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ASSESSING STRUCTURAL CHANGE: THE CASE OF AUSTRIA

by

Dalia MARIN

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BADIA FIESOLANA, SAN DOMENICO (FI)

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European University Institute
Badia Fiesolana
- 50016 San Domenico (Fi) -
Italy

1. Austro-Keynesianism and structural change

The internationally highly-approved successes of Austrian economic policy during the 1970s are attributed by academic observers to the Austrian system of economic and social partnership and to the intervention model of Austro-Keynesianism, used in economic policy for macro-economic control. The control concept of Austrian-Keynesianism is based on a simple but unusual combination of goals and instruments. A threatened speed-up in inflation is opposed through an incomes policy which along with nominal wage guidelines builds on an exchange-rate arrangement oriented towards import stability. To avoid unemployment, in turn, threatened set-backs to growth are moved against through an expansion-oriented fiscal policy. The economic partners guarantee adequate wage and price discipline, which makes it possible for the government to use budget policy to help to guarantee full employment, while the National Bank wards off inflationary impulses from the world economy through a revaluation policy[1].

Austro-Keynesianism as an economic policy model has most recently come under suspicion of having structurally conservative effects. According to academic and economic policy critics, macro-economic stability had to be bought at the expense of delaying structural change in the Austrian economy (Tichy (1979) (1982), Abele/Rothschild/Tichy/Winkler (1984), OECD (1985)). While the structure-constraining consequences of corporatist forms of co-operation are controversial, there seems to be broad agreement that Austro-Keynesianism has effects of braking structural change[2]. The following structure-restraining effects are ascribed to the various individual economic policy instruments:

- The revaluations of the schilling against the currencies of the trading partners bound up with the use of exchange-rate policy to stabilize domestic price levels are alleged

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to lead to losses of profitability in the sector exposed to international competition. The narrower prospects in the exposed sector by comparison with the protected one allegedly bring about a reallocation of resources in favour of the protected and less productive sector, damping the productivity growth of the economy as a whole (Hochreiter (1980), Sitz (1981), Tichy (1985)).

- The awarding of additional public contracts bound up with the use of the government budget to close the full employment gap is alleged to restrain structural change by hindering the bankruptcy of inefficient firms through adequately guaranteed demand and failing to provide sufficient pressure to adapt (Tichy (1986a), but Nowotny (1985)).

- The government's implicit promise to guarantee employment by covering firms' losses in the form of subventions is alleged to set off "moral hazard behaviour" in the firms concerned, bringing about incentives to opportunistic behaviour (Abele/Rothschild/Tichy/Winkler (1984))[3].

Empirical studies on the structural effects of both exchange rate and budget policies available to date seem not to support these industry policy objections to Austro-Keynesianism (Breuss (1984), Handler (1985), Marin (1985), (1986a, 1986b)). However, no unambiguous conclusions can be drawn as to the dynamic efficiency of the public subvention system, which is interpretable as an implicit insurance contract between government and the business sector, for lack of empirical studies. Theoretically, though, a structure-promoting effect of such an insurance system would be just as likely, as the insurance that Austro-Keynesianism offers through fiscal policy for risky and innovative investment activity provides encouragement, since part of the risk is absorbed by the State (Wagner (1984))[4].

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By contrast, empirical studies on the effect of exchange-rate policy on structural change suggest that the revaluation policy not only does not hinder structural adaptation in Austrian industry but has even accelerated it, through the following two mechanisms. Firstly, the exchange-rate revaluation brought about intensified competitive pressure on the exposed sector, promoting the introduction of cost-saving modern technologies and compelling organizational changes reflected in an increase in productivity in all branches of industry except for the machinery and steel industries. Secondly, most branches of industry sought successfully to immunize themselves against likely future revaluations through improved product quality and superior product design, so that price elasticity in exports fell during the 70s. This exchange-rate-induced structural reorganization was further favoured because exchange-rate revaluations in the short term increased cash flow in the exposed sector via direct cheapening of imported input products with export performance unchanged in the short term, giving industrial firms financial room to manoeuvre in technical and organizational innovations. The exchange-rate policy of Austro-Keynesianism in this way contributed to an acceleration of productivity growth in the exposed sector, and through improved qualitative competitivity, to modernizing the structure of the Austrian economy (Marin (1983, 1985, 1986a)).

