot 100$ where X and M refers to exports and imports of industry i; X^e and M^e are import and export values corrected for overall manufacturing trade imbalances. For details see Aquino (1978). - ^bThree-digit SITC positions except SITC. Nos. 515, 533, 688. - ^cAbbreviations for regions: OPEC = oil producing and exporting countries; LDCs = developing countries except OPEC and newly industrializing countries. - ^dAbbreviation of variables: IIC = intra-industry trade coefficient; FT = first trade date; AI = advertisement intensity; SE = scale indicator; LA = level of aggregation; MO = industryspecific transport costs. - ^eFor regression purposes the logit transformation was imposed on the endogenous variables and weighted regressions were estimated (Kmenta, 1971).

Source: See Annex III, (3), (7).

- HCI - Human capital intensity, measured as capitalized difference between industry-specific actual hourly wages and industry-specific unskilled workers' hourly wages in 1975;
- PCI - Physical capital intensity, measured as gross fixed capital stock per hours worked (1970 prices) in 1975;
- SKI - Skill intensity, measured as share of high and medium skilled employees in total employment in 1974;
- NRI - Natural resource intensity, measured as direct inputs from agriculture, forestry, fishery and mining in per cent of value added at factor cost in 1970;
- ENI - Energy intensity, measured as electric power consumption per hour worked in 1976 (used as indicator for infrastructure intensity);
- RDI - Research and development intensity, measured as R+D expenditures in p.c. of sales in 1977.

In addition, the effective rate of assistance (tariff and subsidies; ERA) has been introduced to test for possible systematic distortions of trade patterns by government policies. In all cases, 'revealed' comparative advantage (RCA) serves as endogenous variable.¹

The approaches are applied to an industrial break-down according to the national classification for which a consistent set of data for production, industry characteristics and regionalized trade data is available. The results of the cross industry regressions for 1977 are presented in Table 6 and may be summarized as follows:

¹For econometric reasons RCA was measured as $\ln(x_{ij} \cdot \sum_i m_{ij} / m_{ij} \cdot \sum_i x_{ij})$ where x and m refers to exports and imports of industry i from region j, i.e. a slightly modified version of Balassa's (1967) original concept.

Table 6 - Determinants^a of West German Manufacturing Industries' Competitiveness^b in Trade with Developing Countries, Selected Hypotheses, Cross Section Regressions, 1977

Region ^c		R ² _{adj}	n
- Neo-Factor Proportions Hypothesis -			
NICs	RCA 77 = - 13.181 + 3.573 ln HCI - 0.014 PCI + 0.022 ERA (- 4.41)* (+ 4.45)* (- 1.97)* (+ 0.58)	0.40	28
OPEC	RCA 77 = - 11.862 + 4.132 ln HCI - 0.045 PCI + 0.034 ERA (- 2.00)* (+ 2.60)* (- 3.33)* (+ 0.45)	0.25	28
LDCs	RCA 77 = - 16.072 + 5.571 ln HCI - 0.037 PCI - 1.066 ln ERA (- 3.70)* (+ 5.40)* (- 4.19)* (- 1.67)	0.62	28
- Factor Endowment Hypothesis -			
NICs	RCA 77 = - 10.907 + 2.990 ln SKI - 0.672 ln NRI + 0.663 ln ENI + 0.039 ERA (- 3.59)* (+ 3.18)* (- 5.21)* (+ 3.34)* (+ 0.99)	0.63	27
OPEC	RCA 77 = 0.778 + 0.091 SKI - 0.216 NRI + 0.944 ln ENI - 0.516 ln ERA (+ 0.21) (+ 0.98) (- 4.12)* (+ 2.10)* (- 0.48)	0.43	27
LDCs	RCA 77 = - 2.436 + 0.181 SKI - 0.177 NRI + 0.786 ln ENI - 0.120 ERA (- 1.21) (+ 2.46)* (- 4.26)* (+ 2.07)* (- 1.79)	0.49	27
- Technology Hypothesis -			
NICs	RCA 77 = 2.058 + 1.192 ln RDI - 0.156 ERA (+ 2.22)* (+ 2.97)* (- 2.46)*	0.59	17
OPEC	RCA 77 = 3.750 + 0.182 RDI - 0.222 ERA (+ 2.20)* (+ 0.57) (- 2.25)*	0.25	17
LDCs	RCA 77 = 4.278 + 1.215 ln RDI - 1.744 ln ERA (+ 2.13)* (+ 2.92)* (- 2.19)*	0.56	17

t-statistics in parantheses; * denotes significant at 5 p.c. level; ln denotes natural logarithm.

^aAbbreviation of exogenous variables: HCI = Human capital intensity; PCI = Physical capital intensity; ERA = Effective rate of assistance; SKI = Skill intensity; NRI = Natural resource intensity; ENI = Energy intensity; RDI = Research and development intensity; SCE = Economies of Scale indicator. - ^bRCA 77 = Revealed comparative advantage in 1977. - ^cNewly industrializing countries (NICs); Oil producing and exporting countries (OPEC); Less developed countries (LDCs).

Source: See Annex III, (1), (2), (4), (5), (6), (11), (12).

(i) All trade models tested yield significant explanatory power although to different degrees. Such differences, however, are not large enough to allow either the factor endowments or the technology approaches to be identified as the dominant hypothesis to explain Germany's structure of competitiveness in trade with developing countries. Rather, the hypotheses advanced seem to be complementary.

(ii) The explanatory power of the trade models tested is higher for trade with newly industrializing and less developed countries than for trade with OPEC. This does not come unexpected in view of the relative small importance and more erratic nature of manufacturing trade with OPEC.

(iii) In accordance with a priori expectations, the results clearly indicate Germany's relatively strong position in human capital or skill as well as research and development intensive industries and her relatively weak position in raw labour and natural resource intensive lines of production.

(iv) A by now common result is the negative relationship between competitiveness and physical capital intensity (Fels, 1974; Wolter, 1977). It has been attributed to the high international mobility of physical capital and factor market distortions in developing countries. Given the high international mobility of this factor, a different interpretation may be that physical capital intensity is an acceptable indicator for the degree of standardization rather than a "true" Heckscher-Ohlin variable.

(v) In case of the technology hypothesis, the regressions indicate a significant bias of German industrial policy (as measured by tariff protection and subsidies in effective terms) in favour of less competitive industries in trade with developing countries. Earlier findings have yielded the same result in tests of factor-proportions hypotheses (Fels, 1972; Wolter, 1977).

On the whole, although the results leave room for further analysis, it is evident that a respectable portion of the variance of Germany's revealed comparative advantage in trade with developing countries across industries is susceptible to explanation by a small number of exogenous variables. While the above results indicate the type of industrial activities which are most likely to be exposed to strong adjustment pressure in case of further trade intensification with developing countries there are more factors involved which will significantly influence the ease or hardship of restructuring.

One such factor is the typical firm size of industries under import pressure. Firm size is relevant because of a variety of information costs and entry barriers which emerge or are to be overcome in the course of adjustment. In competitive markets, large and diversified firms can be posited to bring about adjustment at lower cost than a polypolistic system of the same size (Giersch, 1978). Operating in various product markets and various locations may yield relatively cheap information about endangered activities and may significantly lower the search costs for new investment opportunities in comparison to a one-product firm. Often, adjustment can simply take the form of expanding the firm's relatively competitive operations. In such cases, market entry barriers which are present for newcomers are comparatively low. Moreover, intra-firm capital and labour markets can be assumed relative efficient in reallocating resources. Finally, access to external capital for financing the expansion of already successful activities at the expense of activities under import pressure can be assumed relatively easy as opposed to getting funded totally new risks. Empirical evidence for Germany suggests that industries under adjustment pressure tend not to be characterized by the dominance of large and diversified firms (Table 7) - a fact which will make restructuring probably more costly than it otherwise would be.

A further factor to aggravate adjustment is the regional

Table 7 - Characteristics of Industries under Adjustment Pressure for Trade with Developing Countries, Federal Republic of Germany (Spearman Coefficients of Rank Correlation)

Industry Characteristic	Year	n	Revealed comparative advantage 1977 in trade with		
			NICs	OPEC	LDCs
Employment in large scale plants	1974	28	0.47*	0.08	0.38*
Average employm. per establishm.	1974	28	0.45*	0.18	0.43*
Regional concentration ^a	1970	28	-0.34*	-0.30	-0.32
Concentration in 20 poorest LMR ^a	1970	28	-0.45*	-0.15	-0.41*
Share of females in total employm.	1974	28	-0.49*	-0.24	-0.32*
Share of foreigners in total employm.	1974	13	-0.37	0.21	0.02

*Significant at 5 p.c. level.
^aBased on observations for 178 labour market regions (LMR).

Source: See Annex III, (8), (9), (10), (11), (16), (17).

aspect of the problem. As the correlations presented in Table 7 reveal, industries open to strong adjustment pressure especially in trade with newly industrializing countries tend to be highly concentrated regionally. As such, this fact does not give rise to particular concern. For, trade expansion generally involves rising imports and exports. And to the extent that within a given region decreasing employment opportunities in industries under import pressure are met by increasing employment opportunities due to increasing exports no specific regional problem is involved. However, the correlations between the inter-industrial structure of competitiveness in trade with developing countries and the industrial structure of backward regions tend to support the hypothesis that by increasing exports to developing countries mainly the industrial centres of advanced countries benefit while adjustment pressure due to increasing imports from developing countries hits above all the periphery.

From the results obtained so far it can be inferred that adjustment for trade with developing countries demands a relatively high degree of interindustry, interfirm and interregional mobility. Such need for mobility concerns in particular low-skilled labour, the type of skill which is employed most intensively in industries under adjustment pressure. While it can be assumed that interindustry or interfirm mobility of low-skilled labour is a minor obstacle for relatively smooth adjustment as these skills can be retrained at relatively low cost, this notion does probably hold much less with regard to interregional mobility. This is not only because of a marked preference on the part of Germans to stay put, but also because industries under adjustment pressure exhibit a relatively high degree of female employees whose social ties further reduce their interregional mobility as compared to their male counterparts.

IV

Towards Restructuring

An inspection of historical data on adjustment for trade between developed and developing countries is of limited value for speculating about future developments, in particular in times of fundamental changes in basic economic, technological or political conditions. To date, such changes are presented, indeed:

(i) One of the most significant changes in basic conditions is the drastic increase in the relative price for energy which also affects trade relations between advanced market economies and developing countries. The deterioration of the single factoral terms of trade in non-oil producing and exporting countries implies that the trade volume between developed and developing countries of that group will be smaller at least in the short to medium-run than otherwise; resources which could have been used for trade intensification among these countries have now

to be devoted for paying the oil bill. Furthermore, to the extent that OPEC charges domestic industries for oil and natural gas below opportunity costs, revealed comparative advantage for manufacturing industries intensively using such inputs like petrochemicals will shift in favour of these countries. Similar effects might emanate from possible new cartels in raw material markets.

(ii) The longer-run implications of technological breakthroughs such as the micro-processor on trade relations between developed and developing countries are most probably significant, but difficult to predict. While the new technology will largely extend the scope for product and process innovation and, hence, open up a broad field of new investment opportunities in areas where comparative advantage lies with the advanced market economies, it may at the same time shorten the limitation lag and, hence, enforce adjustment pressure as compared to a situation without this technology.