Just as structural change in the exposed sector was accelerated through exchange-rate policy, so structural dynamics in the protected sector proves to have been encouraged by the budget policy of Austro-Keynesianism. This is suggested by a study on productivity growth in the construction industry (Marin (1986b)). For various reasons the construction industry is suitable for analysing the structural effects of fiscal policy. The construction sector represents one of the most important branches of the protected sector of the Austrian economy, in which, moreover, government has

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a demand monopoly (up to 60% of construction is commissioned by public sources). In addition, fiscal policy, in applying the budget as a short-term economic policy instrument, uses the construction industry in particular, by giving out additional public contracts (89% of all public investments are construction investments), since public construction investments have the highest multiplier effects and therefore the highest self-financing proportion (Christl/Maurer (1984)). The dynamics of productivity in the construction industry were promoted by Austro-Keynesianism's fiscal policy in two respects.

Firstly, government as the most important provider of orders for construction firms acted on the construction industry through the Verdoorn relationship, improving productivity[5]. With a value of 1.04 for the Verdoorn co-efficient, the effect of construction production on construction productivity was particularly marked. Threatened falls in demand were opposed by issuing more public contracts to the construction industry, which induced the firms not to cut their production back accordingly. Public demand for construction, as a compensation for absence of private contracts, thus already favoured productivity through guaranteeing full use of construction capacity. Additionally, the maintenance of the production level made possible by public contracts could bring about increasing economies of scale, which have a particularly important role in the construction industry.

Secondly, budget policy, through its publicity effect on the investment behaviour of construction firms, influenced the level of the Verdoorn co-efficient in the construction industry. This became particularly clear during the break with the Austro-Keynesian concept through the priority of budget consolidation in 1981, which caused construction firms to adapt to the changed framwork conditions of economic policy.

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This led to a leap upwards in the Verdoorn co-efficient, and so to a structural break in the growth trend in construction productivity in 1981. For the announcement of budget tightening and the resulting lessening trust in high utilization of capacity drove firms to a drastic adjustment of their capital stock, which led, through the decline in growth of capital stock per employee, to a slow-down in productivity. This indirect productivity-damping effect of a decline in construction production through investment and capital stock growth had the result that a decline in output damped construction productivity following 1981 much more than had been the case in the previous period. In this way, the turn away from Austro-Keynesianism that set in after 1981 in fiscal policy, with the lessening in public demand for construction and the changed effect on firms' investment behaviour, contributed largely to the decline in construction productivity growth by 44% on average for the years 1981-84 by comparison with the period from 1964-80 (Marin 1986b).

The studies adduced suggest that both the exchange rate and the budget policy of Austro-Keynesianism provided structurally accelerating influences for both the exposed and the protected sector of the Austrian economy. Austro-Keynesian currency and fiscal policy thus contributed to the fact that the Austrian economy showed (after Japan) one of the highest productivity growth rates in the Western world.

While accordingly Austro-Keynesianism can on the basis of empirical findings available to date be regarded as having structurally accelerating rather than structurally damping effects, the question arises whether structural weaknesses in the Austrian economy can in fact be identified. This question will be dealt with in the following section on the basis of the structural report of the Austrian Institute of Economic Research and the OECD Country Report (1985), which use a

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theoretically controversial system of indicators to describe structural change in the Austrian economy. The weaknesses of this system of indicators is exemplarily shown on the basis of structural change in the Austrian textile industry, which as a traditional consumer goods industry managed to modernize largely without R & D expenditure of its own and thereby successfully oppose international competition. This technical advance without R & D is analysed in Section 3. A concluding section draws industry policy conclusions generalizable to the whole of Austrian industry.

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2. Popular criteria for measuring structural change

In their assessment of the Austrian economy, both the structural report of the Austrian Institute of Economic Research (1985) and the OECD's report (1985) point, among other things, to the following structural weaknesses in the Austrian economy.[6]

"Share and Shift": Austria is said, by comparison with other Western industrial countries, to have too high a proportion of basic-sector and traditional consumer-goods industries and too small a proportion of manufacturers of technology-intensive final goods. The structure of Austrian industry is therefore said to look more like that of a developing country than a Western industrial country. Additionally, the rate of Austrian industry's development in the direction of high-value final products is said to have declined recently. It is assumed here that every country goes through similar phases of structural development.
The rate of structural change is therefore determined by how closely the Austrian production structure had come to resemble that of highly developed Western industrial countries between two points in time. The departures of Austrian output structure from a "reference structure" defined in this way are taken to point to the structural problems of the Austrian economy.