(iii) The new wave of protectionism in favour of senile industries in the advanced market economies will probably affect both the growth of manufacturing export potential in developing countries and its structure. For one thing, the ad hoc character of product and country specific commercial policies renders the future level of protection unpredictable and reduces investment incentives for the production of manufactures for exports in developing countries. For another, investment will be shifted to a larger degree than otherwise to commodities which are not (yet?) subject to rigid trade controls in the developed countries. An obvious implication is that actual exploitation of comparative advantage in trade between developed and developing countries will fall far below potential.

Further uncertainties arise from the enlargement of the European Community to incorporate the three newly industrializing countries Greece, Portugal and Spain. Although assessments of the impact of this enlargement on the future formulation of the Community's trade policy are highly speculative, one might

infer from the substantial weight of labour-intensive manufactures in the production structure of the new entrants that forces at work to extend the Community's agricultural policy to a significant part of the manufacturing sector will gain in weight.

Nevertheless, such factors are hardly likely to erode the need for or to change the basic nature of adjustment. Part of the necessary restructuring can be managed without friction by natural fluctuation. If prices and wages are sufficiently flexible, market signals provide that new entrants to the labour market look for jobs in industries which are not under import competition from developing countries. Furthermore, in developed countries the relative increase of employment in the non-tradables sector associated with economic growth provides for additional alternatives for labour displaced for trade with developing countries, also and to a significant degree for lower skilled and female labour. Finally, trade relations seem to become increasingly of an intra-industrial nature, the more trade between developed and developing countries intensifies. As experience during the course of economic integration within the European Community suggests adjustment for intra-industry trade may involve relatively little friction.

The thrust in market forces to bring about smooth restructuring heavily depends on efficient complementary economic policies. As noted earlier, growing rigidities within the economy accompanied by a significant decline in investment seem to be among the most important causes for the relatively poor economic growth performance of West Germany in the 1970s which in turn makes adjustment for trade with developing countries more difficult than it otherwise would be¹. Policies to remove such rigid-

¹The lessons of the 1950s and 1960s suggest that phases of relatively rapid economic growth can go along with massive creation of new jobs and tremendous structural changes with a minimum of friction: between 1950 and 1960, for instance, in Germany 5.3 million additional jobs corresponding to about 25 p.c. of the 1950 labour force were created; at the same time, agriculture alone displaced 1.4 million persons which found new jobs in other sectors of the economy.

ities have to be basically supply oriented by enforcing incentives for investment in human and physical capital and strengthening competition. In fact, in West Germany an effort has been made recently towards more intensively introducing such policies, among others, by embarking on a more moderate wage policy, re-dressing the tax system by shifting the tax burden somewhat from factor input to consumption, strengthening indirect incentives for innovation in particular for small and medium sized firms, and improving infant entrepreneur protection by offering a new form of public credit with equity character for the establishment of new firms. While these policies are open for criticism with regard to magnitude, mix and (lacking) comprehensiveness, they can be considered as steps in the right direction.

If economic policies provide for a climate conducive for investment and sufficient wage and price flexibility little seems to be left for an active adjustment policy. In particular, programs specific to individual industries seem hardly warranted, as such programs tend to delay necessary restructuring, turn easily into disguised or open protection, discriminate against the rest of economy, evoke chain reactions in other domestic industries, and provoke retaliatory measures abroad.

Trade integration with developing countries is one cause of structural change among others. Equity considerations suggest that, as there are gains from structural change, the winners should at least partly compensate the losers. This is the case for generally justifying public funds to support retraining as well as interregional mobility, and to compensate those who cannot be retrained because of their age. Whatever the social consensus allows to devote for such purposes, the general funds can be mobilized to facilitate trade induced restructuring. However, compensation can be hardly claimed by capital, as competition from suppliers located in developing countries can be reasonably considered to be part of the normal business risk.

External economies justify that the public sector collects and widely disseminates information on the causes and conse-

quences of adjustment for trade with developing countries and possible ways of restructuring. Probably, this is the most efficient way of assisting in particular small- and medium-sized firms¹. Furthermore, to ease anticipatory adjustment, policy changes such as steps towards liberalizing trade with developing countries should be pre-announced, made irrevocable and spread over a longer period of time to allow room for restructuring. Unless the rules of the game are exempt from bargaining, they never will become accepted.

Backward regions are likely to suffer particularly from trade intensification with developing countries. Specific adjustment assistance for such regions may be based on considerations to avoid increasing diseconomies of agglomeration. However, assistance seems hardly justified unless the regional authorities in question can prove the presence of a significant development potential which in the past could not be exhausted because of lack of complementary infrastructure to attract private investment. Otherwise, a (relative) decline of real wages and/or passive rehabilitation seems to be the only economic way of adjustment².

¹In Germany, a new effort in that field has been made by the recent introduction of a system of structural reports to be submitted to the Federal Government by the five large, independent German economic research institutes. These reports which, for the sake of trial and error, will be carried out in competition among the institutes involved are geared towards offering a detailed assessment of past structural changes in the economy and a diagnosis of the present situation; however, the studies are not to provide projections in order to avoid that the creditworthiness of individual industries becomes subject to public appraisal.

²Of course, any society can decide to subsidize life in backward regions. But this should be made explicit.

ANNEX I

Note on Calculation of Employment Effects

The employment effects of demand, productivity and trade have been calculated according to Krueger (1978). The calculations are based on three identities

$$(1a) \quad D_{it} = Q_{it} + M_{it} \quad (\text{for calculations of employment effects of imports})$$

or

$$(1b) \quad D_{it} = Q_{it} + M_{it} - X_{it} \quad (\text{for calculations of employment effects of net trade})$$

$$(2) \quad P_{it} = Q_{it} / E_{it}$$

$$(3) \quad S_{it} = Q_{it} / D_{it}$$

where D denotes demand, Q domestic production, M imports, X exports, P productivity and E employment in industry i at time t. All monetary values are measured in 1970 prices. If D, P and S change continuously, values of the end-year can be expressed as

$$(4) \quad D_{it} = D_{io} \cdot e^{\alpha t}; \quad (5) \quad P_{it} = P_{io} \cdot e^{\beta t};$$

$$(6) \quad S_{it} = S_{io} \cdot e^{\gamma t}.$$

By combining (1), (3), (4), (5), (6) in (2) it follows

$$(7) \quad E_{it} = E_{io} \cdot e^{(\alpha - \beta + \gamma)t}$$

or

$$(8) \quad \frac{1}{t} \ln \frac{E_{it}}{E_{io}} = (\alpha - \beta + \gamma).$$

Absolute figures can be obtained by (i) subtracting from the actual rate of employment change (8) the partial rate for imports (or net trade); (ii) applying this hypothetical rate of employment change to employment in the base year; and (iii) subtracting the resulting hypothetical employment in the end-year from actual employment in the end-year. Regionalized employment effects were calculated on the basis of regionalized trade figures for 1973 which were extrapolated to 1977 according to the rate of change for domestic production. Deviations of actual trade flows in 1977 from these hypothetical regional trade flows in 1977 served as weights to assess the employment effects of trade with the individual regions. As there are no official export and import price indices for the regional breakdown employed here, calculations had to be based on nominal values.

Table A1 - Share of Total Imports and Imports from Major Trading Regions in Domestic Apparent Consumption, Federal Republic of Germany, 1973 and 1977 (p.c.)

Industry	Region ^a							Region ^a							
	Year	AMEs	JAP	CPEs	NICs	OPEC	LDCs	World	AMEs	JAP	CPEs	NICs	OPEC	LDCs	World
		1 9 7 3							1 9 7 7						
Primary and intermed. goods ind.		17.6	0.4	1.4	0.8	0.1	1.2	21.5	20.7	0.5	2.0	0.7	0.3	1.5	25.7
Stones and earthen goods ind.		7.9	0.0	0.3	0.7	0.0	0.3	9.3	10.0	0.0	0.7	0.8	0.0	0.5	12.1
Iron and steel ind.		17.1	1.2	1.1	1.0	0.0	0.5	20.8	20.2	1.8	1.7	1.4	0.0	1.0	26.1
Foundries		3.3	0.1	0.3	0.1	0.0	0.0	3.8	3.6	0.1	0.3	0.2	0.0	0.0	4.3
Cold rolling mills		12.7	0.3	0.6	0.4	0.0	0.0	14.0	14.4	0.5	1.0	0.4	0.0	0.0	16.3
Non-ferrous metal ind.		26.9	0.2	4.2	1.2	0.4	9.2	42.0	30.9	0.2	3.7	0.9	0.8	9.3	45.9
Mineral oil ind.		15.2	0.0	2.3	0.9	0.6	0.1	19.0	19.0	0.0	3.8	0.1	0.9	1.3	25.1
Chemical ind.		19.0	0.5	0.6	0.6	0.0	0.4	21.1	21.0	0.5	1.3	0.5	0.1	0.4	23.8
Sawmills and woodwork ind.		18.5	0.2	4.0	2.2	0.1	3.0	27.9	19.8	0.1	4.9	1.6	0.1	3.8	30.3
Pulp, paper, paperboard ind.		38.3	0.0	0.8	0.5	0.0	0.0	39.7	42.6	0.1	1.3	0.7	0.0	0.2	44.9
Rubber and asbestos man. ind.		15.8	0.3	0.2	1.1	0.0	0.1	17.4	21.1	0.6	0.5	1.8	0.0	0.1	24.2
Capital goods ind.		14.5	1.1	0.3	0.6	0.0	0.1	16.6	18.5	1.8	0.3	1.2	0.0	0.2	21.9
Structural and light metal eng.		3.5	0.0	0.1	0.3	0.0	0.0	4.0	5.2	0.0	0.1	0.1	0.0	0.0	5.5
Mechanical eng.		15.3	0.7	0.3	0.4	0.0	0.0	16.7	18.3	0.9	0.4	0.5	0.1	0.1	20.2
Man. of road vehicles		19.0	0.6	0.2	0.5	0.0	0.0	20.3	21.9	1.2	0.3	1.3	0.0	0.1	24.7
Shipbuilding		15.7	0.6	3.5	0.9	0.0	0.0	20.7	11.3	10.0	1.4	0.4	0.0	0.9	24.0
Aircraft man.		43.1	0.1	0.2	0.1	0.3	0.3	44.1	108.1	0.1	0.0	0.6	0.3	0.4	109.4
Electrical eng.		11.4	1.5	0.2	0.9	0.0	0.1	14.0	15.2	2.4	0.3	1.8	0.0	0.2	20.0
Precision and optical goods, watches		27.7	6.6	0.4	1.2	0.1	0.2	36.2	28.9	8.8	0.4	1.9	0.1	0.3	40.4
Steel processing		4.5	0.1	0.2	0.2	0.0	0.0	5.0	6.7	0.4	0.2	0.5	0.0	0.0	7.8
Iron, sheet and metal goods ind.		11.2	0.9	0.3	0.6	0.0	0.1	13.2	11.9	1.0	0.3	0.9	0.0	0.2	14.3
Office mach. and data process.		48.0	4.7	0.2	2.4	0.0	0.1	55.4	58.2	4.3	0.1	2.6	0.0	0.4	65.5
Consumer goods ind.		14.1	0.4	0.9	3.0	0.4	0.8	19.7	16.4	0.4	1.4	4.8	0.3	1.6	25.0
Fine ceramics ind.		19.2	3.7	0.5	1.4	0.0	0.1	24.9	26.8	2.7	0.6	2.2	0.0	0.3	32.6
Glass and glass prod. ind.		15.1	0.2	1.0	0.6	0.0	0.0	16.7	16.5	0.2	1.4	1.0	0.0	0.1	19.1
Woodwork man. ind.		6.2	0.1	0.7	1.1	0.0	0.2	8.3	7.5	0.1	1.5	1.3	0.0	0.3	10.7
Musical instr., toys, sport. goods ind.		32.6	5.4	1.4	4.5	0.1	4.6	48.5	33.1	4.3	2.4	8.3	0.0	5.8	54.0
Pulp and paper man. ind.		5.9	0.1	0.0	0.1	0.0	0.0	6.2	7.4	0.1	0.0	0.4	0.0	0.0	8.0
Printing and publishing		4.2	0.1	0.1	0.2	0.0	0.0	4.6	4.5	0.0	0.1	0.2	0.0	0.0	4.9
Plastics prod. ind.		13.1	0.4	0.1	0.6	0.0	0.0	14.1	15.5	0.4	0.1	0.6	0.0	0.1	16.8
Leather ind.		39.9	1.2	0.7	3.9	0.5	11.1	57.4	41.9	1.9	0.7	6.3	0.2	9.2	60.3
Leather man. ind.		10.9	0.7	1.3	6.5	0.0	1.8	21.2	15.3	0.7	2.4	9.2	0.1	2.8	30.4
Shoe ind.		23.1	0.3	1.3	4.3	0.0	0.2	29.2	31.2	0.2	1.9	8.5	0.0	0.6	42.4
Textile ind.		22.4	0.3	1.1	3.7	1.7	1.4	30.5	27.1	0.5	1.5	6.3	1.4	3.0	39.7
Clothing ind.		11.4	0.3	2.3	8.4	0.0	0.9	23.4	13.2	0.2	3.3	13.7	0.0	3.3	33.7
Food, beverages, tobacco		9.6	0.1	0.9	1.4	0.2	1.9	14.1	11.0	0.1	0.8	1.1	0.2	1.8	15.0
Manufacturing		14.6	0.6	0.9	1.3	0.2	0.9	18.4	17.6	0.9	1.1	1.7	0.2	1.1	22.7