"High-tech versus traditional products": The industrial structure is alleged to be reflected in the composition of Austrian foreign trade by types of goods. Austria is said to be a net exporter of primary-sector goods and semi-finished products and a net importer of technology-intensive investment goods. The RCA values calculated suggest that Austria has comparative advantages above all for consumer goods, industrial semi-finished goods, iron and steel and in some areas of technical finished goods (industrial machines, other machines and means of transport, technical household

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goods) (Schulmeister (1985), Survey 4). This pattern of specialization in industrial semi-finished products in foreign trade is said to make the Austrian economy's technical backwardness clear.

"Research intensity": The low innovative potential of Austrian industry, and the inadequate capacity of Austrian firms to keep up in areas with rapid technical progress, is alleged to be expressed in low research and development expenditure. At 0.65%, research expenditure in the business sector in 1979 was in one of the last places by comparison with other industrial countries. The poor technological dynamics is alleged to emerge also in the passive technological balance of payments and in trade in technology-intensive products. Austria is said to be a net importer of patents and licences and of technology-intensive products.

A more complex view

These characteristics of Austrian industry, brought forward in the ~~structual~~ industrial policy debate as weaknesses, can however be interpreted in a different fashion. This will be attempted below.

On "share and shift": The "share and shift" analysis used by the Austrian Institute of Economic Research and the OECD to assess structural change is problematic for several reasons. It presupposes an "iron law" in the evolutionary process of the structural development of a country, for which empirical verification is still lacking. If instead one does not accept the thesis that similar production structures are to be expected in countries of comparable levels of development, then there is no reference point to base evaluations of shifts in a country's output structure on. Is, for instance, a faster contraction of the proportion of traditional consumer goods industries by comparison with other Western industrial countries an indication of a successful structural change, or does it instead indicate that these industries could not cope with international competition and were therefore forced to contract?

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The economic performance of an industry can be assessed only on the basis of market results. Thus, the "market-structure-conduct-performance-paradigm" of industrial economics suggests the following criteria for assessing the economic success of an industry: profitability, efficiency and market-share growth. If these criteria are applied to branches of Austrian industry, then the traditional consumer-goods industries come out best (Table 1). Between 1964 and 1984 they showed the highest cash flow and reasonable gains in market share, while productivity increases held pace with the industry average. By contrast, the basic sector showed the least favourable productivity development, and technically processed products the lowest gains in market share, while the chemical industry had the relatively least favourable profitability[7].

If one absolutely insists on drawing up a ranking of branches of industry, then on the basis of these criteria it would look like this: tradional consumer goods, chemical products, investment goods and technical goods and goods in the basic sector. The smaller contraction process of traditional consumer goods industries and some industries in the basic sector in Austria by comparison with other Western industrial countries, so often complained of, would then appear to be an expression of superior economic viability and not of an insufficiently rapidly advancing adjustment process.

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Table 1

Market results of branches of Austrian industry

Industry	cash flow		productivity[5] annual average change, %		Austria's market share in world trade, %	
	1965-74	1974-84	1973-81	1964-84	1973	1983
Basic sector[1]	24.7	20.4	0.1	3.2	0.72[6]	1.09[6]
Chemicals	28.3	19.5	5.5	6.7	0.83	1.07
Investment goods and technically processed products[2]	20.2	23.5	3.1[3]	4.4[3]	1.04[3]	1.06[3]
Traditional consumer goods[4]	25.0	25.8	4.0	4.2	2.18[7]	2.51[7]
Industry overall	24.7	21.9	3.5	4.6	0.92[8]	1.07[8]

Source: OECD (1985), WIFO

Notes:
1. Mining, petroleum, non-ferrous metals, foundries, paper production.
2. Machines, vehicles, iron and metal goods, electrical industry.
3. Technically processed products.
4. Textiles, clothing, paper processing, foodstuffs.
5. Output per employee.
6. Non-ferrous metals.
7. Textiles.
8. All goods in real terms at 1973 prices.

On "high-tech versus traditional products": Drawing conclusions from the commodity structure of foreign trade to the level of technological development of a country means assuming a ranking among industries, with high-tech products at the top and products of traditional industries somewhere low down. This ranking is based theoretically on the thesis of the "new international division of labour" and on the product cycle model. According to this theory, in Western industrial countries only modern and

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new industries are supposed to have chances of survival, while traditional industries migrate to developing countries. A country with a high proportion of traditional goods in its commodity structure would then be threatened by low-wage countries and thus have to face considerable structural problems.

This diagnosis is, however, only partly accurate, as Section 3 seeks to establish empirically on the basis of the Austrian textile industry, and as recent developments in international trade theory also suggest[8]. For besides inter-industry specialization there is also intra-industry specialization in international trade (more than 60% of world trade), which can be explained in the following way. The industrial structure of a country developed historically. With the emergence of new competitors from low-wage countries part of production migrates to developing countries. The process of contraction in the basic sector and tradional consumer goods industries is in part an expression of this decline in Austria's specialization in these areas (inter-industry specialization)[9]. The remaining proportion of these industries in Austria is specialized on the basis of the possibility of product differentiation and the existence of increasing economies of scale within those industries (intra-industry specialization). These industries might produce a multiplicty of possible products. Each of these potential products is manufactured under conditions of increasing economies of scale, that is, increases in output can considerably lower production costs. To be able to enjoy increasing economies of scale, however, the proportion of these industries remaining in Austria will choose only a limited number out of the range of possible products. Instead of offering all the products demanded on the home market at a low level of output, a limited number of these products will be manufactured at a higher output level. The rest will be imported.

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Specialization in these products on the one hand allows supply to the domestic market and on the other opens up export opportunities since the same industries in other countries decide on other varieties of these products, on the basis of a similar calculation.

This intra-industrial specialization based on economies of scale among countries with similar factor endowment, which gave intra-industry trade increasing importance in the 70s and 80s, no longer, as on the basis of the product cycle model, allows an unambiguous ranking of "successful" high-tech products and "unsuccessful" traditional products. The distinction assumed by WIFO* and OECD between "technology-intensive" and "technology-poor" goods is no longer an adequate criterion for evaluating structural adjustment. A commodity is as good as it proves to be on the market, irrespective of whether it is high-tech or a traditional product. The continuing high proportion of traditional consumer goods and basic-sector goods among Austrian exports may thus indicate successful intra-industry specialization and not structural backwardness.

On "research intensity": The level of research and development expenditure is not necessarily an adequate indicator of a country's openness to innovation. Technical progress and the associated modernization of the economy can be achieved along many lines. For a country like Austria with a medium level of technological development, importing technical progress represents a rational solution and alternative to its own research (note Austria's middle position in productivity level by comparison with other Western industrial countries in Table 2). Models of international diffusion suggest that countries with a middle level of technology are natural candidates for technology transfer from technologically higher developed countries. The technology

*Austrian Institute of Economic Research. ./.

gap points to the productivity potential available in a given country. The technology gap between Austria and the surrounding Western industrial countries is on the one hand sufficiently large for considerable productivity gains to be obtainable through importing technology and know-how. On the other hand, the Austrian economy has already gained a sufficiently high level of technology for it to be able to take up the imported innovation itself and apply it[10]. The relatively low R & D expenditure by comparison with other Western industrial countries and simultaneous net importing of patents, licences and technology-intensive investment goods indicate that Austria has successfully pursued an import-led growth strategy, as is confirmed by its having the highest productivity growth rate after Japan (Table 2). Participation in foreign research by purchasing foreign patents and licences, and the importing of technical know-how as a "free good" in the form of investment goods, reduced the requirement for internal R & D, thus making possible rapid modernization of the Austrian economy at relatively low cost. The low R & D expenditure thus seems to point to a choice in favour of rational modernization rather than to a reluctance by the Austrian economy to innovate[11].

Table 2

Industrial productivity in international comparison

	Productivity level			1964 -1981[2]
	1970	1973	1981	average annual change,
	USA = 100[1]			%
Japan	49	52	79	6.7
Germany	81	77	89	2.9
France	84	81	96	3.5
Great Britain	42	41	39	2.2
Italy	66	62	72	3.3[3]
Austria	66	62	76	4.2
USA	100	100	100	2.6

Source: OECD (1984), and author's calculations

1. Output per employee at 1975 prices and exchange rates expressed as a percentage of Us productivity level.
2. hourly productivity.
3. 1964/80.

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The scepticism expressed about the concepts "share and shift", "high-tech versus traditional products" and "research intensity" as criteria for assessing structural change is empirically supported from a consideration of the Austrian textile industry. As one of Austria's most important consumer goods industries, it managed to modernize largely without R & D of its own, and to cope successfully with international competition through intra-industrial specialization. How that was brought about will be the subject of the next section.

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3. EMPIRICAL EVIDENCE: THE AUSTRIAN TEXTILE INDUSTRY

The 70s and early 80s were characterized by radical changes in the textile industry. Between 1970 and 1983 employment shrank by 43% and productivity rose 70%, while the industry's output stagnated. Over the same period, 30% of textile firms went bankrupt. By introducing labour-saving automation and modernizing its capital stock, the Austrian textile industry, by contrast to that of many other Western industrial countries, managed to maintain its level of output (Table 3)[12].