^aAMEs refers to advanced market economies (OECD except Greece, Japan, Portugal, Spain, Turkey, Yugoslavia); JAP refers to Japan; CPEs refers to centrally planned economies; NICs refers to newly industrializing countries (Brazil, Greece, Hongkong, Rep. of Korea, Mexico, Portugal, Singapore, Spain, Taiwan, Turkey, Yugoslavia); OPEC refers to members of OPEC; LDCs refers to developing countries other than NICs and OPEC.

Table A2 - Share of Exports to Different Regions in Total Exports, Federal Republic of Germany, 1973 and 1977 (p.c.)

Industry	Region ^a							Region ^a							
	Year	AMEs	JAP	CPEs	NICs	OPEC	LDCs	World	AMEs	JAP	CPEs	NICs	OPEC	LDCs	World
		1 9 7 3							1 9 7 7						
Primary and intermed. goods ind.		70.1	1.9	8.1	9.5	3.2	7.2	100	68.3	1.4	9.3	8.9	5.4	6.7	100
Stones and earthen goods ind.		82.7	0.4	4.2	5.3	2.6	4.8	100	73.4	0.2	4.5	7.1	10.1	4.8	100
Iron and steel ind.		70.2	0.2	14.2	7.1	3.2	5.1	100	65.2	0.1	17.5	7.0	6.4	3.8	100
Foundries		84.4	0.2	1.9	2.4	6.5	4.7	100	68.1	0.1	3.1	4.7	18.3	5.7	100
Cold rolling mills		65.1	0.1	20.2	8.1	2.0	4.4	100	58.9	0.1	25.2	6.7	4.8	4.3	100
Non-ferrous metal ind.		81.6	1.4	5.3	6.6	2.3	2.7	100	82.3	0.6	3.6	5.9	4.4	3.1	100
Mineral oil ind.		86.4	0.2	6.2	3.2	1.0	3.0	100	88.2	0.1	3.5	2.3	2.3	3.6	100
Chemical ind.		64.9	3.1	6.1	12.3	3.7	9.9	100	64.1	2.4	7.7	11.3	5.2	9.4	100
Sawmills and woodwork ind.		88.2	0.3	5.1	3.8	1.3	1.3	100	88.5	0.1	1.1	5.3	3.6	1.3	100
Pulp, paper, paperboard ind.		80.7	2.8	3.8	7.0	1.7	4.0	100	81.6	1.1	5.4	6.4	2.2	3.3	100
Rubber and asbestos man. ind.		82.5	0.7	3.2	6.8	2.0	4.8	100	79.8	0.6	3.5	6.4	4.5	5.2	100
Capital goods ind.		72.0	1.5	5.6	9.4	4.1	7.4	100	64.7	1.0	5.8	8.3	12.2	8.0	100
Structural and light metal eng.		69.6	0.6	5.5	12.8	4.8	6.7	100	32.8	0.1	15.5	9.3	34.8	7.5	100
Mechanical eng.		61.2	2.2	10.8	13.7	4.6	7.5	100	52.4	1.3	11.6	11.6	14.2	8.9	100
Man. of road vehicles		81.3	0.7	0.7	5.3	4.3	7.7	100	75.8	0.9	0.9	4.9	10.2	7.3	100
Shipbuilding		65.3	0.0	0.8	4.3	3.5	26.1	100	48.1	0.0	7.0	4.8	13.0	27.1	100
Aircraft man.		89.7	0.4	0.3	4.4	2.6	2.7	100	91.2	0.0	0.0	2.5	3.9	2.4	100
Electrical eng.		74.8	0.9	3.4	10.2	4.4	6.3	100	65.5	0.7	3.8	9.2	13.5	7.3	100
Precision and optical goods, watches		75.6	3.0	3.2	9.7	2.9	5.6	100	72.1	2.6	3.5	9.2	6.3	6.2	100
Steel processing		84.5	0.4	2.8	5.3	2.1	5.0	100	76.8	0.5	7.2	4.8	5.9	4.9	100
Iron, sheet and metal goods ind.		74.5	1.3	10.2	6.3	2.9	5.0	100	76.0	0.9	2.5	6.9	8.2	5.5	100
Office mach. and data process.		81.2	4.3	2.0	7.8	1.2	3.5	100	82.2	2.4	1.9	7.1	2.9	3.5	100
Consumer goods ind.		82.7	1.6	3.4	7.3	1.7	3.4	100	81.7	0.9	3.4	6.7	3.9	3.3	100
Fine ceramics ind.		86.4	0.7	2.5	5.3	1.4	3.7	100	85.2	0.5	2.9	4.3	3.5	3.5	100
Glass and glass prod. ind.		83.7	1.4	1.8	7.0	2.2	4.0	100	81.7	1.5	1.9	6.2	4.3	4.4	100
Woodwork man. ind.		93.5	0.5	0.6	2.0	1.7	1.7	100	85.8	0.4	0.4	1.6	9.8	1.9	100
Musical instr., toys, sport. goods ind.		85.0	5.1	1.1	4.6	0.9	3.4	100	87.9	2.5	0.9	3.3	3.0	2.4	100
Pulp and paper man. ind.		86.1	0.7	2.0	5.4	2.1	3.6	100	84.1	0.6	3.1	4.6	4.3	3.3	100
Printing and publishing		85.5	2.1	2.0	6.4	1.0	3.0	100	85.8	1.6	2.9	4.7	1.9	3.2	100
Plastics prod. ind.		86.8	0.5	3.5	5.0	1.0	3.3	100	84.9	0.4	3.3	5.2	2.9	3.2	100
Leather ind.		69.3	3.1	7.2	15.3	0.9	4.2	100	75.6	2.2	7.5	11.1	0.9	2.7	100
Leather man. ind.		81.0	5.3	1.7	6.5	1.7	3.9	100	84.6	3.6	1.0	4.6	3.7	2.5	100
Shoe ind.		92.7	1.0	2.1	1.4	1.0	1.9	100	90.9	0.8	1.4	2.2	2.4	2.3	100
Textile ind.		75.9	2.0	5.5	9.8	2.4	4.4	100	75.7	0.6	6.0	9.3	4.0	4.3	100
Clothing ind.		83.2	0.8	2.8	11.0	0.8	1.4	100	81.8	0.7	1.9	11.5	2.1	2.1	100
Food, beverages, tobacco		80.0	1.1	8.8	2.8	2.0	5.3	100	80.2	1.3	3.4	1.7	7.5	5.9	100
Manufacturing		73.0	1.6	6.1	9.0	3.5	6.8	100	68.3	1.1	6.3	8.0	9.2	7.0	100

^a AMEs refers to advanced market economies (OECD except Greece, Japan, Portugal, Spain, Turkey, Yugoslavia); JAP refers to Japan; CPEs refers to centrally planned economies; NICs refers to newly industrializing countries (Brazil, Greece, Hongkong, Rep. of Korea, Mexico, Portugal, Singapore, Spain, Taiwan, Turkey, Yugoslavia); OPEC refers to members of OPEC; LDCs refers to developing countries other than NICs and OPEC.

Table A3 - Components of Employment Change by Industry^a: Demand Labour Productivity and Imports, Federal Republic of Germany, 1965 to 1969 and 1969 to 1973

Industry	- 1965 to 1969 -				- 1969 to 1973 -			
	Employment	Demand	Labour Productivity	Imports	Employment	Demand	Labour Productivity	Imports
Continuous percentage rates								
Primary and intermediate goods ind	- 0.77	7.47	- 7.74	- 0.51	- 0.04	4.54	- 4.37	- 0.21
Stones and earthen goods ind.	- 3.75	2.58	- 6.00	- 0.33	1.03	6.13	- 5.06	- 0.06
Iron and steel ind.	- 2.26	7.11	- 8.42	- 0.94	- 0.92	1.65	- 2.38	- 0.18
Foundries	- 4.23	.	.	.	- 2.30	- 0.27	- 1.74	- 0.28
Cold rolling mills	- 0.99	.	.	.	- 0.80	2.75	- 2.56	- 0.99
Non-ferrous metal ind.	0.61	6.57	- 6.11	0.13	0.41	4.54	- 7.69	3.58
Mineral oil ind.	0.92	8.73	- 7.30	- 0.53	1.41	3.17	- 1.10	- 0.66
Chemical ind.	1.62	10.30	- 8.04	- 0.65	0.87	7.64	- 6.21	- 0.55
Sawmills and woodwork ind.	- 3.29	3.45	- 7.72	0.97	- 0.81	5.34	- 6.63	0.49
Pulp, paper, paperboard ind.	- 0.96	6.77	- 6.69	- 1.03	- 4.02	4.34	- 8.55	0.19
Rubber and asbestos manuf. ind	2.14	9.20	- 7.17	0.11	0.19	2.90	- 1.53	- 1.20
Capital goods ind.	0.76	6.25	- 4.96	- 0.54	1.24	5.77	- 3.59	- 0.92
Structural and light metal eng.	- 2.82	.	- 2.84	.	1.27	5.89	- 4.29	- 0.34
Mechanical eng.	0.99	5.44	- 4.02	- 0.42	- 0.93	0.95	- 1.89	0.00
Manuf. of road vehicles	2.15	7.56	- 4.78	- 0.62	2.76	5.00	- 1.10	- 1.14
Electrical engineering	1.06	8.22	- 6.47	- 0.67	1.72	9.08	- 6.34	- 1.03
Precision and optical goods, watches ind.	1.00	7.08	- 4.59	- 1.52	- 0.79	5.97	- 4.36	- 2.38
Steel processing, sheet and metal goods ind.	- 0.46	.	.	.	0.63	3.64	- 2.19	- 0.81
Office machines and data proc.	.	.	.	.	.	.	.	.
Consumer goods ind.	- 0.53	4.12	- 3.94	- 0.71	- 0.83	4.60	- 4.37	- 1.06
Fine ceramics ind.	- 2.18	.	- 6.38	.	- 0.65	3.74	- 1.80	- 2.61
Glass and glass prod. ind.	0.12	5.52	- 4.69	- 0.71	0.42	5.84	- 4.33	- 1.11
Woodwork man. ind.	- 0.13	3.97	- 4.29	0.18	2.96	9.57	- 5.89	- 0.72
Musical instr., toys, sporting goods ind.	0.16	4.64	- 3.37	- 1.13	- 2.53	1.13	- 1.61	- 2.02
Pulp and paper man. ind.	1.10	.	- 3.55	.	- 0.09	5.03	- 4.52	- 0.58
Printing and publishing	0.74	5.27	- 4.26	- 0.26	0.18	4.70	- 4.38	- 0.16
Plastics prod. ind.	5.56	14.45	- 7.49	- 1.39	5.78	13.01	- 6.62	- 0.61
Leather ind.	-15.40	- 6.65	- 3.65	- 5.07	- 9.94	- 7.37	1.23	- 3.80
Leather man. ind.	- 1.50	.	.	.	- 2.11	- 0.22	1.20	- 3.08
Shoe ind.	- 1.97	.	.	.	- 6.88	- 2.79	- 1.14	- 2.93
Textile ind.	- 1.84	3.28	- 4.52	- 0.62	- 3.94	1.56	- 3.94	- 1.55
Clothing ind.	- 1.03	1.69	- 1.36	- 1.37	- 1.51	4.37	- 3.44	- 2.44
Food, beverages, tobacco	- 0.50	3.70	- 3.88	- 0.31	- 0.26	3.62	- 3.54	- 0.34
Manufacturing	0.01	5.91	- 5.39	- 0.51	0.36	4.91	- 3.91	- 0.64