Table 3

Change in the textile industry

	Industry output 1981=100	Employment	Productivity 1981=100
1970	88.8	66.965	59.9
1983	86.8	38.202	100.3

	Number of plants
1971	714
1984	499

Source: IHS-Database, Austrian Textile Industry Association.

Intra-industrial specialization

With liberalization of trade, the Austrian textile firms came under massive foreign competitive pressure. The import ratio rose from 0.46 in 1970 to 0.91 in 1983; over the same period the export ratio rose from 0.43 to 0.84 (table 4). Competition from the developing countries played

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a comparatively subordinate role in this. African and Asian firms had a share of only 9.5% in total Austrian textile imports. The most important competitors of the Austrian textile firms on the home market came from Western industrial countries, in particular Germany, Italy and Switzerland. Their share in textile imports was almost 70%. On foreign markets too, Austrian textile firms were competing primarily with firms from Western industrial countries. Among the most important export markets were the Federal Republic of Germany, Switzerland, Britain, France and Italy. Their share in total Austrian textile exports amounted to around 60% (Table 5). This competitive pattern - concentration of Austrian foreign trade in textiles on the Western industrial countries - is not in line with the "new international division of labour", according to which the textile industries in the Western industrial countries are threatened above all by competition from low-wage countries. This pattern in foreign trade in textiles points to the following change in the dynamics of foreign trade.

Firstly, the liberalization of trade and the emergence of new competitors from low-wage countries led to a decline - albeit comparatively slight - in Austria's specialization in textiles (inter-industry trade), reflected in the slight deterioration in the textile trade balance deficit in the second half of the 1970s (Table 4).

Secondly, competition from the Western industrial countries induced specialization inside the Austrian textile industry, making intra-industry trade in all of the groups of textile goods indicated in Table 6 increase. This specialization inside the Austrian textile industry led to losses of home market shares and gains in shares on foreign markets. Between 1970 and 1979 the Austrian share in the OECD textile market rose by 17% (Table 4).

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Table 4

Foreign trade in textiles

	1970	1983
Export ratio	0.43	0.84
import ratio	0.46	0.91
textile trade balance in 1000 AS	-712.4[1]	-997.5[2]
Austrian share in OECD market,%	2.4	2.8[3]

Source: OECD, IHS-Database, Austrian Textile Industry Association.

1. Ø 1970-76
2. Ø 1977-83
3. 1979

Table 5

International competition for the Austrian textile industry

Countries	Import competition share in textile imports		Export competition share in textile exports	
	1971	1983	1971	1983
Germany	34.3	39.3	16.4	27.8
Italy	6.6	17.4	1.1	4.4
Belgium	2.1	2.8	0.9	1.7
France	3.7	4.0	0.6	4.5
Great Britain	11.2	2.3	20.0	9.7
Switzerland	23.0	12.1	18.3	11.7
EFTA[1]	39.7	14.5	57.8	19.2
EEC[1]	49.7	69.9	20.0	54.3
West.Europe	2.4	2.7	5.6	7.5
Asia	5.9	8.4	4.2	4.3
Africa	0.1	1.1	2.9	10.6
USA	0.6	0.9	2.6	1.4

Source: Austrian Textile Industry Association.

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This pattern in Austrian foreign trade in textiles cannot be explained by the traditional theory of comparative advantage (Heckscher-Ohlin). According to this theory the dynamics of the Austrian textile trade would be as follows. Trade in textile goods would take place primarily between Austria and countries with a different factor endowment. As part of this, Austrian demand for textile products would be met particularly by textile firms from developing countries, which because of lower wage costs would have a comparative advantage. The loss in comparative advantage vis-à-vis low-wage countries would set off a steady rise in textile imports from those countries with a simultaneous decline in Austrian textile exports, along with considerable deterioration in the Austrian textile trade balance.

In fact, however, the major share in foreign trade in textiles took place between Austria and countries with a similar factor endowment. In contrast to the hypothesis of the theory of comparative advantage, the rise in import competition from Western industrial countries went hand in hand with a sharp rise in Austrian textile exports. There was reciprocal exchange of textile goods of similar types between Austria and countries with a similar factor endowment (intra-industry trade), not causing the Austrian trade balance to show any particular tendency towards deterioration (Table 4 and Table 6).

The Austrian textile industry thus impressively confirms that it is not threatened by a move to the developing countries. It managed, through product differentiation to achieve intra-industry specialization, and in so doing was not compelled to contract as severely as some textile industries in other Western industrial countries (see OECD 1983). The Austrian textile industry thereby shows a foreign trade dynamic of the kind described in recent international trade theory with monopolistic competition, product differentiation and increasing

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returns to scale (see Helpman/Krugman (1985)).

Table 6

Intra-industry trade in individual groups of textile goods (in %)

Type of goods	Ø 1969-71	Ø 1976/78
Yarn and thread	67.10	83.13
cotton fabric, standard type, apart from tapes and special fabrics	92.20	95.72
other fabric, standard type, apart from tapes and special fabrics	91.89	93.65
Tulle, lace, embroidery, ribbons, trimmings and other haberdashery	21.43	26.09
special fabric and related products	82.67	93.78
other textile finished products, apart from garments or shoes	76.22	81.75

Source: Breuss, (1983)

Technical innovation without R & D

The Austrian textile industry achieved this intra-industry specialization by modernizing its capital stock and introducing labour-saving techniques. Between 1970 and 1982 the value of invested capital per employee rose from 193,600 AS to 361,000 AS. This above-average increase in capital intensity mainly reflected the dramatic decline in employment. Real capital stock over the same period, with average growth at around 1%, had grown slower than the average for the whole of industry (Table 7).

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Table 7

Capital stock and capital intensity

	Textile industry		Industry	
	Capital stock in mill.AS (P=1964)	Capital intensity in 1000 AS (P=1964)	Cap. stock in mill. AS (P=1964)	Cap.intensity in 1000 AS (P=1964)
1970	12.962	193.6	155.360	247.0
1982	14.863	361.5	263.049	451.2
	average annual change, %			
Ø 70/82	1.1	4.9	4.1	4.7
Ø 64/82	1.4	4.5	4.2	4.6

Source: IHS-Database

Technical progress in the Austrian textile industry was characterized by one special feature: it was imported from abroad. The massive automation of the production process that set in after 1975 was achieved by importing technical innovations from abroad in the form of technical installations, patents and licences and of research contracts to foreign firms[13]. Thus, the share of textile machine imports in the textile industry's capital formation had steadily risen, reaching its culmination in the second half of the 1970s and early 1980s. In 1980, the degree of foreign diffusion was 100% (Table 8). The most important suppliers of textile machinery were from Germany, Switzerland and Italy. In the course of the 1970s, however, Japanese and French textile machinery manufacturers gained importance, while Britain lost weight as a supplier of textile machines (Table 8). The Austrian textile industry thereby managed to achieve its modernization via two mechanisms. Firstly, through a steady increase in the

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proportion of technology imports from countries with a higher degree of technological development in total textile investments. Secondly, through a shift in the structure of textile machine suppliers in favour of those with advanced technical know-how, reflected in the shift in the country structure of textile machine imports in favour of countries with a higher level of technological development.

Table 8

Import of innovation

	1965	1971	1980	1983
Degree of foreign diffusion[1]	63.1	66.4	99.9	87.6

Countries of origin of textile machine imports

	1965 share in percent	1984
Germany	48.3	52.8
Switzerland	19.3	19.3
Italy	5.7	9.7
Japan	0.7	4.1
France	3.1	3.6
USA	6.4	2.6
Great Britain	9.1	2.0
Others	7.4	6.0

Source: Austrian Central Statistical Office, Austrian Textile Industry Association, own calculations.

1. Percentage share of imported textile machinery in fixed investments in the textile industry.

The import of foreign innovations lessened the need for domestic R & D. Buying technology from abroad gave the textile industry the technical know-how as well, as a kind of "free good". This behaviour as a "free rider"

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on foreign R & D allowed the textile industry to cut down its own R & D activities without suffering losses in its modernization process. The level of expenditure on R & D is therefore not necessarily an indicator of an industry's openness to innovations. The textile industry traditionally tends, despite above-average productivity growth, to show relatively low R & D intensity by comparison with industry as a whole. In 1978 the share of R & D expenditure in annual turnover was 1.1, as against a research co-efficient for industry as a whole of 2.0 (Table 9). A notable point here is that in the period of most intensive modernization the textile industry tended to reduce its R & D activities and increase its participation in foreign research. Thus, the textile industry's research co-efficient fell from 1.3 in 1975 to 1.1 in 1978 and a mere 0.9 in 1981. Over the same period the proportion of foreign technology imports in textile industry investments rose from 69.1% to 99.9%. The low importance of the textile industry's own R & D in a phase of very heavy re-structuring is dramatically reflected in patent behaviour. In 1970 the Austrian Patent Office recorded 321 patent issues to the textile industry, and in 1984 only 14 (Table 9).