^aFor measurement concept see appendix.

Table A4 - Components of Employment Change by Industry^a: Domestic Demand^b, Labour Productivity and Net Trade, Federal Republic of Germany, 1969 to 1973 and 1973 to 1977

Industry	Employment	Domestic Demand ^b	Labour Productivity	Net Trade	Employment	Domestic Demand ^b	Labour Productivity	Net Trade
	- 1969 to 1973 -				- 1973 to 1977 -			
	Continuous percentage rates							
Primary and intermediate goods ind.	- 0.04	3.54	- 4.37	0.78	- 3.08	- 0.27	- 2.92	0.12
Stones and earthen goods ind.	1.03	6.14	- 5.06	- 0.08	- 7.84	- 4.95	- 3.68	0.79
Iron and steel ind.	- 0.92	0.41	- 2.38	1.06	- 1.96	- 2.70	- 0.44	1.15
Foundries	- 2.30	- 0.83	- 1.74	0.29	- 3.61	- 3.57	- 1.02	0.97
Cold rolling mills	- 0.80	1.16	- 2.56	0.60	- 3.40	- 3.07	- 2.40	2.07
Non-ferrous metal ind.	0.41	3.57	- 7.69	4.52	- 3.86	3.79	- 8.97	1.33
Mineral oil ind.	1.41	3.28	- 1.10	- 0.74	- 7.92	- 2.22	- 4.74	- 0.97
Chemical ind.	0.87	6.54	- 6.21	0.55	- 0.70	3.58	- 3.82	- 0.47
Sawmills and woodwork ind.	- 0.81	5.33	- 6.63	0.48	- 5.26	- 1.70	- 2.90	- 0.67
Pulp, paper, paperboard ind.	- 4.02	2.93	- 8.55	1.59	- 4.29	- 0.10	- 4.38	0.20
Rubber and asbestos manuf. ind.	0.19	- 2.54	- 1.53	4.25	- 5.02	- 3.54	- 1.48	0.02
Capital goods ind.	1.24	5.29	- 3.59	- 0.45	- 2.53	1.51	- 4.02	- 0.04
Structural and light metal eng.	1.27	6.36	- 4.29	- 0.80	- 3.40	- 8.17	0.86	3.92
Mechanical eng.	- 0.93	- 0.37	- 1.89	1.35	- 2.37	- 0.33	- 3.00	0.98
Manuf. of road vehicles	2.76	3.50	- 1.10	0.36	- 0.26	5.42	- 4.70	- 0.97
Electrical engineering	1.72	8.78	- 6.34	- 0.71	- 3.39	2.24	- 5.59	- 0.04
Precision and optical goods, watches ind.	- 0.79	6.12	- 4.36	- 2.56	- 2.18	5.14	- 5.12	- 2.20
Steel processing, sheet and metal goods ind.	0.63	2.94	- 2.19	- 0.13	- 3.54	0.00	- 2.96	- 0.58
Office machines and data proc.	.	.	.	.	- 7.08	6.07	- 9.91	- 3.26
Consumer goods ind.	- 0.83	4.16	- 4.37	- 0.61	- 4.83	0.27	- 4.84	- 0.26
Fine ceramics ind.	- 0.65	4.56	- 1.80	- 3.40	- 4.07	1.32	- 2.43	- 2.97
Glass and glass prod. ind.	0.42	6.56	- 4.33	- 1.82	- 4.70	- 1.08	- 4.24	0.61
Woodwork man. ind.	2.96	9.64	- 5.89	- 0.80	- 2.74	0.47	- 3.93	0.73
Musical instr., toys, sporting goods ind.	- 2.53	0.86	- 1.61	- 1.76	- 2.00	3.31	- 4.60	- 0.72
Pulp and paper man. ind.	- 0.09	4.58	- 4.52	- 0.15	- 3.54	- 0.57	- 3.48	0.51
Printing and publishing	0.18	4.72	- 4.38	- 0.19	- 3.96	- 0.54	- 3.77	0.35
Plastics prod. ind.	5.78	13.00	- 6.62	- 0.59	- 1.24	2.62	- 3.55	- 0.31
Leather ind.	- 9.94	- 9.04	1.23	- 2.14	- 8.26	4.87	-11.48	- 1.66
Leather man. ind.	- 2.11	0.26	1.20	- 3.58	- 3.82	3.65	- 4.73	- 2.72
Shoe ind.	- 6.88	- 2.80	- 1.14	- 2.94	- 6.99	1.26	- 3.77	- 4.46
Textile ind.	- 3.94	0.08	- 3.94	- 0.08	- 6.87	0.74	- 5.86	- 1.77
Clothing ind.	- 1.51	3.95	- 3.44	- 2.02	- 7.46	- 0.26	- 5.86	- 1.36
Food, beverages, tobacco	- 0.26	2.99	- 3.54	0.30	- 3.74	1.21	- 5.12	0.16
Manufacturing	0.36	4.62	- 3.91	- 0.34	- 3.25	0.69	- 4.05	0.09