Table 9
Innovation without R & D

	R & D[1]		
	Textile industry	industry	patents granted
1972	0.5	1.4	321[2]
1975	1.3	1.7	307[3]
1978	1.1	2.0	20[4]
1981	0.9	2.2	14[5]

Source: Federal Chamber of Industry and Commerce, Austrian Patent Office

1. Research co-efficient: share of R & D expenditure in annual turnover
2. 1970
3. 1974
4. 1983
5. 1984

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.. The competitive strategy chosen varied according to size of firm. Where they did research at all, it was small textile plants that were most intensive in research. In the textile industry, R & D intensity fell with increasing size of firm (table 10). The decrease in R & D with increasing size of firm may be explained by the greater ease for medium and large sized firms to import technical progress, making the larger firms less dependent on their own R & D. The technologies imported from abroad were mainly process innovations, for which the small firms were size constrained.

Purchase of such process innovations may have been profitable only above a certain minimum size. This restriction in exploiting economies of scale by small and smaller medium-sized firms can also be seen by looking at productivity against firm size (Table 10). In order to remain competitive, these textile firms had to go in more for product differentiation, which they by contrast with the medium and large sized firms sought largely to achieve through their own R & D. The big firms by contrast based their competitive strategy on the massive use of foreign process innovations and the exploitation of economies of scale, which allowed them to secure corresponding gains in productivity. The most favourable situation was no doubt that of medium-sized firms with between 100 and 999 employees, for which both strategies were open. On the one hand they had reached sufficient size to be able to obtain appropriate returns to scale while not being economically restricted from importing foreign technical progress. These firms showed the highest productivity levels by comparison with their bigger and smaller competitors. On the other hand they were sufficiently small to be able to react flexibly and quickly to market changes. Accordingly, these firms too based their product design more on import of innovation than on R & D of their own (Table 10).

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Table 10

Competitive strategy by firm size

	textile firms with... employees			
	0-99	100-499	500-999	1000 or more
Efficiency by firm size[1]	123.786	144.775	152.119	142.888
R & D by firm size[2]	2.1	1.2		0.7[3]

Source:
Austrian Industry Association, Federal Chamber of Trade and Industry.

1. Net value of output per employee in AS in 1976
2. Research co-efficient: share of research and development expenditure in annual turnover, as a percentage, in 1981
3. Textile firms with more than 500 employees

This choice by the Austrian textile industry of importing innovation as a modernization strategy seems to have been economically advantageous, as econometric estimates of the quantitative effect of the import-led growth strategy in the textile industry show[14]. The import of innovation contributed on the one hand to a considerable acceleration of productivity growth and on the other opened up new possibilities in product design, which were required in order to achieve intra-industry specialization. This import-led product differentiation led to a reduction in the export price elasticity of Austrian textile products from - .23 to - .11. A 1% increase in technology diffusion from abroad through increases in the share of imported textile machinery in total textile investments and/or through shifts in the structure of capital-goods imports in favour of countries with a higher level of technological development increased productivity growth in the textile industry by .36%. Import-led process innovation contributed approximately as much to the textile industry's productivity growth as did capital intensity.

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Additionally, the various econometric tests for parameter stability suggest that the productivity gains from the import-led growth strategy have increased in the second half of the 70s and early 80s. The higher productivity gains opened up by imported innovation thus seem to explain the shift from domestic R & D towards import of technical progress from abroad in the course of the 1970s.

This reallocation from home R & D in favour of importing foreign R & D was not inconsiderably favoured by the revaluation policy in the 1970s, which made the import of innovation more profitable than domestic R & D. The exchange-rate-induced rise in the relative profitability of importing R & D came about through the following mechanisms.

In the first place, the revaluation policy brought about competitive pressure that forced Austrian textile firms to rapid rationalization and modernization, by making Austrian textile exports more expensive relative to foreign competition and lowering prices of textile imports on the home market. The pressure to relatively rapid action favoured the purchase of ready-made solutions as against more time-consuming solutions of their own.

Secondly, the continuous revaluation of the schilling reduced the costs of foreign technology imports, making technology transfer into an option and an alternative to R & D of their own even for smaller textile firms, otherwise under economic constraints in respect of the import of innovation.

How successful the Austrian textile industry was with the strategy described is shown by the growth in profit-rate and in own-capital ratio. The textile industry, by contrast with industry as a whole, did not have to accept any decline in own-capital ratio, and was able considerably to improve its relative profitability in the early 80s. While in the 1970s it still showed a lower profit rate

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than industry as a whole, this relation was reversed by the early 1980s (Table 11). The success of the adjustment that took place in the 70s thus showed up in the early 1980s.

Table 11

Market performance: profit rate and own-capital ratio

	Textile industry	Industry
	Profit rate	
Ø 1970/79	3.2[1]	4.8
Ø 1980/82	4.8[1]	4.2
	own-capital ratio[2]	
1970	36.2	37.3
1980	35.5	19.2

Source: WIFO (Bayer 1977, Hahn 1982)

1. Textiles, leather and clothing
2. Capital stock plus reserves less reserves for termination-of-service payments as a percentage of balance-sheet total.

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4. CONCLUSIONS FOR INDUSTRIAL POLICY

The experiences of the textile industry allow the following generalizable conclusions to be drawn for industrial policy.

Firstly, traditional industries can, through intra-industrial specialization and modernization of capital stock, successfully combat international competition and thus secure above-average profitability. They are therefore not necessarily threatened by movement away towards low-wage countries. A high proportion of these industries in a country's manufacturing structure is therefore insufficient proof of failure to achieve structural change.

Secondly, modernization and restructuring need not necessarily take place through domestic R & D. The example of the Austrian textile industry makes it impressively clear that process and product innovation can succeed through importing technology from abroad, securing price competitiveness and making intra-industry specialization possible. High R & D expenditure is therefore not a reliable indicator of a country's openness to innovation. The choice between domestic research or buying foreign research is based on an economic assessment that in future too may turn out in favour of an import-led growth strategy.

Footnotes

1. On the interpretation of the model of Austro-Keynesianism see Wagner (1984), and for further interpretations Scharpf (1984), Seidel (1982), Tichy (1982), (1983). On the agreement between the self-perception of economic policy decision makers and their observable behaviour see Marin/Maurer/Wagner (1984).

2. On the structural effects of social partnership see Czada (1983), Matzner (1984), Streeck (1981), Streissler (1976).

3. On the structure-conserving aspects of the Austrian system of investment promotion see Tichy (1980), Szopo/Aiginger/Lehner (1985).

4. This "socialization " of risk is partly adduced to explain Japan's economic success; see Hadley (1983).

5. The Verdoorn relationship assumes that productivity is determined by the level of production.

6. The theses on the structural weaknesses discussed below are not complete.

7. The depressed profitability of the chemical industry was contributed to fairly largely by the revaluation policy of the 1970s. In contrast to other Austrian industries, foreign demand reacted fairly sharply to the exchange-rate-induced increases in prices of Austrian chemical products; see Marin (1986a).

8. On the theory of foreign trade with monopolistic competition and increasing returns to scale, see Helpman (1984), Krugman (1980); for the industrial policy implications see Helpman (1986), Flam/Helpman (1985).

9. The slow-down in the contraction process observed most recently more likely points to the end of the phase of inter-industry specialization than to a slow-down in structural change.

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10. On the diffusion models see Gomulka (1979), Gomulka/ Sylwestrowicz (1976), Findlay (1978) and Rodriguez (1985); for a description of technology transfer under MITI control as Japan's modernization strategy see Kosobud (1973).

11. On the import of technical progress as Austria's technology strategy see Rothschild (1984), Steindl (1977, 1982) and Tichy (1986b), who regard this modernization strategy as no longer available for the future. However, the experiences of the Austrian textile industry argue against this; see Marin (1986c).

12. For a comprehensive description of structural change in the Austrian textile industry see Marin (1986d).

13. For a detailed description of the research process in the Austrian textile industry see Marin (1986d).

14. On the various econometric estimates and tests see Marin (1986c) (1986d).

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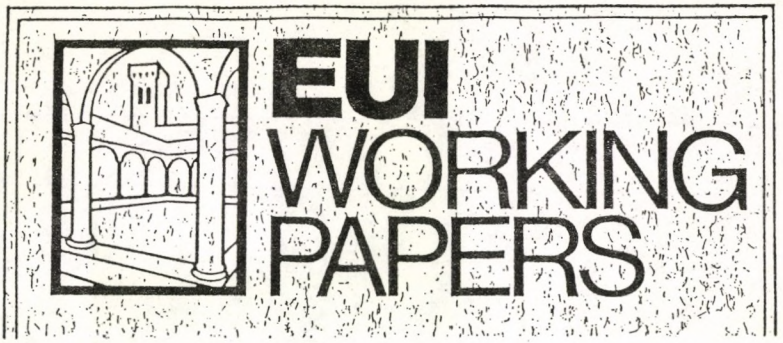

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