^aFor measurement concept see p. 33 sq. - ^bApparent consumption.

Table A5 - Hypothetical Job Losses Attributable to Change in Net Import^a by Major Trading Region^b,
Federal Republic of Germany, 1973 to 1977

Industry	Region ^c						
	AMES	JAP	CPES	NICs	OPEC	LDCs	World
	(in per cent of 1977 employment)						
Primary and intermediate goods ind.	-12.29	- 1.54	0.89	5.42	7.02	- 0.17	- 0.67
Stones and earthen goods ind.	- 1.84	0.05	0.31	- 0.79	- 2.26	- 0.08	- 4.62
Iron and steel ind.	- 0.85	1.22	- 3.17	- 0.35	- 2.31	0.78	- 4.68
Foundries	- 1.83	0.02	- 0.16	- 0.23	- 1.64	- 0.37	- 4.22
Cold rolling mills	- 1.62	0.25	- 4.61	- 0.36	- 1.60	- 0.56	- 8.51
Non-ferrous metal ind.	- 2.95	0.35	- 0.77	- 0.79	- 0.37	- 1.20	- 5.73
Mineral oil ind.	2.01	0.00	0.61	- 0.12	0.13	0.28	2.92
Chemical ind.	- 0.85	- 0.15	0.45	0.70	1.12	0.64	1.90
Sawmills and woodwork ind.	0.15	- 0.02	1.70	- 0.48	- 0.23	1.15	2.26
Pulp, paper, paperboard ind.	- 1.19	- 0.03	- 0.02	0.00	0.03	- 0.00	- 1.21
Rubber and asbestos manuf. ind.	- 0.27	0.08	- 0.06	0.05	- 0.26	- 0.17	- 0.62
Capital goods ind.	0.01	- 0.00	0.00	0.00	0.02	0.01	0.03
Structural and light metal eng.	- 1.51	0.02	- 3.28	- 1.51	- 7.86	- 1.32	-15.46
Mechanical eng.	- 0.64	0.09	- 0.69	- 0.32	- 1.87	- 0.65	- 4.08
Manuf. of road vehicles	1.78	- 0.13	0.05	- 0.05	1.88	0.41	3.95
Electrical engineering	- 0.01	0.01	- 0.01	0.00	- 0.05	- 0.01	- 0.06
Precision and optical goods, watches ind.	2.91	-26.23	4.18	0.53	20.17	7.66	9.21
Steel processing, sheet and metal goods ind.	1.49	- 0.31	- 0.90	0.12	1.40	0.27	2.07
Office machines and data proc.	13.80	2.19	- 0.27	0.62	- 2.64	- 0.10	13.60
Consumer goods ind.	- 0.48	0.06	0.15	0.85	- 0.29	0.33	0.62
Fine ceramics ind.	22.64	- 0.59	- 3.71	12.46	-16.21	- 2.02	12.57
Glass and glass prod. ind.	- 2.53	- 0.14	0.66	0.13	- 0.74	- 0.37	- 2.99
Woodwork man. ind.	- 3.31	- 0.03	1.50	0.68	- 1.99	0.03	- 3.12
Musical instr., toys, sporting goods ind.	-18.80	2.10	3.61	13.18	- 3.41	6.19	2.87
Pulp and paper man. ind.	- 1.69	0.03	- 0.27	0.20	- 0.45	- 0.16	- 2.34
Printing and publishing	- 1.43	- 0.01	- 0.12	- 0.00	- 0.09	- 0.09	- 1.75
Plastics prod. ind.	0.53	- 0.09	0.12	0.18	0.40	0.08	1.21
Leather ind.	2.61	0.77	- 0.23	2.81	- 0.15	0.04	5.85
Leather man. ind.	4.12	0.19	1.47	4.35	- 0.22	1.54	11.45
Shoe ind.	12.19	- 0.01	1.06	6.04	- 0.21	0.32	19.38
Textile ind.	- 0.86	1.06	- 0.52	5.64	- 2.15	3.59	6.76
Clothing ind.	- 1.14	- 0.06	3.79	0.86	- 0.15	1.48	4.78
Food, beverages, tobacco	- 0.48	- 0.07	0.13	- 0.05	- 0.39	- 0.09	- 0.95
Manufacturing	- 0.14	0.06	- 0.05	- 0.00	- 0.37	- 0.07	- 0.57

^aChange of share of turnover in turnover plus imports minus exports between 1973 and 1977. Positive (negative) figures indicate hypothetical job losses (gains). - ^bFor measurement concept see p. 33 sq. - ^cAdvanced market economies (AMES), Japan (JAP), centrally planned economies (CPES), newly industrializing countries (NICs), oil producing and exporting countries (OPEC), less developed countries (LDCs).

Source: See Annex III, (9), (11), (13), (14).

ANNEX III

Statistical Sources

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